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Forecasting Referendums: A Structural Model Predicting Adoption and Support in Irish Plebiscites 1968–2024

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Abstract

Election prediction flourishes among pollsters, the media, academics, and political anoraks, with four significant prognostic paradigms: opinion polls, markets, structural models, and hybrid approaches. Structural models, inspired by political science theory and based on so-called "fundamental" indicators, have a long pedigree in predicting government performance in elections cross-nationally. Despite their prevalence and prowess in forecasting contests for government, these structural models have not been applied to predict referendums, where the prognosis game, as far as it exists, primarily relies on polls. Perhaps this is unsurprising given that plebiscites can be especially hard to forecast given that citizens often vote on complex subjects not always salient in public discourse, partisan cues are sometimes lacking, and late opinion shifts are arguably more common than in elections. In this contribution, we break new ground by fusing two strands of political science literature-election forecasting and referendums-and devise a prediction model of plebiscites based on economic, institutional, and historical variables, thereby providing the first structural forecasting model to account for referendum adoption and support levels. We apply this model ex-post to 42 national referendums in Ireland between 1968 and 2024 to test its applicability ex-ante. In Europe, Ireland stands third only to Switzerland and Italy as polities that regularly employ referendums to decide public policy issues. With reasonable lead time, ex-post estimates of our model offer solid predictions of the referendums' outcome, with out-of-sample estimates calling the outcome correctly 68%-79% of the time, a remarkable feat given that the issues up for decision are varied. Moreover, we demonstrate that our model's predictions are competitive with opinion poll estimates of these contests, illustrating that while our model is not a panacea, it provides a reasonable starting point for predicting the outcomes of referendums in Ireland and, importantly, plants a vital seed for future work on forecasting plebiscites using model approaches.



Keywords

forecasting; Ireland; referendums; structural models

1. The Research Problem

As Qvortrup (2017, p. 7) puts it "one is tempted to say that we live in the age of referendums." The use of the plebiscite as a tool to determine public policy is on the rise cross-nationally, even featuring in many representative democracies where public policy conventionally delegates this task to elected parliamentary representatives (Bjørklund, 2009; LeDuc, 2002b). Much ink has been spilled on typologizing these referendums (e.g., Carboni, 2018; Qvortrup, 2013; Silagadze & Gherghina, 2020). Research on what motivates voters in these contests flourishes, from attitudes toward and longevity of the incumbent government (e.g., Franklin, 2002; Franklin, Marsh, & McLaren, 1994; Garry et al., 2005; Qvortrup, 2016), economic conditions at the time of the vote (e.g., Bornstein & Thalmann, 2008; Elkink et al., 2019; Hobolt & Leblond, 2009), utilitarian economic benefits (e.g., Gabel, 1998; Hobolt & de Vries, 2016; Nadeau et al., 1999), voter approaches to the policy issue people are voting on (Blondel et al., 1998; Svensson, 2002), supposed connected perspectives on issues like globalization and migration (Clarke et al., 2017), knowledge among voters of the plebiscite issue (e.g., Elkink & Sinnott, 2015; Hobolt, 2005), where political elites stand (e.g., Darcy & Laver, 1990; Quinlan, 2012; Silagadze & Gherghina, 2018) to the campaign dynamics that take root (de Vreese, 2004; Pammett & LeDuc, 2001; Suiter & Reidy, 2015).

Our article on plebiscites takes a different and novel direction by investigating whether referendum outcomes can be forecast before they occur, fusing literature on referendums and election forecasting. An extended academic literature exists on election prediction (for overviews, see M. S. Lewis-Beck, 2005; M. S. Lewis-Beck & Tien, 2016), and four broad election forecasting paradigms can be identified. The first is market investor sentiment in the form of stock buying or betting on outcomes with turf accountantsknown as market approaches. Within the market-based approach, there are two subfields. Stock-based market forecasting operates like financial markets where participants buy and sell shares in an electoral outcome, with the share price determined by the market's consensus on the probability of that electoral outcome coming to pass. The lowa Electronic Market, devised by academics in 1988 to study trading markets, is the most renowned election forecasting market (for an overview, see Gomme, 2003; and more recently, Berg et al., 2023; Gruca & Rietz, in press). Predictions with a turf accountant operate differently as they are conventionally associated with entertainment, while betting is more often associated with sporting events. Participants interact with a bookmaker, who sets odds informed by public sentiment and expert judgments of the bookmaker. Odds offered by the bookmaker on the electoral outcome conventionally balance bookmaker risk and sentiment about the outcome and may not always reflect the most likely outcome. Moreover, participants' influence on the odds can be mixed and usually only occurs if the bets significantly alter the bookmaker's risk exposure. Some literature explores this in Britain and Ireland, where political betting is plentiful (e.g., Gallagher, 2008; Rosenbaum, 1999). The second broad approach to forecasting is opinion polls, which are the most renowned. It has three subbranches. The first is likely the most well-known method. It involves asking a supposedly representative sample of voters how they intend to vote, which serves as the prediction (e.g., Fisher et al., 2011; Traugott, 2014). The second is an aggregation of the vote intentions from various polls, with the averages then used to predict the election (FiveThirtyEight, n.d.; Pasek, 2015). The third subbranch is inspired by the wisdom of the crowds, where



