

# Predicting the 2022 Australian Federal Election with Actuarial Methodologies

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## ABSTRACT

Election forecasting has, for a long time, been considered a major tool used by voters and politicians alike to understand the electoral mood. In Australia, tools such as opinion polling even drive many policy decisions made by governments. Yet, these same tools have been misleading and/or wrong in recent elections. The consequences of this have meant large fiscal loss for bookmakers, rash policy decisions, inappropriate leadership changes, and, recently, erosion of trust in the democratic process. Hence, we must look at new ways to analyse elections, and use a more appropriate system to mimic the actual voting system in the country where the election is being held. For example, in representative democracies with strong minor party representation like Australia, any forecasting method used must not use two-party preferred on a national basis, and, instead, analyse preference flows, and first preferences, for each seat. This study uses actuarial techniques to analyse probabilities of parties winning each of the 151 seats in the 2022 Election, and then calculates final party totals based on these probabilities. This study aims to accurately predict the 2022 Election using a methodology which will enable a final forecast which is not misleading and is, in fact, appropriate for a representative democracy. Data used includes first preferences and Preference Flow data from the 2019 Election, Demographic data from the 2016 Census, Economic Data across 2019-22, and Opinion Polls from *The Australian* and *Roy Morgan*. Further, political insight will be used to discuss these results and the potential variances.

## **Introduction**

There exists three main methods of election forecasting in most democracies today: opinion polls, economic models, and betting markets (Leigh and Wolfers, 2001). It is, however, no secret that election forecasting has failed to properly predict the outcome of democratic processes in recent times. Major examples include the 2016 United Kingdom referendum on European Union membership, the election of Former President Donald Trump in 2016, and the re-election of the Liberal-National Coalition in the 2019 Australian Federal Election.

## **Opinion Polling**

Opinion Polling is a widely used forecasting tool, and is often seen as the simplest, and most traditional methodology to illustrate the electoral mood. It entails a polling company carrying out a survey within a pool of voters to “obtain a representative sample of a population” (Leigh and Wolfers, 2001). The first recorded opinion poll is widely considered to have been carried out in July 1824, ahead of the American Presidential Election between John Quincy Adams and Andrew Jackson in Wilmington, Delaware. The poll concluded that 70% of respondents would vote for Andrew Jackson. However, in the election, while Jackson had a slim lead in the popular vote, Adams was elected President by

the House of Representatives under the provisions of the 12<sup>th</sup> Amendment. (Rhodes, 2018). Opinion polling became widespread across America in the late 19<sup>th</sup> century, as demographic equity began to appear in polls, while it had to wait until the early 20<sup>th</sup> century to become as prevalent across the globe.

Recently, however, opinion polling has been open to extreme scrutiny due to consistent failures to accurately predict the results of elections. During the 2016 US Presidential Election, *FiveThirtyEight's* polling average showed Democratic candidate Hillary Clinton consistently lead Republican candidate Donald Trump in opinion polling nationally from June to election day on November 8. While the actual outcome of the popular vote was replicated, Clinton's lead of 4% in the *FiveThirtyEight* average was almost double the actual lead on election day.

In the leadup to the 2019 Australian Federal Election, the Newspoll conducted by *The Australian* had the Australian Labor Party (ALP) enjoying consistent leads since the 2016 election which peaked at 12% on a two-party-preferred basis in 2018 after the spill motion within the Liberal Government led to the removal of Malcolm Turnbull as Prime Minister, and instalment of Scott Morrison. Even on May 17, 2019, a mere one day prior to the election, the Newspoll had the ALP leading the Liberal-National Coalition by 3 percentage points. In reality, the Liberal-National Coalition had 41.4% of the primary vote, as opposed to 33.3% for the ALP, and the Liberal-National Coalition was returned to government with a 2-seat majority in the House of Representatives.

The above examples provide definite evidence that opinion polling as a standalone use is misleading.

