Portuguese General Election
Election Forecasts and Scenario Construction

March 9 2024

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LONDON POLITICA

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Nomenclature

Political Parties

AD Aliança Democrática (Parliamentary Coalition between PSD, CDS-PP, and PPM)
PS Partido Socialista
PSD Partido Social Democrata
CH Chega
IL Iniciativa Liberal
PCP Partido Comunista Português
BE Bloco de Esquerda
PAN Pessoas-Animais-Natureza
LI Livre
PEV Partido Ecologista "Os Verdes"
PPM Partido Popular Monárquico
CDS-PP Centro Democrático e Social – Partido Popular
CDU Coligação Democrática Únitária (Parliamentary Coalition between PCP and PEV)
MFA Movimento das Forças Armadas
FP-25 Forças Armadas do 25 de Abril

Technical Terms

ACF Autocorrelation Function
ADF Augmented Dickey-Fuller Test
ARMA Autoregressive Moving Average model
ARIMA Autoregressive Integrated Moving Average model
AIC Akaike Information Criterion
BIC Bayesian Information Criterion
LOCF Last Observation Carried Forward
MAE Mean Absolute Error

PR Proportional Representation
FPTP First Past the Post

Contents

Executive Summary

This Sunday Portuguese voters go to the polls in an unexpected snap election, called in the latter months of 2023. President Marcelo Rebelo de Sousa called the legislative elections for March 10 2024 after António Costa – the former Prime Minister – tendered his resignation following a corruption probe found himself and his chief of staff involved in illicit hydrogen and lithium deals in October 2023. The probe was dubbed "Operation Influencer" and resulted in the arrest of Costa's chief of staff and the indictment of cabinet ministers, in what has been the only occurrence of such indictments in the history of the current Portuguese republic.

The scandal highlights a decline in the integrity of Portugal's young democracy, which in recent years has been overshadowed by the Socialist Party's ability to balance the country's books and improve the public debt to GDP ratio. Nevertheless, the Socialist Party has been plummeting in the polls since its majority mandate at the January 2022 legislative election, with the right gaining favour. Although, fragmentation on the right throws an additional element of uncertainty over Sunday's election. *Chega*, on the Portuguese far-right, has fetched impressive polling numbers in the run-up to the legislative election and is consequently dampening the odds that the *Aliança Democrática* (a centre-right coalition led by the Social Democratic Party) will be able to form government.

For these reasons, Portugal faces its most challenging and most important election yet: the far-right looks poised to make a comeback to mainstream politics only 50 years after the Carnation Revolution whilst the corruption-ridden Socialist Party may yet minimise the political losses of the lithium scandal. To try and make sense of the uncertainty and provide some insightful analysis, this report uses aggregated polling data to forecast the popular vote share of each of the current parliamentary parties using ARIMA time-series models. From these models, four scenarios are constructed with corresponding estimations of parliamentary composition. It must be noted, however, that the actual number of seats reported in each scenario is <u>only indicative</u>. Some findings and things to look out for on Sunday include:

- The AD is likely to win the majority of the popular vote, however *Chega*'s performance may well determine if the AD will have the capacity to form government or a right-wing coalition;
- *Chega*'s performance, especially in Southern Portugal, will be a major signal of how the Portuguese party system may change after March 10;
- The PS will almost definitely lose its current majority, although fragmentation on the right and strongholds in the south of the country may amortise losses;
- The performance of smaller parties at the polls will be important for the health of the Portuguese democracy in what is set to be a divisive election;
- Whether "Operation Influencer" will trigger a *mani pulite*-esque change in the composition of the party system in Portugal.

Section 1
Introduction and Background

This section provides a background into the mechanics of the Portuguese party system as well as a brief description of the current political situation in the country. The aim is to provide a contextual and technical understanding of the Portuguese party system and why this year's snap election is likely to be a consequential one for Portuguese politics, as well as the European political landscape.

The subsequent sections explain the time-series models used to forecast popular vote share for each of the current parliamentary parties. Results forecasts for the three largest political parties and coalitions – the PS, AD, and *Chega* – are presented within the main text of this document along with brief overviews of their electoral manifestos and head of list candidates. Finally, scenarios based on the forecasts will be proposed. Full forecasts for the remaining parties are included in **Appendix 1**.

1.1   Why the Snap Election?

On November 9 2023, the President of the Portuguese Republic called a legislative election on the back of a corruption probe implicating the incumbent Prime Minister, António Costa of the PS. The election date set was for March 10 2024, just over two years after the current legislature was elected.[1] The scandal that toppled Costa's majority occurred after corruption probes over lithium exploration schemes in the north of Portugal and a green hydrogen project in Sines implicated the Prime Minister and other cabinet members. These probes became known as "Operation Influencer" and led to the arrest of the Prime Minister's Chief of Staff, Vítor Escária, as well as the indictment of the Minister of Infrastructure and the president of the Portuguese Environment Agency.[2,3,4]

The PS quickly voted a replacement for Costa to stand in the snap election: Pedro Nuno Santos, ex-Minister of Infrastructure and Housing. Santos himself resigned from his old post following a scandal involving a EUR500,000 severance payment form the state-owned airline TAP to Alexandra Reis in February of 2022. The payment turned into a scandal as Reis was appointed Secretary of State of the Treasury in December of the same year.[5] The 2024 snap election is likely to be a close one; the PS and PSD (the PSD is in coalition with other older right-leaning parties, AD), are very close in the polls. All the while, André Ventura's *Chega* is further cementing its position as the third political power in the country. With the potential of the far-right returning to government in Portugal, *Chega*'s performance

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[1] Mesquita, Raquel M. (2023), "*Marcelo dissolve a Assembleia da República e convoca eleições antecipadas para 10 de março de 2024*", RTP. Available here.

[2] Hernández-Morales, Aitor (2023), "*Portuguese PM António Costa resigns amid corruption probe*". POLITICO. Available here.

[3] Jopson, Barney (2023), "'*Operation Influencer': Portugal's PM undone by wiretaps, lavish dinners and pile of cash*". Financial Times. Available here.

[4] Piçarra, Fernando (2023), "*Quem é Vítor Escária, o chefe de gabinete do primeiro-ministro detido pelas autoridades?*". SIC Notícias. Available here.

[5] Céu, Beatriz and Guimarães, António (2023), "*Tudo o que se sabe (e o que falta saber) sobre a polémica indemnização da TAP a Alexandra Reis*". CNN Portugal. Available here.

this year is likely to cause shockwaves within the Portuguese party system, and potentially, throughout Europe as well.

Despite the PS' success in drastically reducing public debt as a share of GDP in the aftermath of the Eurozone crisis[6], the party is in a precarious position in the polls due to repetitive corruption crises within the party as well as poor performance across key policy areas and public services. Especially of concern is the state of the country's national health system (NHS) and the present state of the domestic housing market, which has been exposed to foreign investment and competition after the introduction of the golden visa programme.[7] Since 2017, median rent prices per sqm have risen twice as fast as wages, whilst only three per-cent of current housing stock was added between 2010 and 2021.[8,9]

At present, Portugal's NHS is one of the least operational in Europe in terms of accessibility and cost to patients. Since 2015 approximately one third of healthcare expenditure and financing has come from out-of-pocket payments which is significantly higher than the rest of the European Union, including Member States with National Health Insurance (NHI) systems.[10] Though, in the pandemic years such payments and charges have been dropped. Nevertheless, Portugal's outright per capita health expenditure remains lower than the EU average and income inequality in accessing healthcare is also very high compared to other EU Member States.[11] This has resulted in a rapid increase in Portuguese citizens paying for private insurance, in addition to their income tax and social security contributions.[12]

1.2   The Electoral System

This section explains the nature of the Portuguese legislature. The first sub-section explains how MPs are elected, and the second sub-section explains the d'Hondt method used to allocate seats within the legislature.

Composition of the Legislature

Portugal has a unicameral legislature, comprised of the *Assembleia da República* (Assembly of the Republic). The Assembly is composed of 230 MPs, which are directly elected through a multi-member list proportional representation system. The country is divided into 22 electoral circuits as shown overleaf in **Map 1**[13]:

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[6] Gonçalves, Sérgio (2024), *"Portugal's finance minister sees further drop in public debt in 2024". Reuters.* Available here.

[7] Almeida, Henrique (2023), "Runaway Property Costs Push Portugal to End Golden Era of Visas". Bloomberg. Available here.

[8] Instituto da Habitação e da Reabilitação Urbana (2023), *"Relatório Sobre o Arrendamento Haitacional em Portugal"*. IHRU. Available here.

[9] Ribeiro, Felipe (2023), "*Apenas 3,1% das casas foram construídas entre 2010 e 2021*". (re)portugal. Available here.

[10] OECD.Stat (2024), *"Health expenditure and financing"*. OECD. Available here.

[11] European Commission (2023), "*State of Health in the EU: Portugal Country Health Profile 2023"*. OECD & European Observatory on Health Systems and Policies. Available here.

[12] Guimarães, António (2022)*, "Número de portugueses com seguro de saúde disparou em 10 anos. Porquê?"*. CNN Portugal. Available here.

[13] *Diário da República, 1ª série* (2024) "*COMISSÃO NACIONAL DE ELEIÇÕES: Mapa Oficial n.º 1-A/2024"*. Available here.

Map 1: Electoral Districts, including MPs elected.

MPs elected by overseas vote in Europe: 2, MPs elected by overseas vote outside of Europe: 2. Map not to scale.
Map: Ruy Scalamandré • Created with Datawrapper
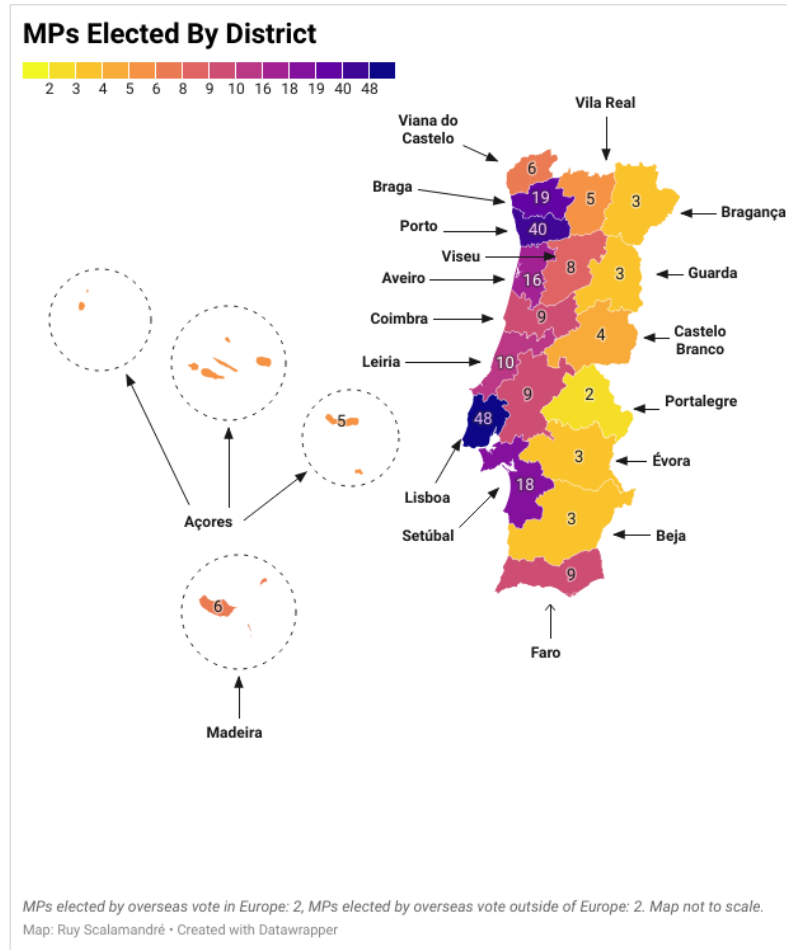
Electoral Rules

MPs are elected to the Assembly through a list proportional representation system, using the d'Hondt divisor to allocate seats. This is known as a 'divisor' system as the d'Hondt system effectively "divides votes won by each party ... by a series of numbers (divisors) to obtain quotients".[14] Quotients are calculated using the following expression:

$$Q_i = \frac{v_i}{\theta_i + 1} \tag{1}$$

where Q_i is the quotient for a given party, v_i are the votes held by a given party, and θ_i are the seats already held by a given party. Thus, at the first iteration, the quotient is equal to the votes obtained, but as seats are won quotients decrease significantly meaning that smaller parties have some degree of competitiveness in electoral circuits with more mandates available. **Equation (1)** is effectively a function for a reciprocal equation where the value of Q_i is asymptotic meaning that as $\theta_i + 1$ increases, Q_i decreases to an infinitesimally small value but never actually reaches zero, as shown in **Figure 1**:

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[14] Clark, Golder & Golder (2018), "*Principles of Comparative Politics*" (Thousand Oaks: CQ Press), pp.553-554.