opinion poll respondents are not asked how they intend to behave but who they think will win. These citizen forecasting forays have been shown to have predictive capacity (e.g., M. S. Lewis-Beck & Skalaban, 1989; Murr, 2016). The third forecasting paradigm bases itself on political science theory and is applied primarily by academics. Sometimes called the structural approach, it relies on so-called political fundamentals. Here, political, historical, and economic indicators are fused into a regression equation and then used to forecast the outcome. There is a strong pedigree of literature that shows that these forays have power, especially in predicting the fate of incumbent governments in elections cross-nationally (e.g., Abramowitz, 2020; Bellucci, 2010; Dassonneville et al., 2017; M. S. Lewis-Beck & Tien, 2004, 2012; Nadeau & Lewis-Beck, 2020; Quinlan & Lewis-Beck, 2021). The final paradigm fuses elements of the three described approaches and is known as a hybrid model (see M. S. Lewis-Beck & Dassonneville, 2015a, 2015b).

Our contribution is in the vein of the political science modeling tradition as we posit that, known in advance, structural factors can help us predict referendums. We focus on forecasting referendums in Ireland, an ideal test case as besides Switzerland and Italy, Ireland stands out as having had the most national referendums of any advanced democracy, mainly because any change to the Irish Constitution, *Bunreacht na hÉireann*, requires a plebiscite of citizens. Ireland has also held more EU referendums than any other member state, as it is a political imperative, if not a constitutional necessity, to hold a referendum on matters related to EU integration (Sinnott, 2005). Moreover, Ireland shares many of the hallmarks of other advanced democracies—a multi-party parliamentary system, coalition governments the norm, and increasing electoral volatility—making it a familiar case. It also has a burgeoning literature on election forecasting (e.g., Quinlan & Lewis-Beck, 2021, 2024).

Opinion polls have been used almost exclusively to predict the outcome of referendums. However, given that the lead-in time for these estimates frequently comes very close to the referendum, the predictions are arguably too late, perhaps even bordering on the trivial (see M. S. Lewis-Beck, 2005 for a broader discussion of lead time). Moreover, the forecasting prowess of opinion polls, at least in Ireland, is questionable. Take the two most recent referendums in spring 2024, where opinion polls a week out from polling day predicted both the Family and Care referendums would be endorsed by the voters (Leahy, 2024; Thomas, 2024), but both were overwhelmingly defeated in the most significant rejections of any plebiscite proposals in Irish history. Thus, our goal is to offer an alternative means of prognostication without recourse to opinion polls and, ideally, an approach that can compete with polling forecasts in accuracy and lead time.

Beyond nourishing the gut desire to know something in advance and break new ground in the systematic study of referendums, there are other reasons for forecasting voting in referendums. For one reason, predictions can signal to political actors how to shape their campaign messages and where to allocate their resources (M. S. Lewis-Beck, 2005; Linzer, 2014). For another reason, predictions generate much media copy, which can be crucial in referendums since sometimes media coverage can be lackluster. Additionally, forecasts based on transparent methods and theory make it more challenging for political actors to mislead the public about the potential outcome. Academically, these contests offer a valuable tool for testing assumptions about voter behavior in political science. Overall, forecasting referendums can advance our understanding of political dynamics and, more generally, our sense of politics (although for a skeptical view of election forecasting in academia, see van der Eijk, 2005).