The primary reason for this is the simple understanding that in both the US, and Australia, as with many other democracies, a two-party preferred national vote is meaningless when it comes to the results of the election. In the US, the result is delivered based on which candidate has the higher number of Electoral College votes, which are distributed based on which states a candidate wins. In 2016, despite Clinton having a greater share of the popular vote, Donald Trump was able to win more states, and, therefore, gain more Electoral College votes. While the US mainly operates within a two-party system, forecasting becomes much more complicated in multi-party systems such as Australia (Biswas, 2021). Alongside the two major parties in Australia, namely the ALP and the Liberal National Party (LNP), there exists an infinite number of minor parties, including but not limited to, the Australian Greens, the United Australia Party (UAP), Pauline Hanson's One Nation (PHON), Katter's Australian Party (KAP), and the Centre Alliance. Hence, the use of a two-party-preferred poll is made almost redundant, particularly due to the influence of the Greens and the UAP, who had 13% of the primary vote in 2019 (Green, 2019).

A further reason for the misleading nature of polls is the decreasing response rates to polls. Lower limits for telephone polls have reached 6% recently, and this would likely be lower in other polling methods (Zhou, et al., 2021). Further, this is likely compounded by growing apathy towards politics, particularly among younger generations, and those without college degrees, resulting in biased results towards those more politically aware. This would explain "the hidden vote," resulting from those without college degrees generally not responding to polls and voting for conservative parties and candidates (Zhou, et al., 2021).

## Economic Models

Economic Models are believed to have first been used in Election Forecasting in the late 20<sup>th</sup> century, focussing on House of Representatives elections in the US during the 1970s (Leigh and Wolfers, 2001). The premise of using economic models to predict elections is based on a theorisation that the voting electorate will likely decide to vote for

the incumbent if the economy is going well. In essence, this depicts that if one has a stable income, and can afford what is required to sustain a high enough standard of living, they will most likely want to preserve the status quo.

There is, however, a greater variance in Economic Model-based forecasting than in Opinion Polling for the simplistic reason of the greater number of indicators available to forecasters. For example, *Moody's Analytics* in the US uses house prices, wage growth, and gas prices as indicators by which to forecast a potential victor. They say that these three indicators are used due to their immense bearing on everyday life. While they had correctly predicted the outcome of every presidential election since 1980, in 2016 their prediction of a Clinton victory with 326 electoral votes was 94 votes off (Ydstie, 2016). In 2020, the *Moody's Analytics* model predicted a Trump victory with 332 electoral college votes. Ultimately, Trump only won 232 votes, with Joe Biden winning the election with 306 votes (Zandi, et al., 2019).

Another model by Ray Fair from Yale University relies on economic growth per capita in the preceding term before an election. Fair's model summates that if growth is sluggish, the challenger candidate will be elected, while if growth is strong, the incumbent will be re-elected (Ydstie, 2016). In both 2016 and 2020, GDP growth in the USA was sluggish and, hence, Fair's model correctly predicted that the challenger would be elected.

Lynn Vavreck, a political scientist from UCLA, notes, however, that elections today are about more than household economics. Elections today are often centred around how candidates and parties decide to construct the narrative to their advantage. For example, Donald Trump, in 2016, was able to construct an economic campaign focussed on losses stemming from Democratic policies, while Clinton attempted to focus on more positive economic factors, such as continued growth. Hence, while middle-class suburban voters may not have personally been affected by job losses due to immigration, Trump's ability to persuade them that this was a major issue led to them voting for him.

In Australia, indicators often used in Economic Modelling are unemployment, inflation, GDP growth, wages, and interest rates. Similarly, to the USA, if these indicators are strong, the incumbent is favoured to be returned, while if they are weak, the challenger is favoured to be elected (Leigh and Wolfers, 2001). In the three years prior to the 2019 election, unemployment had declined to 5%, and inflation had fallen to 1.5%, despite the Reserve Bank of Australia (RBA) reducing interest rates to 1%. Wage growth, however, had begun to recover after hitting lows of 1.75% in 2017, while GDP growth had been sluggish at the 1% mark. Hence, a credible case could be made for an ALP victory given the relative weakness of the indicators. The Coalition, however, was re-elected, based largely on their ability to construct a narrative of reckless spending by the ALP.