Figure 1: Curves of d'Hondt Quotients; 50 votes, 35 votes, 25 votes.
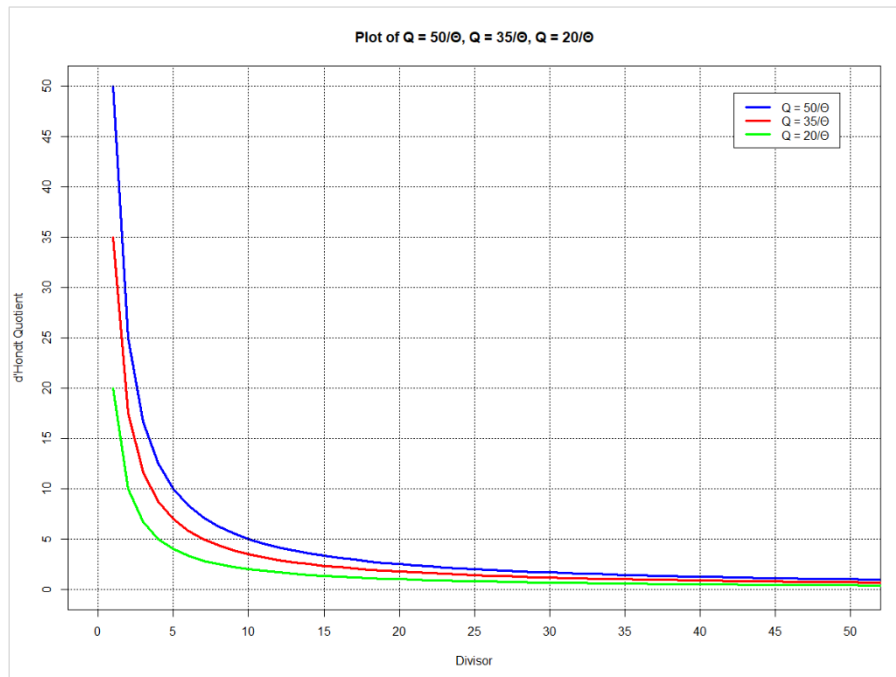
This means that parties with many votes get most seats, but in the case of parity, the d'Hondt system prioritises the party with least divisions. In other words, if on its fifth divisor a party has a quotient of 5000 but there is another party with the same quotient but less rounds of division, the latter party wins the seat. A simplified example of how the d'Hondt system is used in practice can be found in **Appendix 2.**

1.3   Major Parties and the Party System

This section consists of a brief overview of the historic composition of the Portuguese legislature, with a particular focus on the effective parties in the legislature and the proportionality of the d'Hondt system in the context of Portuguese politics. The first sub-section explains the historical context of the current Second Republic of Portugal, including the major parties with a historic presence in The Assembly of the Republic. The focus then turns to an empirical overview of the historic number of effective legislative parties and the Gallagher Index since the start of the current republic in 1976.

The Second Republic and the Consolidation of Portuguese Democracy

The first two attempts of introducing parliamentary democracy to Portugal were in September 1822 and again in October 1910. On the first occasion this failed, although the 1910 Republican Revolution formally brought monarchism to an end in Portugal as the country became only the third parliamentary democracy in Europe at the time. However, the concentration of political power in Portugal and a decreasingly popular colonial foreign policy during this period were causes of great political instability and political violence. In just under 16 years of existence the First Republic had 45 different

governments, eight different presidents, and had held a general election every two years on average.[15]

On May 28 1926, the troubled Portuguese Republic had fallen to a *coup d'état* and the *Ditadura Nacional* (National Dictatorship) was established. The *Ditadura* spanned from 1926 and formally came to an end in 1933. During this period, António de Oliveira Salazar was appointed Minister of Finance and quickly implanted himself as a major political figure.[16] By 1932 he became Prime Minister – a post he held until his death in 1968. Shortly after ascending to that position, with the support with Field Marshall António Óscar de Fragoso Carmona, Salazar established the *Estado Novo* and became *de facto* dictator of Portugal. The new regime ruled until the April 25 1974 Carnation Revolution, though Salazar had already died by then.

Two years after the Carnation Revolution the Constituent Assembly codified the current Constitution of Portugal, and thus the "Second" Republic was born on April 25 1976. The Carnation Revolution, led primarily by the MFA, is usually known for its pacifist nature as only five people were reported to have died[17]. In the two years that followed Portugal saw significant political tensions and social change in a relatively short timeframe. As Raquel Varela and Joana Alcântara write:

> *"Overall, the country's ossified political and economic structure would lead to the most important social rupture in postwar European history: the MFA coup unleashed a social explosion so deep and lasting that until today historians have not been able to completely account for the thousands of diverse mobilizations that emerged across the country in the first weeks of the April-May 1974 upheaval"[18]*

The Carnation Revolution and the eventual codification of the constitution were the result of a delicate political balancing act. The MFA, led by staunch extreme-left activist Otelo Saraiva de Carvalho, found itself torn between conflicts within the left as well as with the right.[19] At the time, many of the other important post-revolution political figures were ex-generals or nevertheless soldiers who had served for the military during the Colonial Wars. Some of these figures – namely António de Spínola, Vasco Gonçalves, and Francisco da Costa Gomes – were ideologically distant from de Carvalho and the MFA's far-left sect, whose fundamental goal was "… for the workers to seize power and construct a socialist society" in Portugal.[20]

Up until the end of 1975, it seemed as if the goals of the far-left in Portugal were set to be realised: the left had been able to overcome political opposition, most notably de Spínola's "silent majority" of manifestations[21,22], and by early 1975 collectivist agrarian reforms and the nationalisation of the

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[15] Wheeler, Douglas L. (1978) *"A Primeira República Portuguesa e a História." Análise Social* 14, no. 56(1978): 865–72. http://www.jstor.org/stable/41010158.

[16] *Viganò, O.* (2021). *"Portugal após o golpe de 1926: a sombra do Padroado e as iniciativas da ditadura militar." Lusitania Sacra,* (39), 87-110. https://doi.org/10.34632/lusitaniasacra.2019.9653

[17] *SIC Notícias* (2019) *"As cinco pessoas que morreram no 25 de Abril"*. Available here.

[18] *Varela, Raquel, and Joana Alcântara. "Social Conflicts in the Portuguese Revolution, 1974–1975." Labour / Le Travail* 74 (2014): 151–77. http://www.jstor.org/stable/24244184.

[19] Kaplan, J. & Zeitlin, J. *"The Real Threat in Portugal"*. The Harvard Crimson. Available here.

[20] Silva, Raquel da, and Ana Sofia Ferreira (2020). *"From the Armed Struggle against the Dictatorship to the Socialist Revolution: The Narrative Restraints to Lethal Violence among Radical Left Organisations in Portugal."* Perspectives on Terrorism 14, no. 6 (2020): 139–51. https://www.jstor.org/stable/26964731.

[21] RTP (2023). *"25 de Abril. Os anos da Revolução dos Cravos"*. Available here.

[22] Carvalho, Miguel & Silva, João. *"No tempo em que os militares faziam a reforma agrária". Público.* Available here.

banking sector were codified by the Constituent Assembly.[23] Nevertheless, by 1975 the political bridge-building which allowed for the Carnation Revolution was on the brink of collapse and Portugal ran a very real risk of falling back into a dictatorship as tensions between the far-left and moderates (socialists and conservatives alike) intensified.

These tensions reached a boiling point in 1975 following an attack on a PCP work centre in Rio Maior, a small town in the Santarém District. The attack was among many instances of political violence that year and marked the boiling point of the "Hot Summer" of 1975, culminating in a *coup d'état on* November 25 1975 from the moderate and right-leaning sects of the MFA. The coup formally brought the revolutionary period to its end. Thereafter, Portugal began developing its modern democratic institutions and the far-left was slowly relegated to the margins of parliamentary politics and to terrorist groups like the FP-25.[24,25]

In contemporary Portuguese politics, the PS and the PSD remain the largest political powers. The two have governed Portugal for the vast majority of the post-revolutionary period, either in coalition with smaller parties or through outright majorities. The PCP on the other hand has seen a stagnant drop in popularity, often having to form parliamentary coalitions with smaller left-wing parties to gain substantive parliamentary representation. Since the early 2000s, the BE has largely overtaken the PCP has the second left-wing party. The lasting power of the PS and PSD can be attributed to their fundamental roles in the Carnation Revolution but also the November 1975 coup, which helped to consolidate Portuguese democracy. In combination with a strict application of the d'Hondt method, these two parties enjoy a cultural and systemic permanence in Portuguese politics.[26] However, in recent years, Portugal has seen a new wave of political parties across the political spectrum which have in many ways rejuvenated the political landscape. The most notable recent additions to the Assembly include:

- **LI:** a social democratic party on the left with a strong feminist, pro-European, and ecological ideological base;
- **PAN**: a centre-left party with an ecological and pro-animal rights ideological base;
- **IL** a right-wing party with progressive social politics with regards to reproductive rights and recreational uses of cannabis, but is at its core a classic liberal/soft-libertarian movement;
- **CH** a conservative, far-right party which emerged in 2019 following a split with the PSD. In the last legislative election, *Chega* emerged as the third-largest political party and has cemented its position since the lithium scandal in October of last year.

The emergence of these new parties is indicative of a new stage of maturity of Portugal's democracy. Nonetheless a tense geopolitical environment globally, chronically stagnant economy, and a substantial democratic backsliding across the Western world indicates that this year's Portuguese legislative election is set to be a litmus set for the apparent maturity of Portugal's democracy and party system.

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[23] Silva, Raquel da, and Ana Sofia Ferreira (2020).

[24] Cerezales, Diego Palacios, and Rui Cabral. *"Um Caso de Violência Política: O «Verão Quente» de 1975." Análise Social* 37, no. 165 (2003): 1127–57. http://www.jstor.org/stable/41011753.

[25] Silva, Raquel da, and Ana Sofia Ferreira (2020).

[26] Colomer, Josep M. (2008), *"Spain and Portugal: Rule by Party Leadership"* in Colomer, Josep M., ed. Comparative European Politics. (London: Taylor & Francis Group).

The Party System: Effective Legislative Parties and the Gallagher Index

As abovementioned, the PS and PSD are the two major political parties in Portugal. Their cultural and historical importance across major urban centres and rural areas alike as well as the importance of key electoral districts such as Lisbon, Porto, and Braga have led to a stable party system in contemporary politics. The party system, as shown in **Figure 2** and **Figure 3** can be characterised by the following features: (i) a hegemony of the PS and PSD, and (ii) a high level of votes-to-seats proportionality, evidenced by a low Gallagher Index. Although the first of these features fluctuates naturally with political tensions, the latter is slowly becoming less and less true as new parties gain popularity across different regions of the country. Using previous election data[27], this sub-section provides an overview of effective legislative parties and the Gallagher Index over time in Portugal. This is done using the following expressions, with results being plotted overleaf in subsequent pages:[28]

Effective Legislative Parties:

$$N = \frac{1}{\sum (S_i{}^2)} \tag{2}$$

where *N* is the number of effective legislative parties, and S_i refers to the share of seats held by a given party.[29]

Gallagher Index:

$$Gh = \left(\frac{\sum [S_i - V_i]^2}{2} \right)^{0.5} \tag{3}$$

where *Gh* is the output of the equation, ranging from 0 to 100.[30] A value close to 0 indicates a more proportional system whereas high values are indicative of disproportionate electoral systems.[31] S_i refers to the share of seats held by a given party, whereas V_i corresponds to the share of votes won by a given party.

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[27] *Assembleia da República* (2022), "*Resultados eleitorais*". Available here.

[28] Taagepera, Rein (2003), "*Arend Lijphart's Dimensions of Democracies: Logical Connections and Institutional Design*". Political Studies 2003, vol. 51, pp.1-19. (Oxford: Blackwell Publishing Ltd.)

[29] Taagepera, Rein (2003).

[30] Taagepera, Rein (2003).