We recognize that formulating a prediction model for referendums is a challenging task. Elections often fall into the category of plebiscites on the incumbent government, where voters play the vengeful gods, rewarding or



punishing governments based on their office records (Key, 1966). Referendums, conversely, are theoretically, at least, on issues and not on actors per se (although see research highlighting the role of the incumbent government in shaping referendum outcomes—e.g., Franklin, 2002; Franklin, Marsh, & McLaren, 1994; Franklin et al., 1995; Quinlan, 2012). Moreover, voters are often confronted with unfamiliar partisan configurations in referendums. Take the 2009 Lisbon Treaty referendum in Ireland, where traditional political opponents Fianna Fáil and Fine Gael were on the same side, arguing for ratification of the Treaty. Such unfamiliar terrain can lessen the heuristic pull of partisan cues, complicating theoretical assumptions (Quinlan, 2009). Additionally, not all the issues subject to plebiscite are salient in politics, meaning voters do not necessarily have ready-made views on the topic, for example, the 1996 referendum in Ireland on the country's bail laws. This particular issue was not divisive, and there was no significant opposition from any major political players, nor was the topic a central preoccupation of voters. Little wonder that only 29.3% of eligible voters cast a ballot in the referendum.

Another complication for our task is there are two aspects to referendum forecasting: foreseeing the winner/loser of the contest and, more challenging, calling the percentage of the vote either side will obtain. The base criterion for a forecast is that a model will correctly call the winner of the referendum and that the approach will, on average, perform better than a 50:50 coin toss (i.e., a guess). For the above reasons, estimating the percentage share of the vote each side will obtain is anticipated to be more complex. Thus, we acknowledge that the point estimates for the extent of support for a proposal will likely be subject to greater error. In sum, we recognize that a structural forecast of referendums is likely to have less precision than such predictions of government or party performance due to the issue-specific nature of plebiscites, the diverse cross-cutting coalitions in support or against the proposal, the arguably more significant potential for campaign effects to take hold and thus "late swings," and the fact that voters are often confronted with voting on issues that are complex, and/or have little salience. Therefore, our goal with this article is undeniably ambitious and requires grappling with intricate and unpredictable dynamics. Yet, precisely the complexity and challenge of this endeavor make it worthwhile.

As we shall demonstrate, our forecasting model offers credible and competitive ex-post estimates about how key Irish referendums between 1968 and 2024 turn out, with out-of-sample tests showing the model calls the referendum winner between 68–79% of the time. The model's parsimony, replicability, and good lead-in time are all pluses (M. S. Lewis-Beck, 2005). We demonstrate that the model is competitive with opinion poll forecasts of the referendum outcome as far as possible, illustrating that it has some value. While not a panacea, the prediction model advanced in this contribution does have value in predicting the outcomes of referendums in Ireland. Furthermore, it plants a seed for further research.

2. Theory

Our model has its foundations in literature from election forecasting and research on referendums. From this, we devised a political history and economy-inspired model. We draw on four broad features of the Irish case to devise a forecasting model: economic conditions leading up to the referendum, support for the incumbent government, campaign dynamics, and Ireland's political history.

A political economy perspective has traditionally inspired model forecasts of elections. It has been argued that elections represent a referendum on the incumbent administration's handling of the economy and other issues. Thus, the lowa model of election forecasts was born based on the premise that prior aggregate



assessments of the economy and government popularity would go a long way to predicting how governments would perform in a forthcoming election (M. S. Lewis-Beck et al., 2008). Indeed, the Iowa model, with some local tweaks, has been plentiful in the US forecasting scene and has also proved fruitful in offering prognoses on how incumbent governments will fare in elections elsewhere (e.g., Bellucci, 2010; Dassonneville et al., 2017; M. S. Lewis-Beck, 1995; Nadeau & Lewis-Beck, 2020; Quinlan & Lewis-Beck, 2021). Economic conditions and voters' economic perceptions have been shown to correlate with referendum outcomes too (Clarke et al., 2004; Nadeau et al., 1999), especially notable in EU referendums (Aylott, 2005; Clarke et al., 2017; Jupille & Leblang, 2007; Tverdova & Anderson, 2004). Previous research has established that economic growth is among the most potent economic variables in explaining government election performance (Duch & Stevenson, 2008; M. S. Lewis-Beck & Stegmaier, 2000). Hence, our starting point is to suppose economic conditions at the time will correlate with referendum support.