The main reason for the failure of this method of forecasting is the simple understanding that, in this era of identity politics and activism, the economy no longer is the primary reason for one's vote. With issues such as climate change and COVID-19 continuing to dominate the news, it is highly likely that economic models alone will not be able to accurately predict future elections.

## Election Markets

Election markets refer to betting markets where individuals can place a monetary bet on a particular election outcome and receive a payout if the outcome is true (Erikson and Wleizen, 2012). This practice of betting on an Election Result is considered to have been around in the USA since the Lincoln Administration, with the city of New York considered to be the centre of betting activity in the country (Rhode and Strumpf, 2004).

The 2016 Presidential Election was believed, at the time, to be the "most wagered-upon political event ever," with over 130 million USD being traded in various markets to decide the victor of the Election (Tennery, 2016). A major market used in US Presidential Elections is the *Iowa Electronic Market (IEM)*, which offers odds on the share of the 2-party popular vote a candidate will receive. On November 7, 2016 (the day before the Election), IEM

forecasted Hillary Clinton would receive 56.8% of the two-party popular vote (Iowa Electronic Market, 2016). In reality, Clinton won 51.1% of the two-party popular vote (CNN, 2016) and bookmakers across the globe made mass losses, and share prices for most bookmakers fell (Sjolin, 2016).

The 2020 Election, while not as drastic as 2016, saw similar failures to accurately forecast the vote share of the Presidential Election. On November 2, 2020, IEM forecasted Joe Biden to win 55.5% of the two-party popular vote (Iowa Electronic Market, 2020), while he went on to win 52.2% of the two-party popular vote in the November 3 Election (CNN, 2020).

In Australia, betting is done in a similar way to that of sporting events, whereby bookmakers set odds which would be paid out for each dollar wagered if the outcome eventuated. On a simplistic market for the victor of the 2019 Australian Federal Election, all three major bookmakers, Sportsbet, Ladbrokes, and TAB, had the ALP at short odds to form government, with Ladbrokes and TAB at \$1.22, while Sportsbet was at \$1.25. If odds were replicated in the May 18 election, the ALP would have won 82 seats in the 151 seat House of Representatives chamber, resulting in a 6-seat majority for a Labor Government (Wright and Koslowski, 2019).

On Election Day, the Coalition won 77 seats, while the ALP won 68, resulting in a Coalition Majority Government with a 2-seat majority (Australian Broadcasting Corporation, 2019). Major bookmaker Sportsbet noted that the result cost them upwards of 5.2 million AUD (9News Staff, 2019).

As can be noted by the examples outlined, Election Markets have failed to properly predict Election results in many recent democratic exercises, and it can be ascertained that this has led to major fiscal losses for bookmakers globally.

## 2022 Australian Federal Election

In 2022, Australians will once again head to the polls in a similar situation to 2019. As of February 2022, the ALP has a large lead over the Coalition in opinion polls, and betting markets have placed the ALP as short-priced favourites to form a majority Government for the first time since 2009.

Opinion Polling in December 2021 by *The Australian* had the ALP at 53% of the 2-party preferred vote, while a *Roy Morgan* poll had the ALP at 56.5% of the 2-party preferred vote. These numbers, however, are quite like the numbers preceding the 2019 election, and the impact of COVID-19 has meant that many of the issues plaguing opinion polls then have not yet been resolved. Hence, it can be concluded that these polls may be a misrepresentation of the electorate and a Labor victory is not certain.

Economic modelling, however, may paint a differing story to 2019. Unemployment is below 5%, and at levels not seen since before the Great Financial Crisis, the recovery from COVID-19 is happening much faster than anticipated, and inflation is not expected to exceed the 2-3% target set by the RBA in the long-term. While gas and oil prices are at record highs, the Coalition's ability to construct narratives of itself as strong economic managers would place them in good stead if the election was held on the economy.