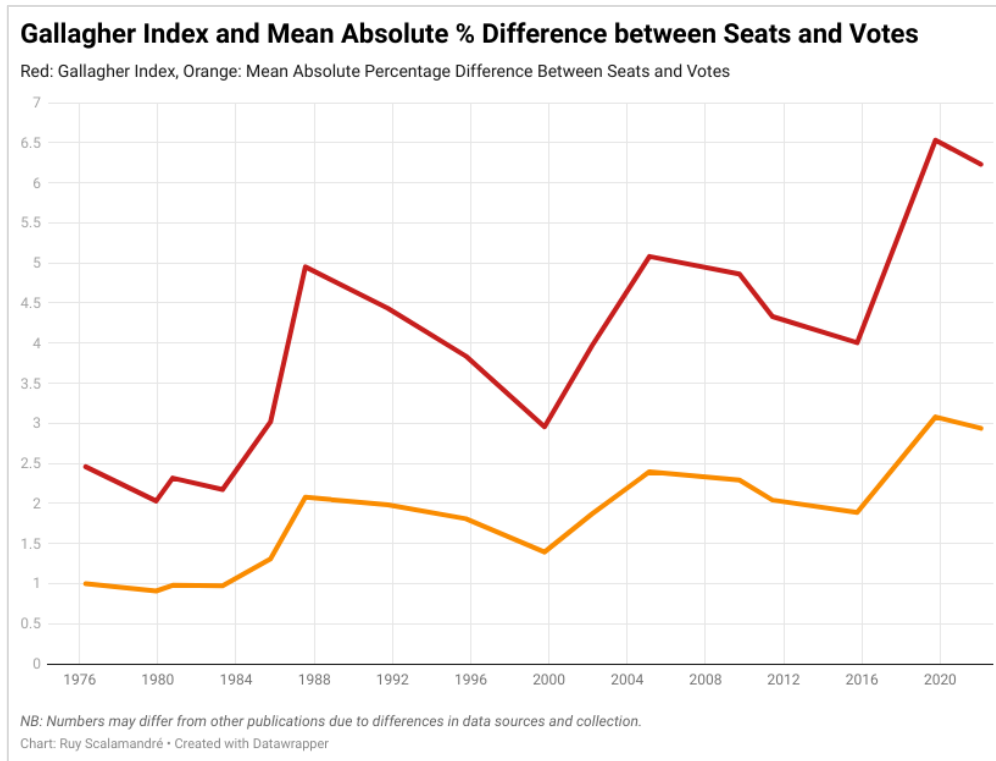[31] Gallagher, Michael (1991), "*Proportionality, Disproportionality and Electoral Systems*". *Electoral Studies* 10: pp.33-51. https://doi.org/10.1016%2F0261-3794%2891%2990004-c

Figure 2: Effective Legislative Parties and Parliamentary Parties since

Effective Legislative Parties and Total Legislative Parties in the Assembly of the Republic

Red: Total Legislative Parties, Orange: Effective Legislative Parties

Chart: Ruy Scalamandré • Created with Datawrapper
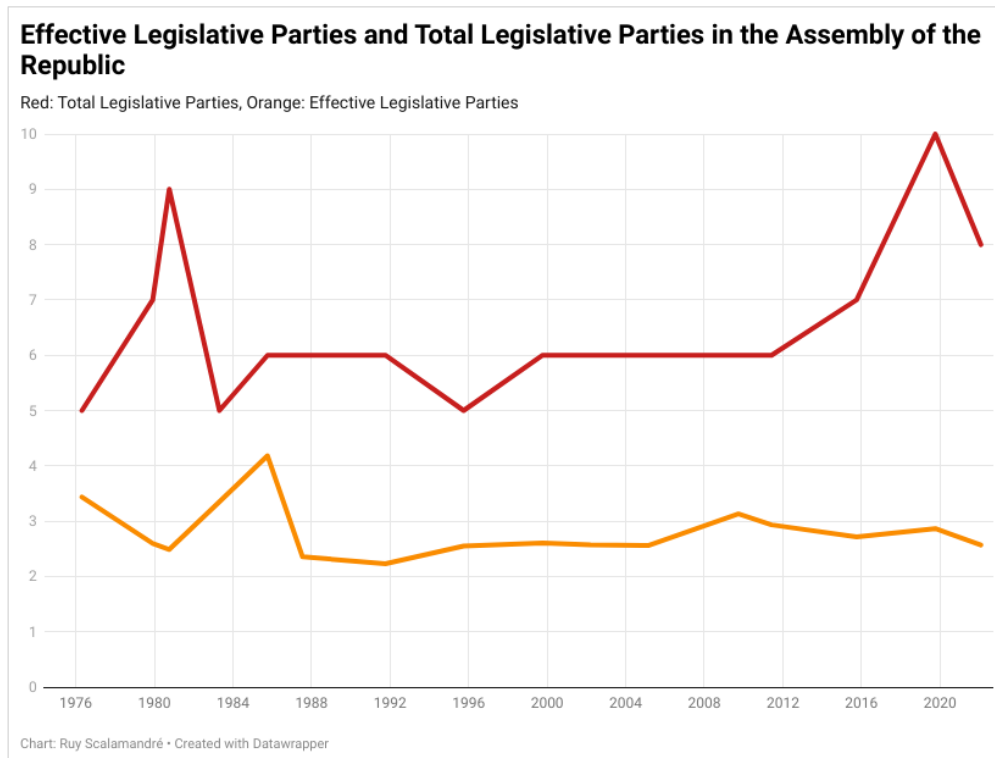
Figure 2 demonstrates that, historically, Portugal has had a small number of effective legislative parties, with the number of such parties exceeding 3 only in the first years of democracy. Since then, there has usually two effective legislative parties which reflects the hegemony that the PS and PSD have enjoyed, even as the number of parties with a parliamentary presence has increased drastically since the late 2010s. In the period since 1987 until the present day, the party system has enjoyed low fragmentation with governments being formed by the PS or PSD, and when necessary, through coalitions with allied parties on the fringes of parliamentary politics. This underscores the permanence of a low number of effective legislative parties as a vernacular feature of the Portuguese party system.

However, the lithium scandal and emergence of new political alternatives might lead to a significant shift in the Portuguese party system in the near future, similar to other South European democracies. For example, in neighbouring Spain, before the emergence of *Podemos!* and *Vox* the mean number of effective legislative parties was 2.63. Since 2015 it has risen to 4.35.[32] In Italy *Tangentopoli* and the *mani pulite* investigations had a similar effect on the party system; from 1945 to 1987 the mean number of effective legislative parties was 3.29 and since 1992 the mean grew to 4.17. Whether a similar effect will be observed remains to be seen. However, the setting of the election in the context of a corruption probe – whose magnitude is yet to be discovered – and the emergence of new parties on the left and right is akin to similar pretexts that have led to considerable political change in other South European democracies.

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[32] Gallagher, Michael & Mitchell, Paul (2023), "*Election indices*". Trinity College Dublin. Available here.

Figure 3: Gallagher Index and Mean Absolute Percentage Difference Between Seats and Votes

Gallagher Index and Mean Absolute % Difference between Seats and Votes

Red: Gallagher Index, Orange: Mean Absolute Percentage Difference Between Seats and Votes

NB: Numbers may differ from other publications due to differences in data sources and collection.
Chart: Ruy Scalamandré • Created with Datawrapper

Figure 3 demonstrates Portugal's historical Gallagher Index as moderate although in recent years it has been increasing and approaching 7.00. Although at a slower rate, the trend is similar for the absolute mean difference between seats and votes. The difference between seats and votes is calculated by taking the absolute value of the average of $(S_i - V_i)$. Since $(S_i - V_i)$ is a component of the Gallagher Index formula, the two curves follow the same trend. The average $(S_i - V_i)$ is a useful indicator of how seats can be inflated/deflated for parties with large/small share of popular vote. Whether this increase in disproportionality will continue after Sunday's election is difficult to anticipate and Portugal's almost unique electoral system in Southern Europe makes comparison difficult.

Portugal, unlike Italy and Spain, actually has very little political regionalism so competition between parties is typically reserved to electoral circuits with more seats in the Assembly (i.e. urban circuits), as the d'Hondt divisor in small-seat circuits where parties tend to perform well effectively dampen competition. So, among less voted parties small discrepancies in popular vote can lead to larger discrepancies in parliamentary seats. For example in 2022; the IL had only 29,000 more votes than the BE across the country, which is approximately 110% more votes. However, the IL won 8 seats compared to the BE's 5, which corresponds to 160% more seats. On the other hand, in Spain, the Gallagher Index has been coming down since the 1977 as regionalist voting behaviour has matured.[33] As a result regionalist parties can win seats even if they have less votes than non-regionalist parties. With respect to Italy, Portugal remains far more proportional. This is due to two reasons: (i) Italy's party system is more fragmented than Portugal's, and (ii) Italy has recently incorporated some FPTP electoral districts.

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[33] Gallagher, Michael & Mitchell, Paul (2023)

Section 2
Methodology

This report aims to forecast vote share for the 2024 Portuguese general election using an array of time-series models, an often-used method used for the purpose of election forecasting.[34] A time-series can be understood as a series of equally spaced and chronologically ordered observations of a given variable. Time-series models are used for forecasting by "…decomposing the observed data into building blocks or components which we can interpret. We aim to forecast each component and then reassemble all forecasts to forecast the series as a whole"[35] A basic example of a time-series model is the random walk model:

$$y_t = \alpha_0 + \ \bar{y}_{t-1} + \ \varepsilon_t \qquad \textbf{(4)}$$

where Yt is the forecasted value of Y at time t. This is the product of the previous observation, Yt − 1, a drift term α_0 plus some random white noise error ε_t with an assumed mean of zero. The drift term can be understood as a deterministic constant useful for including small shifts in *Y* over time. Typically, a time-series consists of isolating two deterministic components – the trend and seasonality of the time-series – as well as a stochastic random error term.[36,37]

2.1   Data: Source and Handling

The data used for this forecast is totally open-source and the dataset is downloadable from the Europe Elects database in .CSV format, and features just over 5 years of polling data in Portugal.[38] Europe Elects is a not-for-profit organisation, dedicated to providing open-source polling data for European democracies for purposes of journalism and research. With a combined reach of 250mn+ social media users, Europe Elects is a reliable and *bona fide* data source.[39] Nevertheless, there are two primary limitations to this data for scenario construction: polls are collected at the national level and there is no demographic information on respondents. This makes estimating seats for each district particularly challenging and at the judgement of the author.

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[34] Rodrigues, David (2009), "*Modelling Election Poll Data Using Time Series Analysis*". Doctor of Philosophy (PhD) thesis, University of Kent. Available here.
[35] Rodrigues, David (2009), p.39.
[36] Rodrigues, David (2009), p.39.
[37] O'Malley, James & Randerson, James (2019), "*The Brussels Twitter bubble – an illustrated guide*". POLITICO. Available here.
[38] Europe Elects (2024), "*Database*". Available here.
[39] Europe Elects (2024), "*About Us*". Available here.

Once downloaded and opened on Excel for data cleaning. The first stage is creating filters to examine individual pollsters; those with infrequent data were (less than 5 polls reported in the 5-year period) removed from the dataset. The next step was to create a pivot table to sort observations into monthly intervals, as the raw data's time stamps come in the form of sporadic 7-day fieldwork periods.

To avoid double counting observations, only the date in which the fieldwork period ended was used to assign observations to specific months. Once filtered, the polling data was averaged to obtain the mean. Overall, there are 74 observations/lags (January 2018 to February 2024) in total. August 2019 and March 2022 had no observations, these missing observations were filled using LOCF. For those months where elections were held, October 2019 and January 2022, official election results were used.[40]

Once formatted, the .CSV file was exported onto RStudio. The relevant packages were installed in order to format the data, create time-series, plot ACFs and conduct ADF tests, before forecasting polling numbers for March 2024.[41,42,43] These packages automatically calculate parameters and constants for the models used. An .R file with the full script, including ACF and ADF results, can be downloaded from the relevant webpage on the London Politica website.

2.2   ARMA and ARIMA Specifications

This sub-section introduces basic specifications for ARMA and ARIMA models, including definitions for their individual components.

Autoregression

Autoregression is a stochastic process which can be used to predict Y_t based on the past behaviour of the variable Y being predicted. Stochastic processes can be understood as a sequence of random variables $[X_t]$, where t is an element of a subset ranging from 0 to infinity.[44] Time, for instance, is a common subset which can be used to model the sequence of *continuous processes*, like a time-series with observations taken at every *s* intervals.[45]

In the context of time-series forecasting, autoregression can be used to forecast future behaviour of a sequence by including the correlation between Y_t and Y_{t-d} obseverations as a predictor variable to estimate Y_t. This can be expressed as:[46]

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[40] *Assembleia da República* (2022), "*Resultados eleitorais*". Available here.

[41] Trapletti, Adrian; Hornik, Kurt and LeBaron, Blake (2023), "*tseries: Time Series analysis and Computational Finance*". Available here.

[42] Hyndman, Rob *et al*. (2023), "*forecast: Forecasting Functions for Time Series and Linear Models*". Available here.

[43] Zeileis, Achim *et al*. (2023), "*zoo: S3 Infrastructure for Regular and Irregular Time Series (Z's Ordered Observations)*". Available here.

[44] Žitković, Gordan (2010), "*Introduction to Stochastic Processes – Lecture Notes*". University of Texas, Department of Mathematics. Available here.

[45] Statistics How To (n.d.), "*Stochastic Model/Process: Definition and Examples*". Available here.

[46] Rodrigues, David (2009), p.41.

$$y_t = a_0 + \sum_{i=1}^{p} a_i Y_{t-p} + \varepsilon_t \qquad (5)$$

where a_0 is a constant value and α_i is parameter for the lagged values, expressed by Y_{t-p}. p refers to the total number of lags considered in an autoregressive model, hereafter denoted as AR(p). Again, ε_t is a random white noise error. To know which order AR(p) to call depends on the product of the continuous sequence's ACF.[47] Modern statistics and data handling software can calculate and plot ACF as well as fitting AR(p) models rapidly. The order of AR(p) used will be indicated in the relevant forecast tables.