The lockstep theory of referendums posits that the outcomes of the contest align with the electoral cycle and context of a polity. Central to this view is that voters in referendums are not solely motivated by the issue but can use these ballots to express satisfaction or dissatisfaction with the incumbent government. This second-order framework, inspired by work from European Parliament elections (Reif & Schmitt, 1980), suggests that attitudes to the incumbent government influence the vote. There is an ongoing debate, especially in European referendums, as to how government popularity influences referendum outcomes (Franklin, Marsh, & Wlezien, 1994; Garry et al., 2005; Quinlan, 2012; Svensson, 2002). Focusing on government support is also a central tenet in election forecasting models, with countless models exploring government popularity in the run-up to an election or from the previous contest to foretell the results of the next. Evidence exists that government support in the last general election correlates with referendum support (Altman, 2002; Silagadze & Gherghina, 2018), partly driven by partisan loyalties, enhancing our supposition. Consequently, we suppose the more support the main party of government won in the previous general election, the more potential for a heuristic cue from the government, which in Ireland usually supports the referendum proposal. Ireland's largest party in government has chiefly provided the prime minister (Taoiseach) and is the most visible actor within the government, making it the primary focus of public opinion. We know the main government party tends to gain more blame (or credit) in elections (Plescia & Kritzinger, 2017). Additionally, the largest party tends to have a more significant say in setting the course of government policy. Using the largest government party's support as a variable allows for more parsimony, avoiding unnecessary noise from coalition partners.

A plethora of literature shows that referendum campaign dynamics have a solid role in shaping the outcome of plebiscites (e.g., LeDuc, 2002a; Quinlan, 2012; Sciarini & Tresche, 2011; Silagadze & Gherghina, 2018). A prediction model may need to account for the campaign. We identify two relevant potential dynamics. The first feature concerns the type of referendum proposal. We argue that referendums that impact the way democracy operates and involve potential changes to the rules of the game stand out, as these contests impact the architecture of political institutions or the rules by which power is distributed and exercised. Plebiscites proposing significant changes to the game's rules may run into *the status quo* dynamic. Advanced democracies are known for conventionally having (and arguably promoting) institutional steadiness. Consequently, voters can be cautious about changing long-standing conventions because they fear the loss of familiarity or worry about unintended consequences. Alongside, building a consensus on these kinds of changes is challenging. Few wonder why these contests frequently engender polarization. Take the example of changing the electoral system in Britain in 2011, where the Conservatives, in government with the Liberal



Democrats, put the electoral reform issue to the public. They campaigned against a switch to the alternative vote from the first-past-the-post system, partly for fear it would electorally disadvantage them, in opposition to their Liberal coalition colleagues, with the proposal unsurprisingly going down to defeat. Moreover, game rule changes often involve technical details and complexity. This requires significant engagement from citizens to understand the proposal, which is not always forthcoming. Recall the adage: "If you don't know, vote no." In sum, we anticipate that support for referendum proposals involving fundamentally amending the structure or mechanisms of democratic decision-making or the eligibility conditions for participation within the electoral process will be less likely to be supported, ceteris paribus.

The second campaign feature of relevance is the extent of support for the proposal in the political system. In a recent comparative analysis of plebiscites, Silagadze and Gherghina (2018, p. 905) identified that "referendums proposed by a large parliamentary majority" will likely prevail, while an earlier study (Williams & Hume, 2010, p. 244) concluded that "bipartisan support has proven to be essential to referendum success. Referendums need support from all the major parties." The mechanisms driving this association are threefold. First, in these circumstances, a broad swathe of political actors in favor of the proposal signals to the electorate that the issue is less divisive, at least in regular political competition, thus potentially reducing the likelihood of a divisive campaign. Second, heuristic cues from political actors to voters are potentially more robust as the electorate faces a more united message. Further, strong parliamentary support for the proposal suggests implicitly that the proposal resonates with a broad slice of the electorate. Third, the more political actors support a proposal, the more resources are available, meaning a more robust campaign. Consequently, we assume that the more parliamentary support for a proposal, the more public support there will be. However, from a forecasting perspective, we must proceed with caution. A sine qua non in the forecasting literature is that referendums are predicted in advance to avoid charges of triviality. Predicting ex post is a contradiction in terms. But showing that results are capable of being predicted requires us to use older data. In any case, a balance needs to be struck. Conventionally, the position of actors in a referendum campaign is certainly evident by the campaign's outset, meaning a forecast incorporating this variable is possible at least four weeks in advance. Even more, bipartisanship often becomes clearer earlier, meaning an estimate may be possible earlier than the four-week expectation.

The final two features of our forecasting model are inspired by political history. Using political history as a foundation for election forecasting is a growing enterprise (e.g., M. S. Lewis-Beck & Quinlan, 2024; Quinlan & Lewis-Beck, 2024). The inspiration for this model is that events and patterns can recur—as ABBA (1974) said, "The history book on the shelf is always repeating itself." Structural patterns lock in certain types of repetitive behavior. Alternatively, game-changing events or unique occurrences can impact things, sometimes long-term or sometimes temporarily. Incorporating these aspects in a model is crucial as it acknowledges the contextual realities and real-world phenomena, but it also helps us avoid biased estimates and systemic prediction errors.