However, mismanagement of the COVID-19 vaccine rollout, and sluggish action on climate change has meant that bookmakers have placed the ALP as short-priced favourites to be victorious in the election. TAB has placed the ALP as \$1.65 favourites to form the next Australian Government, while the Coalition is at \$2.25.

For the reasons outlined earlier, these forecasting methods have been unsuccessful, and there is a possibility that they may be wrong again. It is therefore important that new methods are found for Election Forecasting.

# Methodology

Actuarial Science refers to the study of applying mathematical and statistical methods to analyse risk, and a major task is the forecasting of cash flows using a random variable known as an Actuarial Assumption. For example, in the calculation of premiums for Life Insurance, this is used in simulations to predict the number of deaths and the interest rate in each annuity. The methodology used in this study also resembles a basic Monte-Carlo simulation.

## Aim of the Study

Such a methodology can be used to accurately forecast probabilities of a particular candidate winning a seat, and, hence, remove the issues surrounding the misleading nature of 2-party preferred polls. This will enable a more appropriate, and accurate statistical method, which will result in better Election Forecasting.

## Data Collection

The data required for this study is the 2019 Australian Federal Election First Preference votes, and the 2-party preferred preference flow in each seat. Furthermore, demographic data, COVID-19 vaccination rates, COVID-19 case numbers, economic indicators, and Opinion Poll results must also be considered. The data on 2019 election results can be obtained from the Australian Electoral Commission website, and demographic data can be obtained from the Australian Bureau of Statistics. COVID-19 statistics can be found on the Australian Government Department of Health website, while economic indicators can be found on the Australian Government Department of the Treasury website. Opinion poll results were obtained from *The Australian* and *Roy Morgan*.

## Research Design

To analyse each of the 151 seats in the House of Representatives, 151 Microsoft Excel spreadsheets, one for each seat, must be set up. Within each spreadsheet, 3 sheets should be set up: Inputs and Outputs, Random Swings, and Preference Flow

										Simulation No.	Result	Prob of Coalition	0.384
Boothby										1	Coalition	Prob of Labor	0.616
										2	Labor		
										3	Labor		
										4	Coalition		
First preferences (2019)										5	Coalition		
	ALP	LP	Greens	UAP	PHON	Independents	Nats	Other		6	Coalition		
	34.63%	45.19%	11.96%	1.89%	0.00%	2.57%	0.00%	3.75%		7	Coalition		
										8	Labor		
Preference Flows (2019)										9	Coalition		
	ALP	Coalition								10	Labor		
Greens	83.97%	16.03%								11	Coalition		
UAP	31.33%	68.67%								12	Labor		
PHON	0	0								13	Labor		
Independents	65.00%	35.00%								14	Coalition		
Nats	0.00%	0.00%								15	Coalition		
Other	37%	63%								16	Labor		
										17	Labor		
										18	Labor		
										19	Coalition		
										20	Coalition		
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Figure 1. Inputs and Outputs sheet for Federal seat of Boothby, South Australia