Moving Average

The moving average, or rolling average, of a variable is the mean of fluctuations or changes in the observed values of the variable. Moving averages can be used to break down observations over time and eliminates white noise by smoothing data, thus helping identifying trends across a desired timeframe. A basic model for using moving averages to estimate Y_t is:

$$y_t = \mu + \beta_1 \varepsilon_{t-1} + \beta_2 \varepsilon_{t-2} + \cdots + \beta_n \varepsilon_{t-n} + \varepsilon_t \qquad (6)$$

where μ is the average of the observations, β is a parameter for the error (ε) at lags $t-1$, $t-2$, …, $t-n$. A finite expression for this model can be written as[48]:

$$y_t = \sum_{i=0}^{q} \beta_n \varepsilon_{t-n} + \varepsilon_t \qquad (7)$$

where q refers to the number of lags being estimated for the parameter β, referred to as MA(q). Combining the autoregressive and moving average specifications we can obtain the ARMA model:

$$y_t = a_0 + \sum_{i=1}^{p} \alpha_n Y_{t-n} + \sum_{i=0}^{q} \beta_n \varepsilon_{t-n} + \varepsilon_t \qquad (8)$$

Non-Stationarity

A process is considered stationary when its mean and variance remain constant over time.[49] Nevertheless, this is hardly the case in reality. Especially when it comes to opinion polling; political

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[47] Nounou, Mohamed N. and Bakshi, Bhavik R. (2000), "*Chapter 5 – Multiscale Methods for Denoising and Compression*". *Data Handling in Science and Technology* 22, pp.119-150: Elsevier.

[48] Rodrigues, David (2009), p.42.

[49] Carnot, N., Koen, V., and Tissot, B. (2011), "*Economic Forecasting and Policy*". (London: Palgrave Macmillan UK) ProQuest Ebook Central. Available here (ProQuest required).

scandals, the performance of the economy, or the arrival of a political rival may cause the mean and variance of a time-series of polling data to shift over time. This is referred to as a non-stationary time-series. Non-stationarity limits the accuracy of forecasts because, as abovementioned when explaining Equation (4), a time-series has a deterministic and a stochastic component. If the mean and variance of a time-series change with time, then the deterministic component of the time-series cannot be accurately calculated. One way to deal with non-stationarity is by *differencing* observations such that:

$$y'_t = y_t - y_{t-1} \tag{9}$$

$$y''_t = y'_t - y'_{t-1} = (y_t - y_{t-1}) - (y_{t-1} - y_{t-2}) \tag{10}$$

where **Equation (9)** shows first-order differencing (typically the most common) as the difference between Y_t and Y_{t-1}, whereas **Equation (10)** shows an example of a higher-order (second) differencing as the difference between Y_t and Y_{t-1} *and* the difference between Y_{t-1} and Y_{t-2}. By differencing, then, we obtain a time-series of differences between observations which has a mean and variance that remain constant over time.

Model Selection and Robustness Checking

Before forecasting vote share for each party, each time-series was subject to tests for autocorrelation and stationarity. ACF plots were used to inspect the autocorrelation of each time-series, whereas ADF tests were used to test for stationarity. None of the time-series were stationary, indicating that at least first-order differencing was needed. To estimate model parameters, the auto.arima() command was used. Subsequently, parameter estimation and the models' residual values (the difference between the observed value and predicted value) were tested for normal distribution and autocorrelation. Models whose residual values have mean deviating substantially from zero were amended (typically adding a drift term), to align with assumptions about the error term explained in **Equation (4).** In this report all the forecasts derived from the auto.arima() command are reported along with upper and lower estimates. For more information on model fitting and robustness checks, kindly download the .R file from the webpage where this report is published.

Section 3
Results Forecasts for Major Parties

This section includes forecasts for the three major parties: AD, PS, and *Chega*. The forecasts include the forecasted values returned from the auto.arima() function, and where necessary, other models that better respect crucial assumptions of time-series forecasting, discussed above. This includes a synopsis of each party's manifesto and campaign, an overview of the polling data used to fit the ARIMA models, forecasted popular vote share, and distribution of residual values.

3.1   Aliança Democrática

The AD is a parliamentary coalition between the PSD, CDS-PP, and the PPM. Though the monarchic PPM has not enjoyed any significant popular support in recent years having last won seats in the assembly since 2015, the PPM does enjoy historic political ties with the PSD and CDS-PP. Indeed, the moniker *Aliança Democrática* has historical connotations to the late 1970s and early 1980s when the three parties ran under the same banner. In a semantic sense, the return of the *Aliança Democrática* banner is a message to older and younger voters which unites the traditional parties on the Portuguese right from the IL and *Chega*.

Luís Montenegro, the acting PSD president and leader of the opposition is the AD's prime candidate for Prime Minister. He is running for election in the Lisbon electoral circuit. Montenegro first became MP in 2002, aged just 29, and has gone on to take up various roles within the PSD parliamentary group and parliamentary committees. Luís Montenegro was elected president of the PSD in the months after the PS' landslide election win in 2022 and has since been instrumental in the party's positive performance in the polls.

Overall, the AD proposes ambitious reforms to Portugal's tax code and housing crisis. In particular, the AD manifesto proposes fiscal incentives to younger citizens and first-time buyers. This is because the AD explicitly identifies the growing Portuguese Diaspora and low birthrates rates as two components of the "demographic crisis"[50] it aims to solve with bold policies. The first is the roll out of a 'youth income tax' which incudes a flat tax of 15 per-cent on income for under-35s, with the exception of top-rate earners.[51] In addition to this, the AD also propose an exemption from property tax and stamp duty for first time buyers as well as a public guarantee for total financing for first time buyers.[52] In addition to the youth-oriented housing policy and tax reform, the AD's manifesto also places greater emphasis on improving connectivity through the various networks of the Portuguese Diaspora, which totals some 5 million all around the world.[53]

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[50] Aliança Democrática (2024), "*Mudança Segura: Programa Eleitoral 2024*". Available here.
[51] Aliança Democrática (2024), pp.122.
[52] Aliança Democrática (2024), pp.172.
[53] Ministro de Negócios Estrangeiros (n.d.), "*Comunidades Portuguesas*". República Portuguesa. Available here.

In terms of health policy, the AD is equally as ambitious though less thorough in their policy proposals. Some shorter-term goals include ensuring that maximum waiting times for consultations are respected, increasing testing for cancer (specifically breast, uterus, colorectal, lung, and prostate cancer), and to better prepare the wider health network for an aging population. In the longer-term, the AD aim to reform the wider health network to perform better across the following indicators: cancer and cardiovascular disease mortality rates, life expectancy without illness, average waiting times for consultations and surgery, life expectancy at birth, and per capita out-of-pocket payments.[54] To achieve short-term waiting time goals, the AD proposes a 'Consultation Voucher' that patients can redeem at the public or private health provider of choice when maximum waiting times are exceeded. Most of the longer-term and some short-term goals are included in an Emergency Plan for the NHS 60 days after the formation of the new government.[55] Though, it is not specified if this Emergency Plan will be proposed conditional to the election outcome.

Models and Forecasts

Figure 4: Polling data for the AD
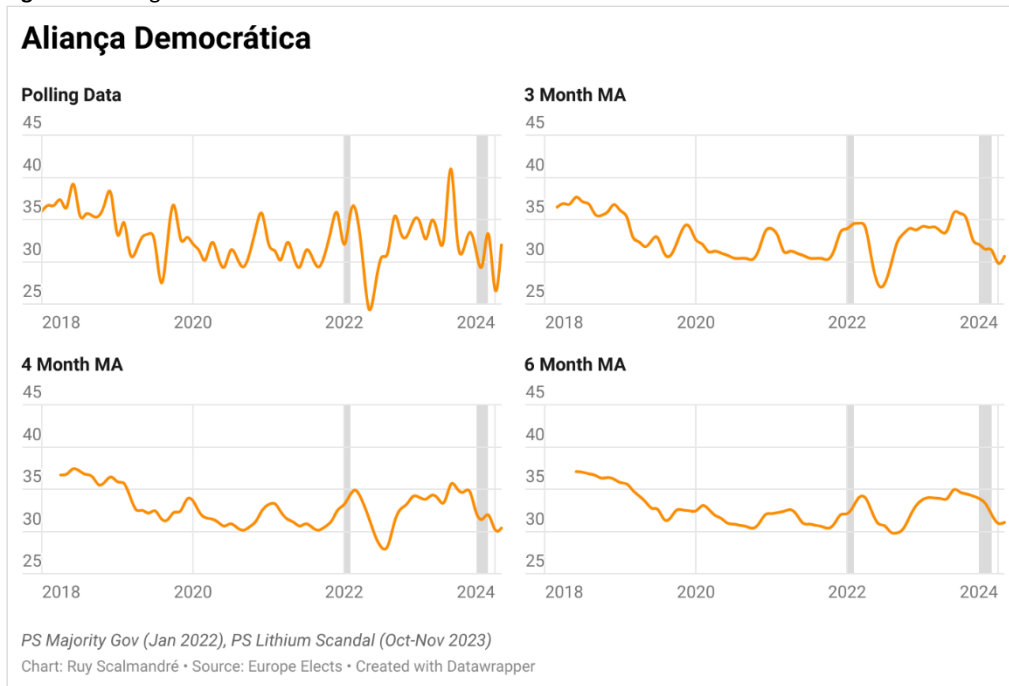
Table 1 below displays the forecasts of popular vote share for the AD, including upper and lower ranges (95% confidence interval). The auto.arima() command returned ARIMA(0,1,2) as the best-fitting model and indeed, in comparison to more complex models tested, none had a better fit. Nevertheless, the distribution of residuals was sub-optimal, so a drift term was incorporated. This had a small impact on forecasted popular vote share:

Table 1: Forecasts for AD popular vote share

Model	Forecast	Lower	Upper
ARIMA (0,1,2)	32.72%	27.79%	37.64%
ARIMA (0,1,2) drift	32.47%	27.55%	37.39%

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[54] Aliança Democrática (2024), pp.45.

[55] Aliança Democrática (2024), pp.46.

The forecast data for AD tells us two things: more complex models with additional parameters did not improve the wellness of fit, and the 95% confidence interval range is quite large compared with other forecasts (circa 10%). Nevertheless, adding autoregressive components did not improve the fit of the model, neither did the forecasted values change significantly with all of the models forecasting a popular vote share around 31.80% for the AD. However, the wide range of the confidence intervals suggests that the AD could win by a landslide, or just narrowly pip the PS. **Figure 5** illustrates the distribution of residuals for the ARIMA(0, 1, 2) model, with the drift term:

Figure 5: Distribution of residual values for AD ARIMA(0, 1, 2) with a drift term.

Distribution of Residuals AD, (0, 1, 2)

Mean = -0.0001, SD = 0.0246, Variance = 0.001, Kurtosis = 4.366, Skewedness = -0.006, MAE = 1.83
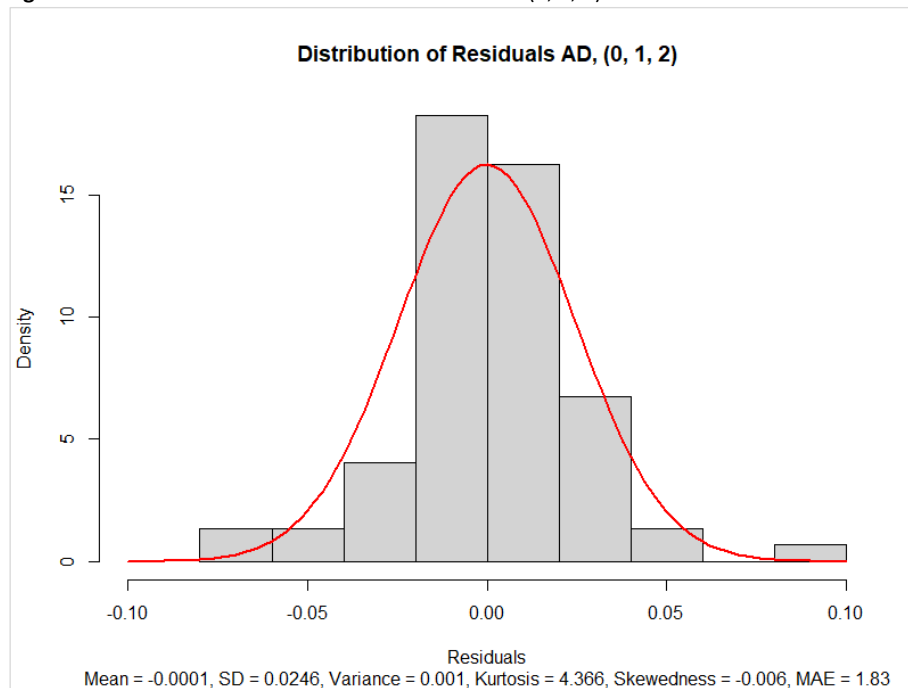
The distribution of residuals for the ARIMA(0, 1, 2) has a mean of -0.0001. Variance and skewedness are minimal, although there is some excess kurtosis (1.330) which indicates a leptokurtic distribution (fat-tailed). This indicates an increased likelihood that the forecasted vote share may be over or underestimated by the model as the error term has an increased likelihood of falling within the extremities of the distribution. Considering the negative skew, it could be that the 31.80% forecast of popular vote share for the AD is slightly overestimated by the best-fitting model. This is reflected especially in models with higher MA(q) specifications.