The 1998 referendum on the Good Friday Agreement in Ireland stands out from all other referendums held. It involved changing Articles 2 and 3 of the Irish Constitution to lift the Republic's long-standing claim on Northern Ireland and to acknowledge the new political beginning the Agreement would bring. The referendum stands out on many aspects. Principally, it addressed a quarter of a century of conflict arising from The Troubles in Northern Ireland. Thus, it was centrally about reconciliation and peace (McGarry & O'Leary, 2004; Mitchell, 1999). Little wonder there was no significant opposition in the Republic to the referendum. Another reason this referendum stood out was that the plebiscite's success was linked to a referendum on the Agreement in



Northern Ireland, which was held on the same day (Coakley, 2002). The vote was also a unique redefinition of Irish identity with a new political dispensation (Laffan, 1998). In sum, we classify this referendum as a unique event about a particular subject, and we incorporate this into our model.

The 1970s in Ireland could be described as a watershed decade, permeated by the profound impact of The Troubles in Northern Ireland and the beginning of economic and social modernization, predominantly driven by Ireland's entry into the EU (e.g., Garvin, 2004; Lee, 1989). The country experienced notable population growth, reversing decades of emigration, and increased urbanization. The impact of the Church, while remaining prominent, did begin to wane (Ferriter, 2005; Inglis, 1998). Unlike later decades, the political landscape in the 1970s featured strong cross-party support for referendum issues, with these topics, besides arguably entry into the EU in 1972, having substantially greater consensus than issues that permeated plebiscites in other decades. With these contextual features and the issues on the agenda, we anticipate that referendums held in the 1970s are exceptional regarding the consensus among elites about the topics on the ballot and the fact that the country was starting to embrace modernization, increasing the likelihood of openness to constitutional change. Consequently, we anticipate that referendums held in this decade will, on average, have a higher vote share in favor of the proposal.

In sum, our model to forecast the referendum outcome and the share of the Yes support takes the form of:

Referendum Outcome = $\beta_0 + \beta_1 \times \text{GDP Growth}_{t-6} + \beta_2 \times \text{Main Governing Party Support}$ + $\beta_3 \times \text{Electoral Reform Referendum} + \beta_4 \times \text{Bipartisan Support for Referendum}$ + $\beta_5 \times \text{Good Friday Agreement} + \beta_6 \times \text{Referendum 1970s} + \text{Error.}$

3. Research Strategy

We have compiled data for 42 plebiscites in Ireland between 1968 and 2024. Our data come from the Department of Environment in Ireland (the organizers of these elections). We focus on the Yes share of the vote as, historically, more plebiscites have been passed (31, ~74%) than rejected in Ireland.

We use ordinary least squares (OLS) regression, with our dependent variable being the proportion of voters voting to adopt a constitutional change. In measuring our six independent variables, we follow the forecasting principle that variables must be measured in advance (ex-ante). We codify our five independent variables as follows. Concerning the economy, the leading measure has become economic growth. We measure this using the standard quarterly GDP growth, which we measure two quarters before the referendum. These data are sourced from the World Bank. We measure support for the main governing party in the previous general election by codifying the party with the largest share of cabinet portfolios and taking the first preference vote share in the last referendum. In contrast, bipartisanship is codified as a dichotomy, coded 1 if at least one party in the parliament besides parties serving in government support the proposal, and 0 in all other cases. We classify referendum topics by dichotomizing referendums focused on significant changes to the rules of the electoral game as 1 and all other plebiscites as 0. To classify the exceptional nature of the Good Friday Agreement 1998 referendum and polls held in the 1970s, we codify these contests as applicable as 1, and all others as 0. In Appendixes A–C in the Supplementary File, we provide summary data, variable classifications, and ancillary analyses.