Simulation	ALP	LP	Greens	UAP	PHON	Independents	Nats	Other	Remainder
1	-4%	-2%	-3%	1%	0%	7%	0%	-4%	-5%
2	0%	-4%	-2%	0%	0%	18%	0%	-5%	7%
3	-2%	-5%	0%	1%	0%	17%	0%	-4%	7%
4	-3%	3%	0%	1%	0%	20%	0%	5%	26%
5	-3%	-3%	2%	-1%	0%	12%	0%	5%	12%
6	0%	2%	-4%	-1%	0%	8%	0%	-1%	4%
7	2%	2%	1%	-1%	0%	17%	0%	6%	27%
8	6%	-8%	-2%	1%	0%	7%	0%	5%	9%
9	0%	1%	-2%	0%	0%	19%	0%	6%	24%
10	5%	3%	1%	0%	0%	6%	0%	-3%	12%
11	1%	-4%	-4%	1%	0%	5%	0%	3%	2%
12	5%	-6%	2%	1%	0%	7%	0%	-3%	6%
13	-1%	-8%	-1%	-1%	0%	14%	0%	4%	7%
14	-4%	-3%	-3%	-1%	0%	7%	0%	6%	2%
15	2%	3%	-2%	1%	0%	13%	0%	1%	18%
16	3%	-6%	-1%	1%	0%	17%	0%	3%	17%
17	-4%	-8%	-4%	1%	0%	14%	0%	4%	3%
18	5%	3%	1%	-1%	0%	6%	0%	-2%	12%
19	1%	-1%	0%	-1%	0%	8%	0%	5%	12%
20	2%	1%	-4%	1%	0%	5%	0%	-3%	2%
21	1%	0%	-2%	0%	0%	10%	0%	0%	9%
22	6%	-1%	-4%	1%	0%	15%	0%	-2%	15%
23	1%	-5%	-3%	0%	0%	11%	0%	6%	10%
24	0%	-2%	-3%	-1%	0%	5%	0%	4%	3%
25	4%	-6%	2%	0%	0%	5%	0%	3%	8%
26	1%	1%	2%	0%	0%	7%	0%	4%	15%

**Figure 2.** Random Swings sheet for Federal seat of Boothby, South Australia

Figure 1 depicts the Inputs and Outputs sheet for the marginal South Australia seat of Boothby. As can be seen, data inputted includes the First Preference data from 2019, and Preference Flows data from 2019.

Figure 2 shows the Random Swings sheet, which houses the Actuarial Assumptions as mentioned earlier. This is carried out through the *RANDBETWEEN* function on Microsoft Excel, which returns a random number between a specified upper and lower limit. As the *RANDBETWEEN* function only returns integer values, the output of the function is then divided by 100 to formulate a percentage swing. This is then copied down across the 1000 simulations.

The remainder is a sum function of the total swing, which is then subtracted from the final preferences to ensure that the sum of the preferences is 100%.

**Equation 1:** Random Swing Formula

$$S = \text{if} \left( F > 0, \left( \frac{\text{randbetween}(L, U)}{100} \right), 0 \right)$$

Where S, F, L, and U are the Random Swing, First Preference, Lower Limit, and Upper Limit Respectively

In Equation 1, a logical if statement exists to ensure that the swing is only calculated if there is a candidate for that party running in the seat. For example, in Boothby, Pauline Hanson’s One Nation (PHON) is not running and, hence, no swing is calculated.

The lower and upper limits were calculated by considering demographic, COVID-19, and economic data, as well as Opinion Polling in particular states. For example, the seat of Boothby is considered to be “Outer Metropolitan” by the Australian Electoral Commission, and, on average, is more educated and richer than the rest of Australia. We can compare this to opinion poll data, which shows this demographic is more likely to vote for the left-leaning ALP in this election, meaning there is a higher chance of a negative swing against the Coalition, than the ALP. Hence, the lower limit of the Coalition is -8%, while it is -5% for the ALP. The upper limit for the Coalition is 3%, while it is