3.2   Partido Socialista

The PS is running in this election on its own and not committing to pre-electoral coalitions. Though in the case of a close-cut election, it would not be unlikely to see the PS leading a left-wing coalition as had happened in 2015. The PS candidate for Prime Minister is Pedro Nuno Santos – former Minister of Infrastructure and Housing – despite the TAP severance scandals. Santos is running for a seat in the district of Aveiro. The electoral manifesto of the PS consists largely of a list of its achievements since being in government in 2015 – most notably the balancing of public debt as a share of GDP and GDP growth.

With regards to the PS' health strategy, the manifesto seems far less radical than the AD's. The PS places greater emphasis on improving the NHS rather than overtly encouraging more private sector involvement – though it does not disqualify the possibility explicitly. The PS pledges to take action in the following nine areas; (i) remuneration for healthcare professionals in the public sector, (ii) reforms to the governance of the NHS, (iii) diversification and further investment in care provided by the NHS, (iv) further investment in diagnostic and treatment resources to improve the NHS' capacity, (v) preparing the NHS' preparedness for an ageing population, (vi) expanding mental health services, (vii) further investment in addiction treatment and rehabilitation, (viii) investment in modern healthcare equipment and technology, (ix) improving transparency and collaboration with the private sector. A notable difference with the, beyond the contents of proposals, is the mention of explicit plans of action (e.g. the AD's Emergency Plan for the NHS) nor any signposted short-term or long-term goals. Nevertheless, there is some convergence on few policy issues between the two rival parties; preparing for an ageing population and better public-private collaboration in healthcare provision.[56]

Similarly to its health policies, the PS' approach to housing is not particularly clear nor ambitious. Though, there is some convergence with some of the AD's approaches and proposals. Most obviously would be a proposal for a public guarantee for the necessary credit for under-40s without a house registered under their names (so not necessarily first-time buyers) to be made available by banks. However, there is no mention of how much financing would be made available or if the scheme would have a maximum property value. Other than this proposal, like much of the manifesto, other housing lack substantial metrics or scope, although there is a proposal for a lease expense income tax exemption of EUR50/month, up until EUR800.[57] The PS also pledges to "promote the industrialisation of the construction and eco-construction sectors" and to unify letting laws and regulations under one unified Urban Rental Code.[58]

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[56] Partido Socialista (2024): "*Plano de Ação Para Portugal Inteiro: 2024*", pp.60-66. Partido Socialista. Available here.
[57] Partido Socialista (2024), pp.70.
[58] Partido Socialista (2024), pp.71.

Figure 6: Polling data for the PS.
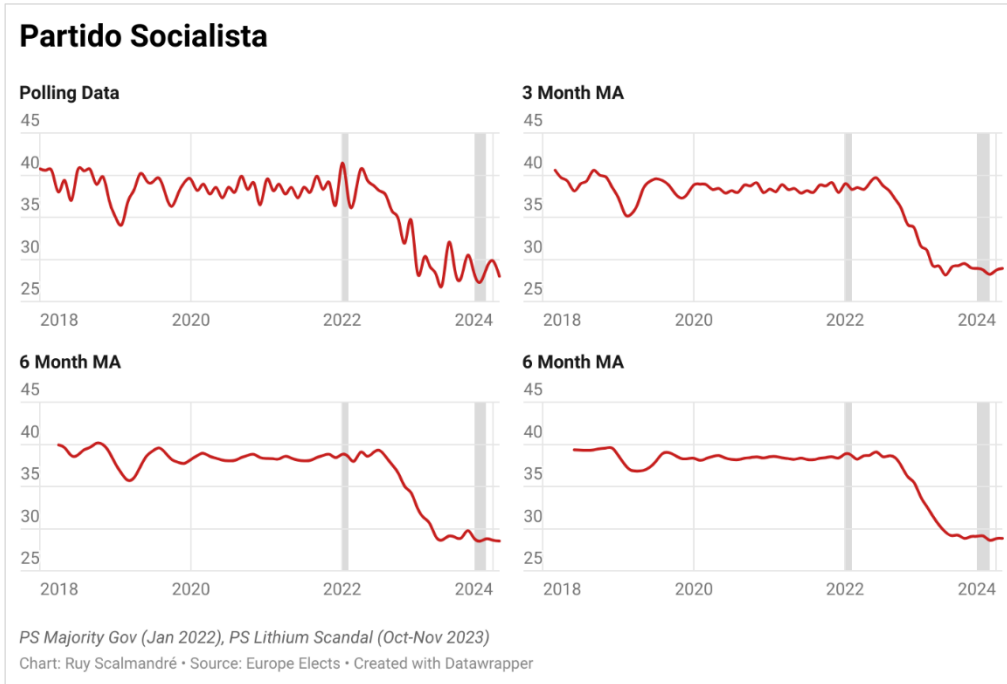
Models and Forecasts

Table 2 below displays the forecasts of popular vote share for the PS, including upper and lower ranges (95% confidence interval). The auto.arima() command returned ARIMA(1,1,0) as the best-fitting model. However, these parameters resulted in some autocorrelation between residual values. Experimenting with different models showed that autoregression below AR(2) persisted autocorrelation issues with residual values. AR(p) was dropped altogether and the next-best fitting model which respected assumptions of the error term was ARIMA(0,1,5) with a drift term. This had a small impact on forecasted popular vote share with relation to the auto.arima() model returned:

Table 2: Forecasts for PS popular vote share

Model	Forecast	Lower	Upper
ARIMA (1,1,0)	28.64%	25.12%	32.15%
ARIMA (0,1,5) drift	28.75%	25.48%	32.03%

Similarly to the forecasts for the AD, simpler models exhibited better goodness of fit. AR(0) models with MA(<5) exhibited strong autocorrelation of residuals and were not considered. This improved after introducing autoregressive parameters at AR(3). First and second-order autoregressive parameters did not eliminate autocorrelation of residual values. Notwithstanding, forecasts from other models did not return popular vote share forecasts significantly greater than 29.00% for the PS. The distribution of residuals in the ARIMA(0, 1, 5) model with a drift term is shown in **Figure 7**:

Distribution of Residuals PS, (0, 1, 5)

Mean = -2.91e-05, SD = 0.016, Variance = 0.0003, Kurtosis = 3.917, Skewedness = 0.131, MAE = 1.25

The distribution of residuals for the ARIMA(0, 1, 5) model has a mean of $-3.46e^{-05}$. Excess kurtosis is limited at 0.967, indicating a reduced likelihood that the forecasted vote share may be over or underestimated by the model. Nevertheless, despite the lithium scandal and recent plunges in the polls, it would seem that the PS could well challenge the AD as the first political party in the elections. This is of course, resulting largely from significant fragmentation within the right in Portugal, evidenced by *Chega*'s impressing polling numbers.

3.3   Chega

André Ventura, president of *Chega* since its founding in 2019, is the head of list and the party's candidate for Prime Minister. Ventura is also running for election in the Lisbon electoral circuit, like his counterparty at the AD. *Chega* has enjoyed a meteoric rise since 2019, bringing the far-right into the fore of Portuguese politics.[59,60]

The AD and *Chega* dominate the Portuguese right, with the IL picking up the remainders. H Ventura forming his party after leaving the PSD – the leading party of the AD – and the two have rapidly developed a fierce rivalry on the right. In a televised electoral debate, Luís Montenegro categorically refused a coalition with *Chega*.[61] This could pose a headache for the right and a lifeline to the PS in a close election where the AD and PS are both unable to form government. However, if needed to form government, it could also be good news for the IL.

Similar to much of the right, *Chega* calls for greater co-operation between the public and private sector in healthcare delivery. Their manifesto formally calls for a "National Health System" as opposed to the current National Health *Service*, though it is unclear what this actually means in concrete terms except for better integration between the public and private sectors.[62] Beyond a promises to build more hospital and to role out a "mental health cheque" for individuals seeking mental health care when the NHS is unable to deliver services, *Chega*'s proposals for healthcare seem to lack detail and substance.[63]

With regards to housing, *Chega* proposes the abolition of property taxes and VAT for first-time buyers, on the condition that the property in question is used as permanent residence. Similarly, *Chega* proposes the abolition of municipal taxes on one's permanent residence.[64] Generally, in their housing proposals, *Chega* aims to facilitate the acquisition and/or rental of public and private sector housing developments as well as the urban development of existing and future developments.[65] Among the three main parties, all seem to be almost *ad diem* with their vision and proposals. From build-to-rent to some sort fiscal incentive for first-time buyers. Whilst this should, in theory, provide political will to come to a concrete plan or solution for Portugal's housing crisis it is not a given.

[59] Henley, Jon (2024), "*Portugal's far right on rise as election campaign begins*". The Guardian. Available here.
[60] Jopson, Barney (2024), "Far-right former football pundit shakes up Portugal". The Financial Times. Available here.
[61] SIC Notícias (2024), "*Debate AD vs Chega: o 'idiota útil da esquerda' e o 'xenófobo demagogo'*". Available here.
[62] Partido Chega (2024), "*Limpar Portugal*", pp.31. Available here.
[63] Partido Chega (2024), "*Limpar Portugal*", pp.32
[64] Partido Chega (2024), "*Limpar Portugal*", pp.37
[65] Partido Chega (2024), "*Limpar Portugal*", pp.38

Figure 8: Polling data for *Chega*.
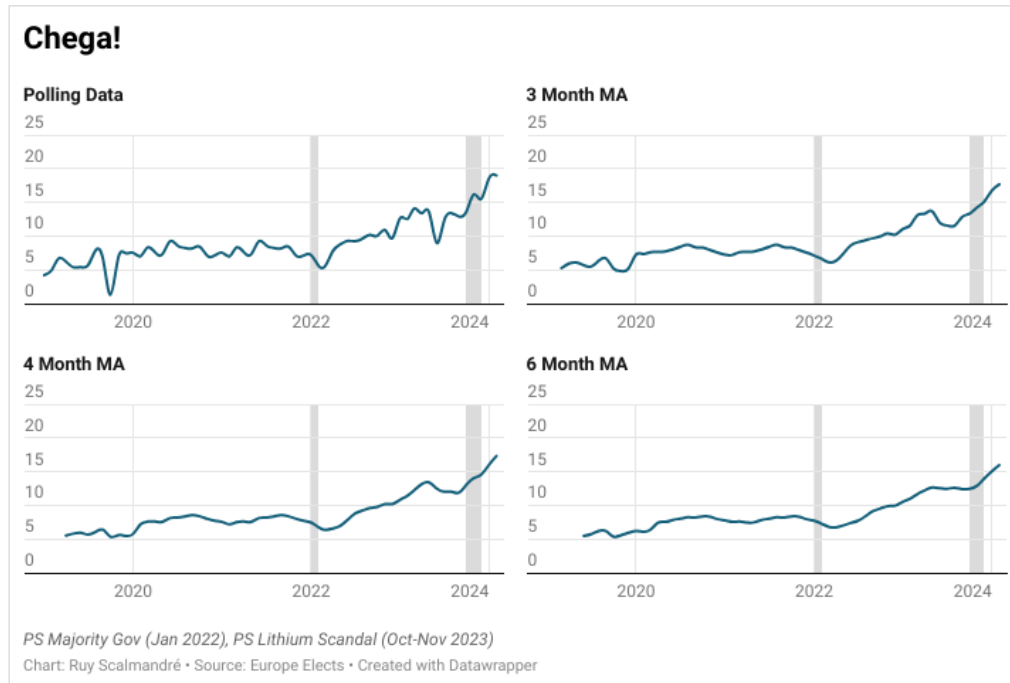
Models and Forecasts

Table 3 below displays the forecasts of popular vote share for *Chega*, including upper and lower ranges (95% confidence interval). The auto.arima() command returned ARIMA(0,1,1) as the best-fitting model. Although, modelling and forecasting for *Chega* is a bit more complex than other parties. As seen above, since January 2022 the party has almost quadrupled in the polls from just over 5.00% to just under 19.00% - this is just from the aggregated dataset used in this forecast.

Although first-differencing does render the time-series stationary, forecasting ARIMA(0,1,1) as time-series object returned an unlikely 12.56%. However, when forecasting the variable as a numeric vector, the forecasted ARIMA(0,1,1) returned a more probable forecast of 17.97%. Both forecasts are included for the sake of transparency, and although not best-practice, in this instance it is likely that that the forecast of the numeric vector will be more accurate than the time-series object. Refer to the .R file for more information.