Before advancing to the results, we highlight three robustness checks. First, using Cook's distance, we tested whether any observations were especially influential in our analysis. Naturally, the Good Friday Agreement referendum in 1998 was discovered to be highly influential, and we have included a model (see Table C2, Appendix C, Supplementary File) without this observation. Our results broadly remain in line with what is reported in the results. We also identified four other observations exceeding the threshold values and devised a model excluding these operations (see Table C3, Appendix C, Supplementary File). Their removal did not significantly impact the results reported, although there is an improvement in the root mean square error (RMSE) to 11.0. Second, we tested whether inflation captured by the Consumer Price Index at T-6 months from the referendum correlates with referendum outcomes and improves the model. As Table C4 (Appendix C, Supplementary File) shows, this substitution does not improve the model performance. Third, some might consider that EU referendums are different given their internationalized dimension and that Ireland has been among the most supportive of EU membership and integration for much of the country's membership of the EU. To test this, we included a dichotomous variable in our models capturing EU referendums (see Table C5, Appendix C, Supplementary File). We discovered that EU referendums do not stand out in any meaningful way.

4. Model

4.1. Within-Sample Analysis

In Table 1, our slope estimates broadly align with theoretical expectations. GDP growth two quarters before the referendum positively relates to the Yes vote in referendums. For every one percentage point of economic growth, the Yes side in the referendum can expect to win 2.9 points more ceteris paribus. The referendum issue at hand also matters, with referendums on electoral reform, as anticipated, on average, resulting in a lower Yes vote share, speaking to the challenge of changing electoral or institutional parameters. Bipartisan support for a referendum proposal increases the Yes vote share on average, although the variable only reaches statistical significance at p < 0.1. The stronger the performance of the main governing party in the previous general election, the higher the Yes vote share, although this variable only attains statistically significant at the 0.1 level. As expected, referendums in the 1970s and the Good Friday Agreement plebiscite ceteris paribus both see a higher Yes vote share.

M. S. Lewis-Beck (2005) outlined four criteria for classifying a model's prediction capacity: parsimony, replication, lead time, and accuracy. In the first two, our model cuts muster—it has six variables and is easily replicable, all based on publicly available data that are readily calculable. As we previously alluded to, the lead time for a referendum forecast may be less than a conventional general election due to campaign dynamics not becoming apparent until closer to the contest. Yet, our model can be estimated once partisan configurations for the campaign become clear. All other variables are known even earlier.

The Shangri-La of forecasting is accuracy. There are several means of investigating this. First, the model's fit to the data. It is reasonable—an adjusted R^2 of 0.56, meaning over half the variance is accounted for. But notably, the fit is much less than we would expect in a conventional election forecast model, highlighting the challenge of forecasting referendums we alluded to earlier. Second, we examine the within-sample mean absolute error (MAE), which treats all errors equally and provides a yardstick of the conventional prognostication error. It comes in at 8.9. Third, the RMSE is a stricter test of average error as it gives more weight to more significant errors from the model. Unsurprisingly, it is greater than the within-sample MAE



Table 1. Political-economy model: OLS regression models exploring the percentage share of the Yes vote in Irish referendums 1968–2024.

	Unstandardized coefficients β	S/e
GDP growth ^{t-6 months}	2.896**	(1.051)
Referendum issue: Electoral reform	-18.961**	(5.924)
Bi-partisan support for a referendum	9.584+	(4.890)
Main governing party performance in prev. general election	0.633+	(0.330)
Referendum issue: Good Friday Agreement	27.002*	(12.757)
Decade: 1970s	21.259**	(7.878)
Constant	28.005 ⁺	(13.925)
Model summary		
N referendums	42	
Adjusted R ²	0.56	
Durbin-Watson statistic	2.37	
RMSE	12.2	
Within-sample diagnostics		
x MAE	8.9	
Median $\overline{\mathbf{x}}$ MAE	8.1	
Largest absolute prediction error (% share Yes vote)	22.9	
Correctly calls referendum outcome	86%	
Out-of-sample diagnostics: Jackknife		
x MAE	9.4	
Largest $\overline{\mathbf{x}}$ MAE	10.0	
Largest absolute prediction error (% share Yes vote)	24.2	
Correctly calls referendum outcome	79%	
Out-of-sample diagnostics: One step ahead		
x MAE	11.1	
Largest x MAE	14.3	
Largest absolute prediction error (% share Yes vote)	57.6	
Correctly calls referendum outcome	68%	

Notes: $^{+} = p < 0.1$; $^{*} = p < 0.05$; $^{**} = p < 0.01$; $^{***} = p < 0.001$; MAE = mean absolute error; RMSE is also called standard error of estimate (SEE); the Durbin-Watson statistic is a measure of autocorrelation in the time-series data.