Table 3: Forecasts for Chega popular vote share

Model	Forecast	Lower	Upper
ARIMA (0,1,1) drift	12.56%	9.88%	15.24%
ARIMA (0,1,1) drift*	17.97%	15.08%	20.85%

The complexity in modelling and forecasting *Chega*'s popular vote share is reflected also in the distribution of residual values. Although the residuals have a mean of $-2.224e^{-05}$, high excess kurtosis (3.796) indicates that the actual error term may lie in the extreme ends of the distribution of residual

terms. Considering the negative skewedness, it may be likely that the eventual popular vote share might be closer to the upper-range forecasts, as shown below in **Figure 9:**

Figure 9: Distribution of for *Chega* ARIMA(0, 1, 1) with a drift term.

Distribution of Residuals PS, (0, 1, 5)

Mean = -2.91e-05, SD = 0.016, Variance = 0.0003, Kurtosis = 3.917, Skewedness = 0.131, MAE = 1.25
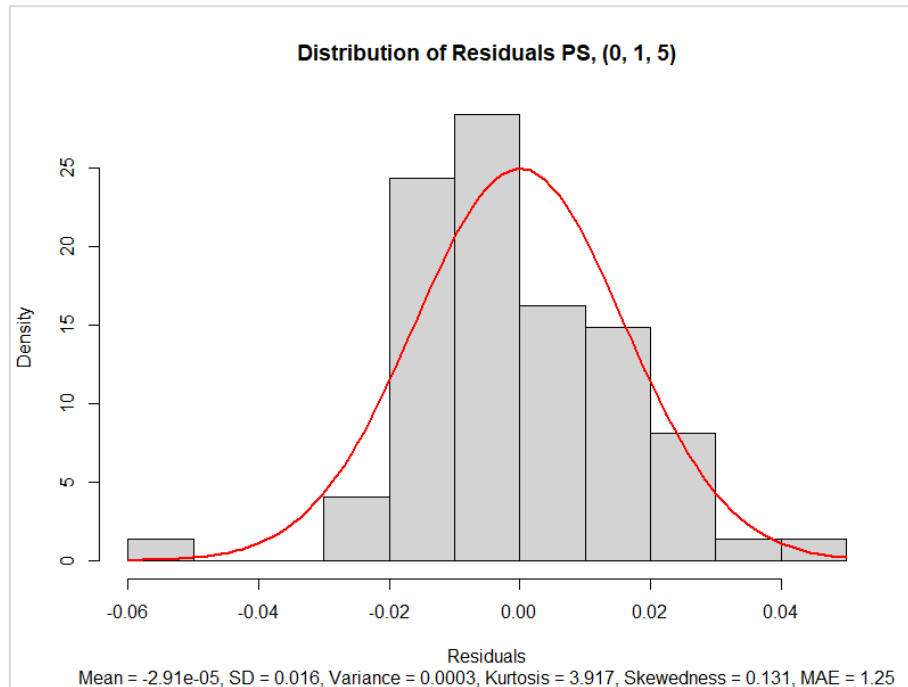
Chega's meteoric rise is somewhat anomalous in Portuguese politics, being the first far-right party likely to obtain a considerable vote share since 1976. Of course, this may not necessarily translate into a high portion of seats in the Assembly. Nevertheless, *Chega's* performance and rise since 2022 has only been fuelled by recent scandals within the PS and the Portuguese government, cementing its status as the third political party in Portugal. If *Chega* can fetch a vote share similar to its polling numbers, it will truly mark a new era for Portuguese politics as the prospect of the far-right returning to government is likely to be on the cards.

Nevertheless, this depends on the electoral circuits where *Chega* manages to win seats. Typically, metropolitan circuits tend to elect smaller parties simply because they have more seats available and with the convergence of d'Hondt quotients, smaller parties are subsequently likely to win a handful of seats in these circuits. So, it will be especially interesting to see if *Chega* will be able to steal votes and seats from the PS or PSD from non-metropolitan electoral circuits, though this seems unlikely as those circuits offer few seats in comparison to metropolitan circuits. In some of those circuits the PS and PSD hold considerable historical influence and advantages. For example, Beja and Évora are historically very left-leaning. Even in recent elections, the CDU has actually beaten the PSD in popular votes so whether the far-right can surmount the PS, PSD, *and* the communist-led coalition in these electoral circuits hardly seems probable in this election. Notwithstanding, *Chega's* performance in those circuits in this year's legislative election could be an indication of longer-term shifts in Portuguese politics and the party system, hence deserving special attention.

Section 4
Potential Scenarios and Analysis

Using forecasts for popular vote share from Section 3 and **Appendix 1**, this section proposes four likely scenarios using forecasted popular vote share and analytical judgement with relation to the party system characteristics highlighted in Section 1 and wider trends in contemporary Portuguese politics. In all of the scenarios, the right is expected to win. However, the main differences between the four scenarios are the margins of victory of the AD over the PS and *Chega*'s performance in AD and PS strongholds.

The scenarios are presented in assumed order of likelihood and are formed by using values within the confidence interval range to calculate d'Hondt quotients and seat allocations in electoral circuits with more 5 or more MPs elected. For smaller circuits, where popular vote forecasts may drastically change the historical composition, recent performance is used as a multiplier to the forecasted values. This is done by multiplying the vote share forecast by average seats won in the last three elections and using the product of the interaction as the initial d'Hondt quotient. PSD performance is used for the AD.

4.1   Scenario 1: Minimal Change to *Status Quo*

The first scenario, and potentially the most probable, is that the AD wins narrowly over the PS. The rationale for this is that jumping of polling at elections is not unlikely in Portuguese politics, as seen in **Figure 4** where the mean of polling data for the PS before the January 2022 election was floating around the 37.00 per-cent mark but the true result was 41.40 per-cent in favour of the PS. Of course, upper and lower forecasts account for this jumping, but the scenario construction serves to provide an indicative estimation within these ranges. An approximate seat composition can be seen overleaf.

Figure 10: Seat composition for a *status quo* scenario.

Scenario 1: Status Quo

Close split between AD and PS could retain the status quo, or at least a coalition on the left. Unless, the AD are willing to form a government with Chega!

CDU ● LI ● BE ● PAN ● PS ● AD ● IL ● CH

Party	Seats
● CDU	5
● LI	1
● BE	8
● PAN	2
● PS	86
● AD	83
● IL	9
● CH	36
● Other	0

Seats are approximations from forecasts and historic performance.
Absolute Mean Si - Vi = 2.858

In this scenario, the AD and PS have a very similar popular vote share, however the PS is able to cling on to its strongholds, especially in the South, such as Beja and Évora. Consequently, this would allow the PS to cling onto a narrow lead in the Assembly. Nevertheless, the possibility of a left-wing government would remain unlikely unless AD choose not to honour their oath to not forming a governing coalition with *Chega* – although this is unlikely. Should the oath be honoured, a minority left-wing coalition might be formed to govern.

4.2   Scenario 2: AD Minority Government or Coalition

The second scenario, perhaps equally as likely as the first, is that the AD wins over the PS comfortably but insufficiently to form a majority government on their own and to form a minority government with the IL. The rationale for this would be that the AD honour their oath to not form a coalition with *Chega*, but nevertheless seek to form a minimum winning coalition with the IL to ensure that they have a majority to cover off a coalition on the left.

Figure 11: Seat composition for an AD minority government or coalition.
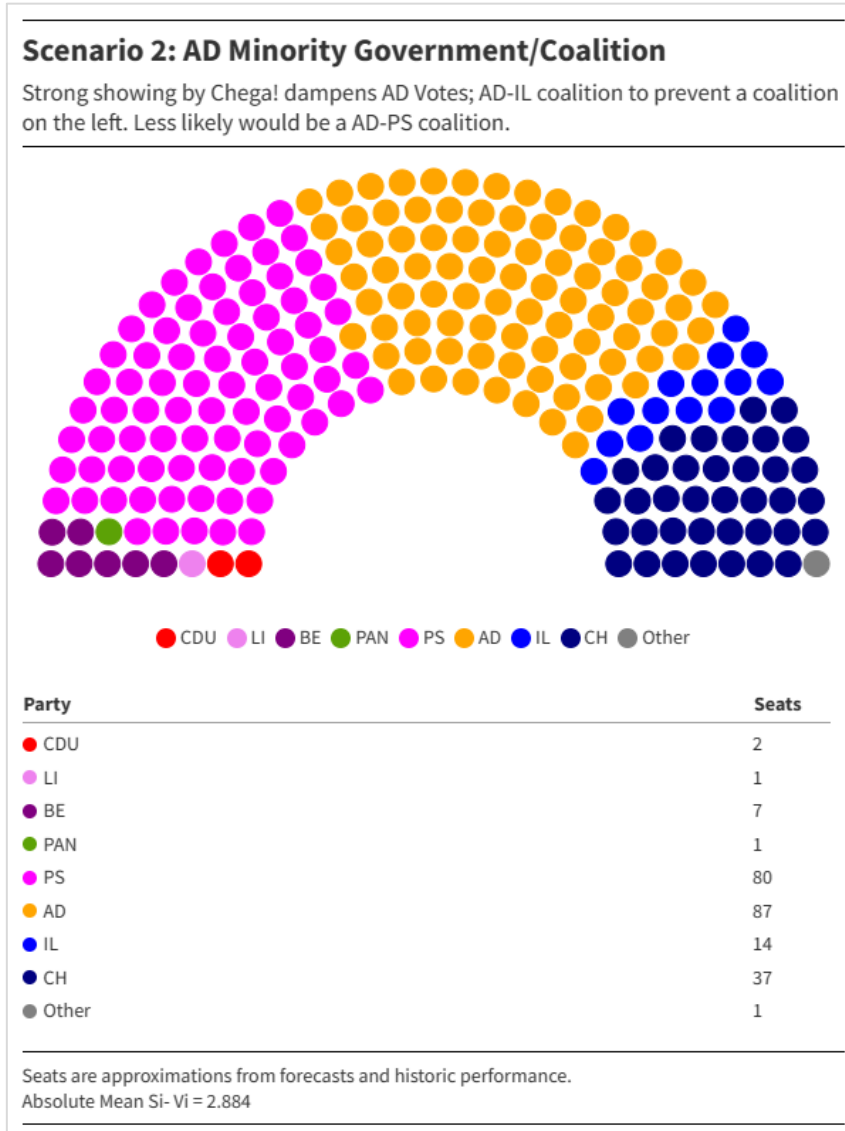
Scenario 2: AD Minority Government/Coalition

Strong showing by Chega! dampens AD Votes; AD-IL coalition to prevent a coalition on the left. Less likely would be a AD-PS coalition.

● CDU ● LI ● BE ● PAN ● PS ● AD ● IL ● CH ● Other

Party	Seats
● CDU	2
● LI	1
● BE	7
● PAN	1
● PS	80
● AD	87
● IL	14
● CH	37
● Other	1

Seats are approximations from forecasts and historic performance.
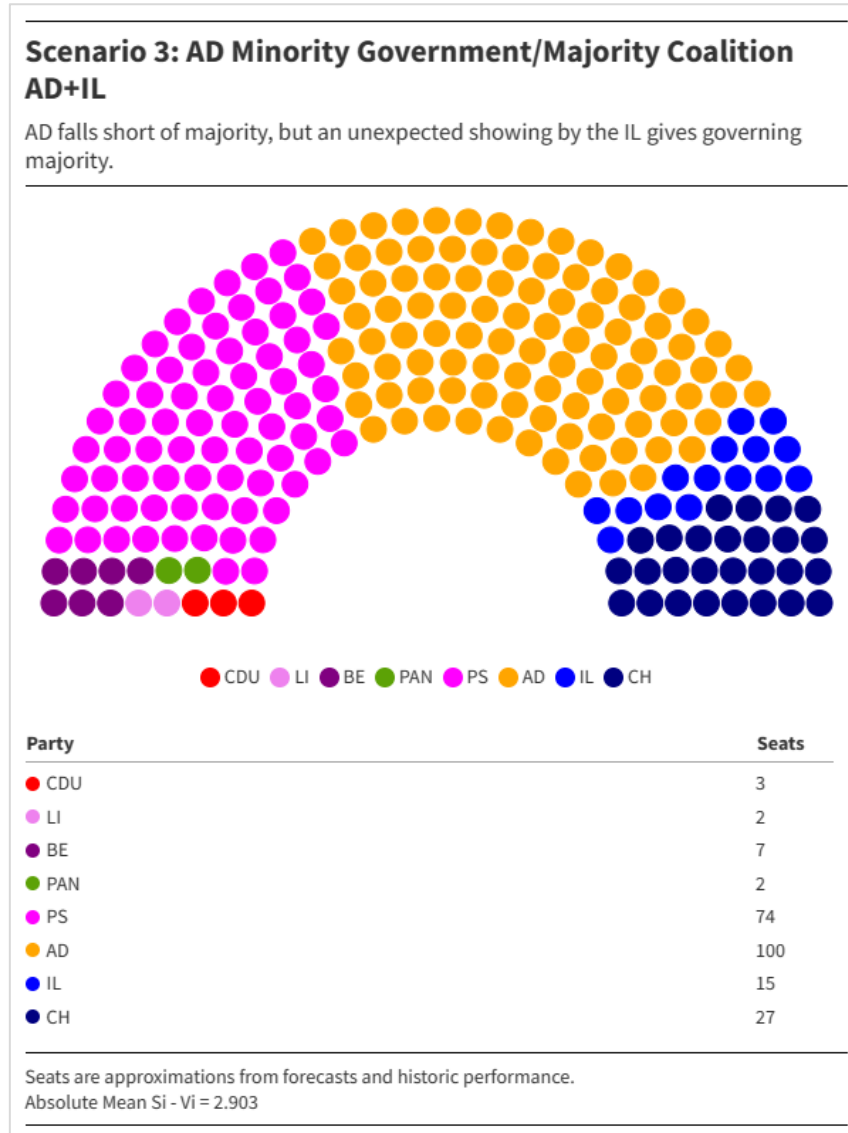Absolute Mean Si- Vi = 2.884

In this scenario, the AD has a substantially higher popular vote share than the PS and is able to maximise votes in larger circuits, and potentially make some inroads in PS strongholds and re-establish itself in the North East of the country. The result would be a hung parliament with a right-wing coalition, or a less likely alternative where the AD and PS form a coalition.

4.3   Scenario 3: Governing Right Coalition

The third scenario is that the AD wins over the PS comfortably, but the rest of the left performs toward the lower end of the confidence interval, and that *Chega* and the IL perform well as a result. This would ensure that the AD would still seek a minimum winning coalition with the IL, but in this instance, the two would have enough combined seats for a governing majority. The rationale for this is the same as in Scenario 2, only the IL performs better than expected.

Figure 12: Seat composition for a governing right coalition between the AD and IL.

Scenario 3: AD Minority Government/Majority Coalition AD+IL

AD falls short of majority, but an unexpected showing by the IL gives governing majority.

● CDU   ● LI   ● BE   ● PAN   ● PS   ● AD   ● IL   ● CH

Party	Seats
● CDU	3
● LI	2
● BE	7
● PAN	2
● PS	74
● AD	100
● IL	15
● CH	27

Seats are approximations from forecasts and historic performance.
Absolute Mean Si - Vi = 2.903

In this scenario, the AD has a substantially higher popular vote share than the PS and is able to maximise votes in larger circuits, make considerable inroads in PS strongholds and re-establish itself in the North East of the country. All the while the IL is able to solidify its presence in urban circuits and win a few seats across the rest of the country. This is the scenario in which *Chega* and the far-right are less

likely to influence the policy agenda within the Assembly, even though they are expected to increase their proportion of seats.

4.4   Scenario 4: Hung Parliament/Minority AD Government

The last proposed scenario is that the AD wins over the PS comfortably, but an overall increase in party system fragmentation results in neither the left or the right to form a governing coalition whatsoever. This would leave the AD to form a minority government (assuming ulterior elections are not called). This would mean that *Chega*, the PS, and to a limited degree, the IL would vote more strategically in parliamentary sessions. In this instance, the IL might not want to form a coalition with the AD to remain detached from the established elite, whilst also enjoying the potential to decide important votes when *Chega* and the PS abstain or oppose AD proposals.

Figure 13: Seat composition for an AD governing majority.

Scenario 4: AD Governing Majority

AD manage to overcome competition from Chega! and IL to reduce fragmentation on the right, whereas voters on the left seek alternatives to the PS.

● CDU ● LI ● BE ● PAN ● PS ● AD ● IL ● CH ● Other
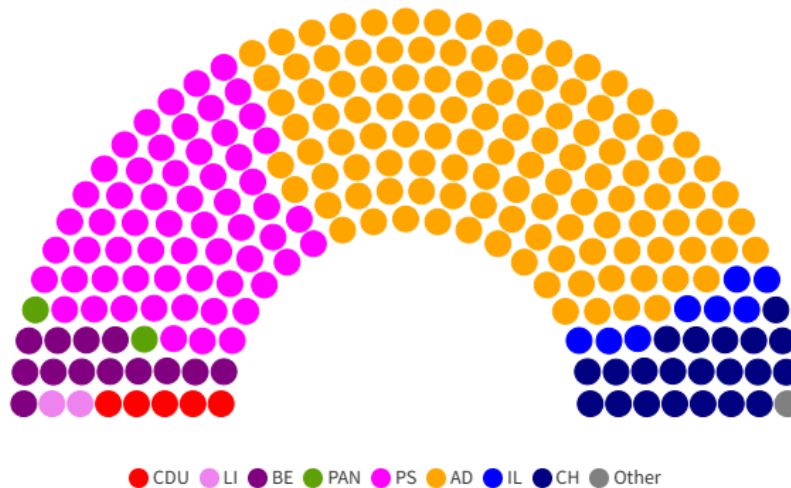
Party	Seats
● CDU	5
● LI	2
● BE	13
● PAN	2
● PS	60
● AD	118
● IL	8
● CH	21
● Other	1

Seats are approximations from forecasts and historic performance.
Absolute Mean Si -Vi = 3.289

In this scenario, the AD has a substantially higher popular vote share than the PS and is able to maximise votes in larger circuits, but not sufficient votes to make any meaningful inroads into PS strongholds. *Chega* would likely underperform, as would PS. This would give these two parties considerable influence in important votes, as indeed the remainder of parliamentary parties.
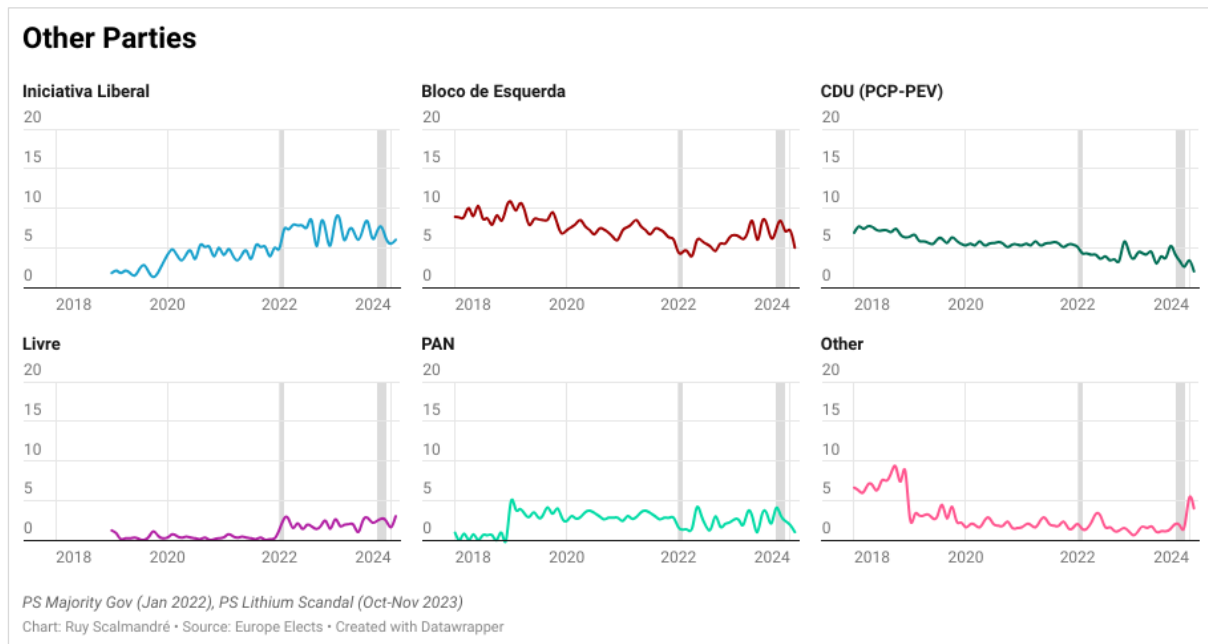
4.5   Summary and Conclusion

This report has considered the history of Portugal's democracy and party system before subsequently providing popular vote share forecasts of the current parties with a parliamentary presence by fitting various time series models to their polling data over the last 74 months. These forecasts were contextualised to the present political scene in Portugal as well as recent regional trends to produce the following four scenarios: (i) minimal change to the current *status quo*, (ii) a hung parliament with a right-wing government or an improbable AD-PS majority government, (iii) a right-wing majority government or a minority AD government, and (iv) an outright AD majority.

Certainly, the PS is highly unlikely to maintain its current majority in the National Assembly. Although the AD is likely to win the popular vote according to the forecasts and scenarios, their ability to form government hinges upon *Chega*'s performance, overall fragmentation on the right, and political competition in urban electoral circuits.

Appendix 1
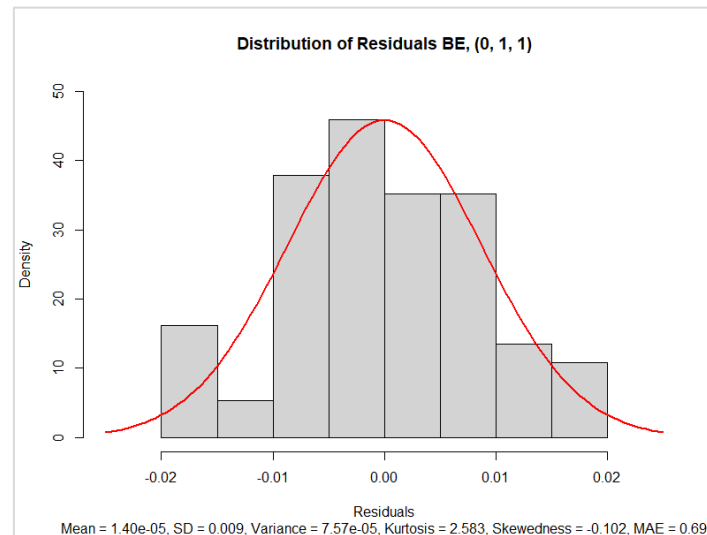# Results' Forecasts for Smaller Parties

This appendix contains the polling data, forecasts for popular vote share of the remaining parties, as well as distribution plots of residuals and commentary where needed.

Other Parties

PS Majority Gov (Jan 2022), PS Lithium Scandal (Oct-Nov 2023)
Chart: Ruy Scalmandré • Source: Europe Elects • Created with Datawrapper

Bloco de Esquerda

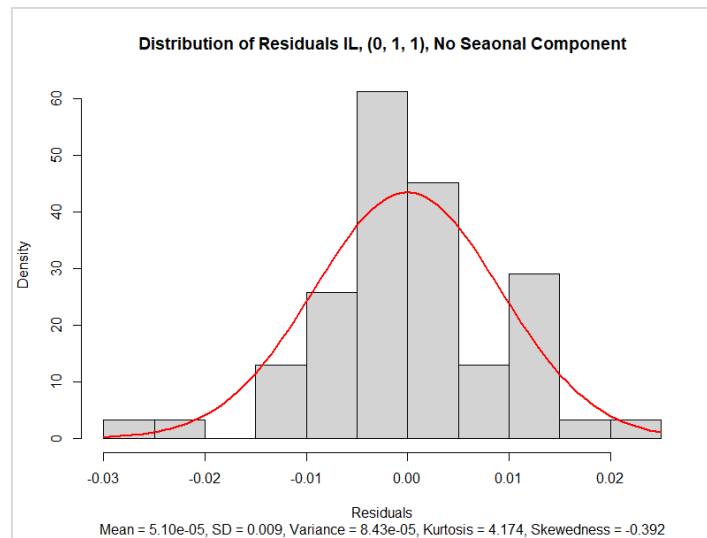| Model	Forecast	Lower	Upper
ARIMA (0,1,1)	6.11%	4.39%	7.83%
ARIMA (0,1,1) drift	6.06%	4.33%	7.79%

Of the two models, the ARIMA(0,1,1) with the drift term is preferred for its closer to zero mean, whilst minimal loss in goodness of fit with respect to the ARIMA(0,1,1) with no drift term.

Distribution of Residuals BE, (0, 1, 1)

Mean = 1.40e-05, SD = 0.009, Variance = 7.57e-05, Kurtosis = 2.583, Skewedness = -0.102, MAE = 0.69

Iniciativa Liberal

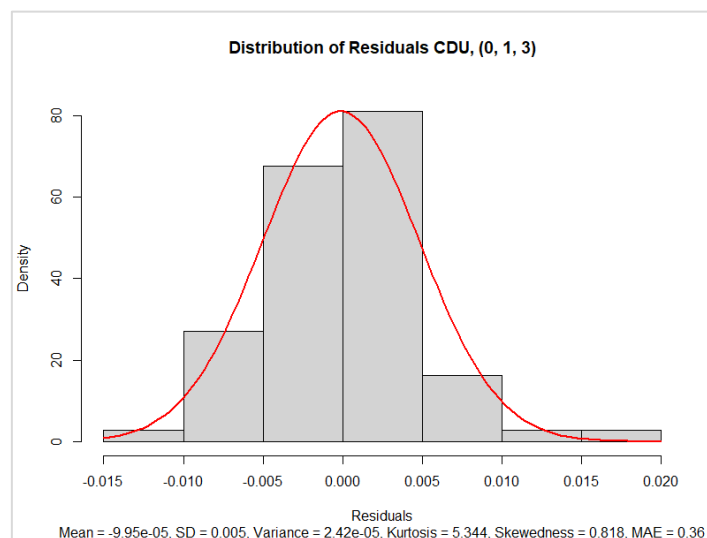| Model	Forecast	Lower	Upper
ARIMA (0,1,1) drift, SMA(1) 12 month seasonal component	8.55%	6.77%	10.34%
ARIMA (0,1,1) drift, no seasonal component	8.09%	6.26%	9.92%
ARIMA (0,1,2) drift, no seasonal component	8.11%	6.27%	9.94%

auto.arima() returns an ARIMA(0,1,1) model with a seasonal MA(1) component over 12 months. The fit of this model is BIC = -385.2607. The ARIMA(0,1,1) model with no seasonal component returns a marginally lower estimate and is marginally better-fitting: BIC = -386.3627. The seasonal model is included for transparency, but considering jumping of polling data at elections seasonality may not necessarily hold in this election. However, the removal of the seasonal component induced minimal autocorrelation of residual values for the ARIMA(0,1,1) hence an ARIMA(0,1,2) is also included whose BIC = -382.7502. Of the three models, ARIMA(0,1,1) is probably the best compromise between accuracy and validity of important assumptions, albeit some minor autocorrelation. Like *Chega!*, the limited polling data that does exist for the IL is made less reliable considering the party's rise in a relatively short timeframe.