at 12.1, again much higher than conventional election forecasting models. On average, we can expect the point forecast for the Yes share of the vote to be within 12 points. Fourthly, we decipher how often the model correctly predicts adoption/rejection—the ultimate test of the model's accuracy. Encouragingly, the within-sample analysis predicts the winner of the referendum on 86% of occasions. Figure 1 plots the estimates for each referendum generated from the model and compares them to the official results. The visual confirms there is no noteworthy deviation for the required assumption of linearity and that for



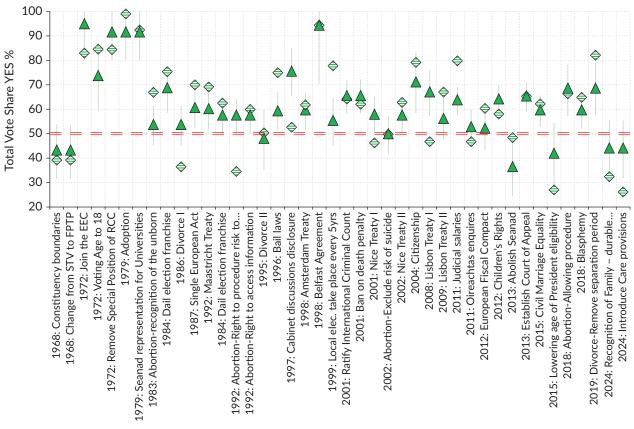


Figure 1. Within-sample forecasts (triangles) of the percentage share of the Yes vote yielded from the model compared with official results (diamonds) for 42 Irish referendums 1968–2024. Notes: Within-sample estimates based on the model in Table 1; vertical bars from triangles are 95% confidence intervals associated with estimates; STV = Single transferable vote; FPTP = First past the post; EEC = European Economic Community.

some contests, the within-sample forecasts are close (2013 Court of Appeal contest spot on; 2002 and 2018 abortion referendums within 2pts of the result). However, there are some notable misses, too (one of the 1992 abortion referendums and the Lisbon Treaty 2008, both of which were incorrectly called by the model).

4.2. Out-of-Sample Analysis

While within-sample estimates give us a solid idea of the accuracy of a model and the extent to which it fits the data, they are known to be optimistic, for they rely on information available retrospectively. Out-of-sample estimates are firmer tests as they involve prognosticating and excluding data about the contest in question, either temporally or spatially, better mimicking the situation forecasters encounter. Under these conditions, we can expect more significant residuals. The RMSE mentioned above offers a valuable baseline measure of forecasting beyond the sample, as it has more demanding assumptions for inference (C. C. Lewis-Beck & Lewis-Beck, 2015). Here, as expected, we see it is greater than the within-sample MAE (8.9) at 12.5. This result clarifies that forecasting referendums can be challenging, especially in close contests.



The most common out-of-sample diagnostic in election forecasting is the jackknife method, especially helpful for small-N datasets, as often is the case with election prognosis, due to its simplicity and the fact it maximizes the use of available data for model "training." This approach involves leaving out one observation from the dataset and then making a prediction of the excluded case based on the remaining data. This process is repeated iteratively to compute an aggregate MAE estimate based on the projections of all the excluded instances, indicating how well the model generalizes to unseen data. Under this procedure, promisingly, the model's MAE is 9.4, only marginally above the within-sample estimate, while the largest MAE is slightly higher at 10. Soberingly, the most significant vote share error is 24.2 points, illustrating the error band can be high. But more comfortingly, the referendum outcome is correctly called 79% of the time based on the point estimates.

The one-step-ahead method is arguably the strictest out-of-sample test as it evaluates predictive accuracy by forecasting results iteratively chronologically, based solely on data that would have been available to the forecaster for an ex-ante prediction. For example, the prediction of the 2024 referendums would be based on data from all referendums *before* these plebiscites. We apply this procedure to referendums from 1992 onwards (i.e., N = 31; ~74% of data). As we might expect, the MAE for the model is higher than the within-sample estimate, coming in at 11.1 (compared to 8.9). The largest MAE is 14.3, above the RMSE. Disappointingly, the most significant absolute error is 57 points, which is a huge miss. But more promisingly, this model specification accurately calls the result of the referendum in 68% of instances, admittedly lower than the within-sample and jackknife estimates, but reasonable given the complexity and complexion of the issues we are trying to model, and 18 points better than a random guesstimate, indicating the model has some predictive capacity beyond chance.