Distribution of Residuals IL, (0, 1, 1), No Seaonal Component

Mean = 5.10e-05, SD = 0.009, Variance = 8.43e-05, Kurtosis = 4.174, Skewedness = -0.392

CDU (PCP-PEV)

Model	Forecast	Lower	Upper
ARIMA (0,1,1) drift	2.86%	1.85%	3.87%
ARIMA (0,1,3) drift	3.06%	2.07%	4.05%

The ARIMA(0,1,1) drift model returned by auto.arima() unfortunately had some autocorrelation within its residual values, as well as very high kurtosis (8.314), indicative of a higher probability of a true error term closer to the extremities of the distribution curve. To address these issues, alternate models were fitted. The best performing was an ARIMA(0,1,3) drift model. This model had no autocorrelation residuals and far less outliers among the distribution of residuals:

Distribution of Residuals CDU, (0, 1, 3)

Mean = -9.95e-05, SD = 0.005, Variance = 2.42e-05, Kurtosis = 5.344, Skewedness = 0.818, MAE = 0.36

Livre

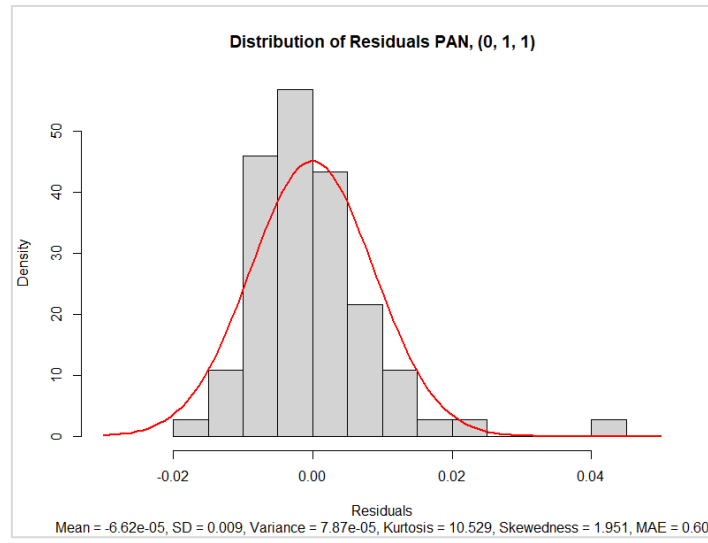| Model	Forecast	Lower	Upper
ARIMA (1,1,1)	1.83%	0.95%	2.71%
ARIMA (3,1,3) drift	1.78%	0.93%	2.63%

The ARIMA(1,1,1) model returned by auto.arima() suffered from autocorrelation of residual terms. Adding the drift component helped ameliorate the issue, but not entirely. Further models with varying AR(p) and MA(q) were tested until autocorrelation was no longer an issue, and the best candidate was the ARIMA(3,1,3) with a drift parameter reported above. This also helped lower kurtosis, but nevertheless remains high. However, much like *Chega!* and the IL, *Livre* is a new party with limited past polling data and has enjoyed a strong upward trajectory since the 2019 elections.

Distribution of Residuals Livre, (3, 1, 3)

Mean = -0.0002, SD = 0.003, Variance = 1.6e-05, Kurtosis = 5.209, Skewedness = -1.283, MAE = 0.28
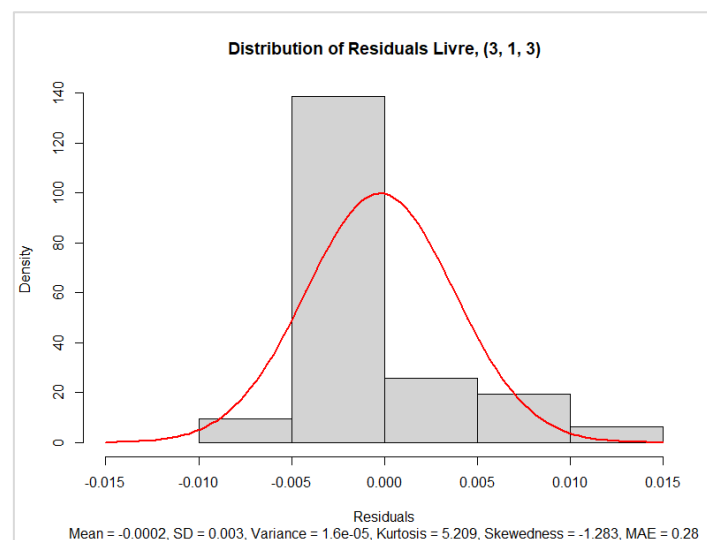
PAN

Model	Forecast	Lower	Upper
ARIMA (0,1,1)	2.39%	0.64%	4.15%
ARIMA (0,1,1) drift	2.46%	0.70%	4.22%

The model returned by auto.arima() was an ARIMA(0,1,1) without a drift term. However, the mean term of residuals without a drift term was higher (0.0004) than with a drift term (-6.81e^{-05}). Nevertheless, the distribution of residual values of both values had very high kurtosis – in excess of 10 for both. This means that there is a significantly increased likelihood that the true error term lies at the extremities of the distribution curve, as seen in the diagram overleaf.

Distribution of Residuals PAN, (0, 1, 1)

Mean = -6.62e-05, SD = 0.009, Variance = 7.87e-05, Kurtosis = 10.529, Skewedness = 1.951, MAE = 0.60

Appendix 2
The d'Hondt Method Explained

The below table provides an example of how seats are allocated using the d'Hondt divisor method, using numbers from **Figure 1**. Suppose there are five political parties: A, B, C, D, and E. Party A has 50,000 votes, B has 35,000 votes, C has 20,000, D has 15,000, and E has 5,000 votes. The five parties are contesting an electoral district with 10 seats available. The allocation would be as follows:

Party	A	B	C	D	E
Votes	50,000	35,000	20,000	15,000	5,000
Divisor	50,000 **(1)**	35,000 **(2)**	20,000 **(4)**	15,000 **(7)**	5,000
1	25,000 **(3)**	17,500 **(5)**	10,000 **(10)**	7,500	-
2	16,667 **(6)**	11,667 **(9)**	-	-	-
3	12,500 **(8)**	8,750	-	-	-
4	10,000	-	-	-	-
5	-	-	-	-	-
Total Seats	**4**	**3**	**2**	**1**	**0**

The order of seat allocation is highlighted in bold with total seats included in the last row. As explained in the main text, the d'Hondt formula sees a decrease in the value of the quotient toward zero. In larger seat electoral circuits, this is more pronounced. The system allows for representation of smaller parties, but only to a limited extent.
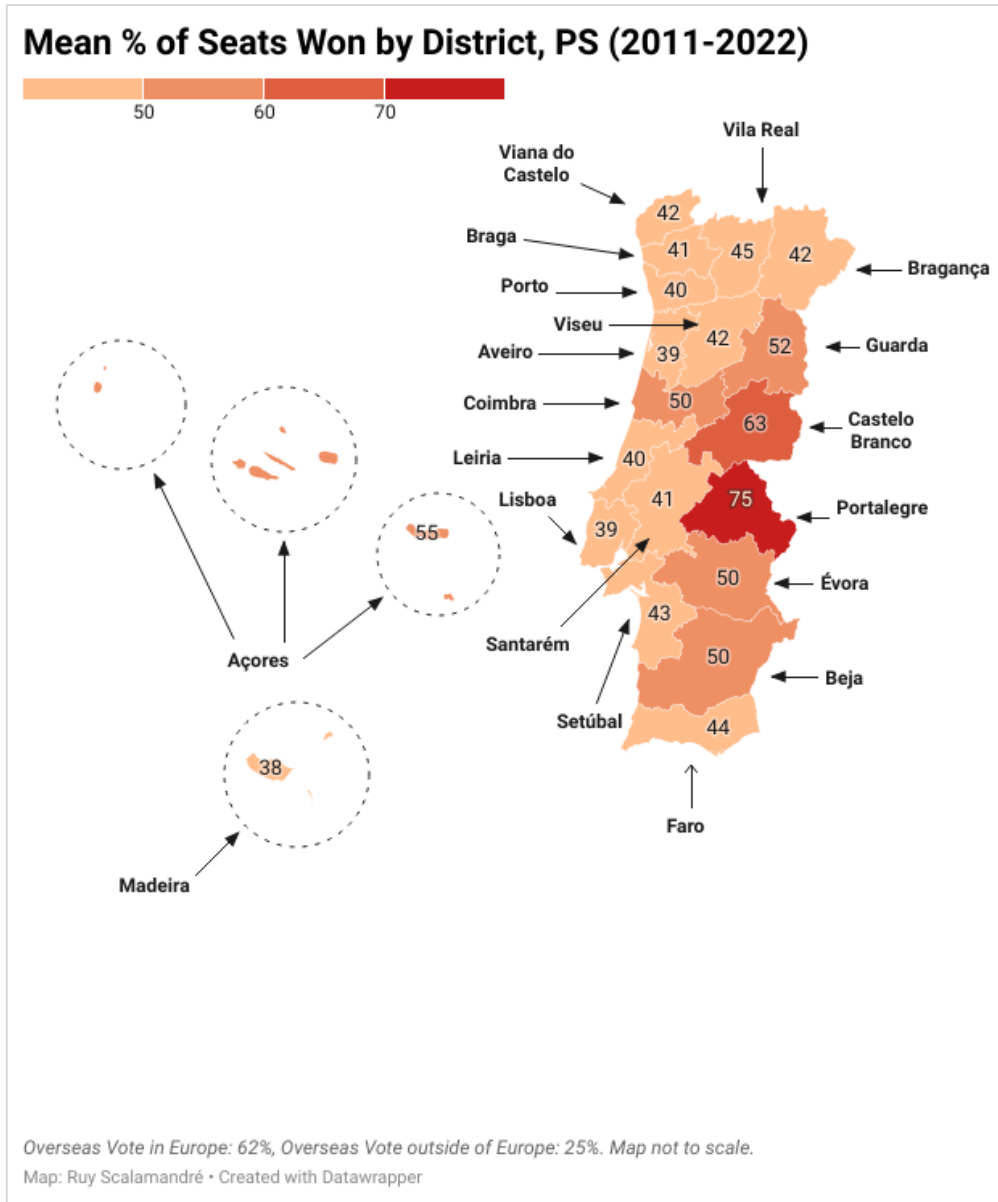
Appendix 3
Historic Electoral Maps for the AD and PS

The following maps illustrate the electoral performance of the AD (PSD and CDS-PP) and the PS since 2011 until 2022. They show the average percentage of MPs elected by district:

Aliança Democrática

Mean % of Seats Won by District, AD (2011-2022)

Overseas Vote in Europe: 38%, Overseas Vote outside of Europe: 75%. PSD and CDU-PP MPs Combined. Map not to scale.

Map: Ruy Scalamandré · Created with Datawrapper

Partido Socialista

Mean % of Seats Won by District, PS (2011-2022)

Overseas Vote in Europe: 62%, Overseas Vote outside of Europe: 25%. Map not to scale.
Map: Ruy Scalamandré • Created with Datawrapper

Appendix 4
Correlation Matrix of Polling Data

The below table is a correlation matrix between the eight parties' polling data used for the forecasts reported in **Section 3** and **Appendix 1**:

	PAN	LI	CDU	BE	IL	CH	PS	AD
AD	-0.6009	0.1150	0.3541	0.2002	-0.0754	-0.1958	-0.0182	.
PS	-0.2033	-0.7359	0.6170	0.1162	-0.4918	-0.7879	.	
CH	-0.2148	-0.6306	-0.7312	-0.2478	0.6156	.		
IL	-0.3325	0.7257	-0.7633	-0.6448	.			
BE	0.0017	-0.3815	0.6585	.				
CDU	-0.3029	-0.7547	.					
LI	-0.3325	.						
PAN	.							