4.3. Comparison of Model With Opinion Polls

How does this model compare to another standard method of forecasting—opinion polls, where vote intention in the referendum is aggregated and used to forecast the result? Before diving into that, it is worth noting that while opinion polls close to an election (i.e., one month or two out from polling day) in Ireland have been shown to correlate with the election result positively (Quinlan & Lewis-Beck, 2021), polls are not designed to be predictive tools but are rather snapshots of opinion at a particular time point. It is little wonder that there is also evidence that poll forecasts of elections with longer lead times (i.e., more than three months) are often much less solid (Quinlan & Lewis-Beck, 2021). Moreover, a serious drawback of poll forecasts is their lack of theoretical underpinning. And when it comes to referendums, there is some academic evidence that opinion polls tapping referendum vote intent are sometimes wide of the mark. In Irish plebiscites, it has been noted that the polls sometimes perform poorly, with the 2024 referendums cases in point. It's not hard to see why polling plebiscites is perhaps even more challenging than polling vote intent for parties or candidates, given that with referendums, voters are often asked to decide upon issues they are unfamiliar with or of great complexity, meaning many voters make up their minds very close to polling day. Consequently, polls conducted with sufficient lead-in time could be more likely to be wide of the mark. That said, as polls are the only comparative predictive method, we must establish if our model is competitive with this.

We collected data available on opinion poll predictions of the Yes vote one to two months before the election and contrasted it with our prediction model for the same 21 plebiscites where polling data were available. We conclude that opinion poll estimates of the Yes vote share in Irish referendums, whether excluding Don't



Know or including them in the forecast, do not perform better in predicting the referendum outcome or the Yes vote share than our complete model. Take the opinion models first, where we specify the dependent variable in two ways—Yes vote share including Don't Know, and Yes vote share excluding Don't Know (see Table C6, Appendix C, Supplementary File). The MAE for both the opinion poll models (13.3 for the model including Don't Know; 14.2 for the model excluding Don't Know) is higher than the MAE for our complete sample or direct observation comparison (see Table 1, or Table C7, Appendix C, Supplementary File). Moreover, the RMSE for our models is smaller than the RMSE for the opinion poll models. And looking at correct calls, our model calls at least as many referendums correctly as the opinion polls. It is more evidence that our model has predictive capacity, at least to the same extent as other standard prediction methods.

5. Conclusion

"If life were predictable, it would cease to be life and be without flavor." The words of Elanor Roosevelt could capture the predictability of plebiscites, which are known to sometimes buck the trend and produce unexpected results, often with late swings to one side or the other. Perhaps there is no surprise that forecasting referendums is something political science has largely ignored thus far, instead preferring to offer ex-post analysis of these contests. Here, we break new ground by exploring whether referendums are potentially forecastable in advance, using Ireland as our laboratory's ideal test case, given its vast experience of plebiscites. We show there is some cause for optimism. Applying a political history and economy-inspired model, informed by theory from both the election forecasting and the referendum literature, we demonstrate that our parsimonious model has some promise in Ireland. When applied ex-ante using out-of-sample tests, the model correctly calls the referendum outcome in 42 contests between 68-79% of the time. At face, skeptics might charge that such precision is lackluster and is well short of the accuracy of traditional model forecasts of general elections. We recognize this shortcoming, but we should not lose sight of the Herculean task of formulating a model to forecast referendums, let alone a model that tries to do so on plebiscites covering various topics. Furthermore, readers should not lose sight of the fact that the model's accuracy level is reasonable and competitive, considering it aligns with and sometimes exceeds the reliability of opinion polls, which presently serve as the dominant approach for forecasting referendum outcomes in Ireland. As such, we contend that this model advances the literature on forecasting, albeit modestly, and offers a credible alternative to opinion poll methods in Ireland.

Evidently, we accept that the model does not capture the whole story, and there are some notable misses. Hence, there is scope for improvement, which future research endeavors should consider, including whether the intuition applied here can be used in other jurisdictions. But we assert that as referendums are issue votes held on various topics and arguably do not have the same glue as national elections, specifying a model that gets us this far is no mean feat. The model gives us a starting picture of the potential outcome, which has value, especially for actors going into a referendum campaign, as our model can be specified once we know the contest date and the partisan configuration of actors in favor or against the contest.

Hitherto, referendum research has generated more heat than light in scholarly writings about elections (and other institutions). Given the increasing importance of referendums and how this institution of semi-direct democracy is being used in cases ranging from the Brexit vote in Britain to constitution issues in Bolivia (and other cases besides), a model that can potentially predict the outcome of contests has value. The forthcoming challenge for this model will be to apply it ex-ante to a future contest, see how it performs in "real-time," and



extend this beyond Ireland. In sum, we see this work as merely a seed for future work and encourage scholars to build on this and finesse the model.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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