Simulation	ALP	LP	Greens	UAP	PHON	Independents	Nats	Other	Labor 2-party	Coalition 2-party
1	31.46%	44.02%	9.79%	3.72%	0.00%	10.40%	0.00%	0.58%	47.83%	52.16%
2	33.46%	40.02%	8.79%	0.72%	0.00%	19.40%	0.00%	-2.42%	52.79%	47.20%
3	31.46%	39.02%	10.79%	1.72%	0.00%	18.40%	0.00%	-1.42%	52.50%	47.49%
4	27.30%	43.86%	7.63%	-1.44%	0.00%	18.24%	0.00%	4.42%	46.74%	53.25%
5	29.63%	40.19%	11.96%	-1.11%	0.00%	12.57%	0.00%	6.75%	49.99%	50.00%
6	33.96%	46.52%	7.29%	0.22%	0.00%	9.90%	0.00%	2.08%	47.37%	52.62%
7	32.13%	42.69%	8.46%	-3.61%	0.00%	15.07%	0.00%	5.25%	49.84%	50.15%
8	39.13%	35.69%	8.46%	1.39%	0.00%	8.07%	0.00%	7.25%	54.60%	45.39%
9	30.63%	42.19%	5.96%	-2.11%	0.00%	17.57%	0.00%	5.75%	48.52%	51.47%
10	37.63%	46.19%	10.96%	-0.11%	0.00%	6.57%	0.00%	-1.25%	50.61%	49.38%
11	35.30%	40.86%	7.63%	2.56%	0.00%	7.24%	0.00%	6.42%	49.58%	50.41%
12	38.63%	38.19%	12.96%	1.89%	0.00%	8.57%	0.00%	-0.25%	55.58%	44.41%
13	32.46%	36.02%	9.79%	-0.28%	0.00%	15.40%	0.00%	6.58%	53.05%	46.94%
14	30.30%	41.86%	8.63%	0.56%	0.00%	9.24%	0.00%	9.42%	47.20%	52.79%
15	33.63%	45.19%	6.96%	-0.11%	0.00%	12.57%	0.00%	1.75%	48.26%	51.73%
16	34.80%	36.36%	8.13%	0.06%	0.00%	16.74%	0.00%	3.92%	53.97%	46.02%
17	30.13%	36.69%	7.46%	2.39%	0.00%	16.07%	0.00%	7.25%	50.27%	49.72%
18	37.63%	46.19%	10.96%	-1.11%	0.00%	6.57%	0.00%	-0.25%	50.66%	49.33%
19	33.63%	42.19%	9.96%	-1.11%	0.00%	8.57%	0.00%	6.75%	49.71%	50.28%
20	36.30%	45.86%	7.63%	2.56%	0.00%	7.24%	0.00%	0.42%	48.36%	51.63%
21	34.13%	43.69%	8.46%	0.39%	0.00%	11.07%	0.00%	2.25%	49.38%	50.61%
22	38.13%	41.69%	5.46%	0.39%	0.00%	15.07%	0.00%	-0.75%	52.35%	47.64%
23	33.96%	38.52%	7.29%	0.22%	0.00%	11.90%	0.00%	8.08%	50.89%	49.10%
24	34.13%	42.69%	8.46%	0.39%	0.00%	7.07%	0.00%	7.25%	48.63%	51.36%
25	37.30%	37.86%	12.63%	0.56%	0.00%	6.24%	0.00%	5.42%	54.13%	45.86%
26	33.13%	43.69%	11.46%	-0.61%	0.00%	7.07%	0.00%	5.25%	49.10%	50.89%

6% for the ALP.

Figure 3. Preference Flow sheet for Federal Seat of Boothby, South Australia

Figure 3 is the final sheet in the file and shows the 2 party-preferred result of each simulation. The party totals for first preferences are in black and are calculated by adding the 2019 First Preference result with the random swing calculated in the Random Swings sheet. The remainder is then divided by the number of candidates, which in Boothby is six, and that is subtracted from each total.

Equation 2: Simulated Party Total Equation

$$T = if \left( F > 0, \left( F + S - \frac{R}{n} \right), 0 \right)$$

Where T, F, S, R, and N are Simulated Party Totals, 2019 First Preferences, Random Swings, Swing Remainder, and the number of candidates respectively

The logical if function in Equation 2 exists for the same reason as in Equation 1.

The 2-party preferred in Figure 3 can be seen in red and blue for the two parties leading on first preferences. In the seat of Boothby, this is the ALP, and the Coalition, respectively. The ALP total is calculated by multiplying each minor party’s total by the preference flow for the ALP as stipulated in Figure 1 and adding the sum of these to the ALP total. The Coalition is done in the same way, but with the Coalition’s data instead of the ALP’s.

Equation 3: 2-party preferred Equation

$$P_{ALP} = T_{ALP} + Pf_{Greens} \times T_{Greens} + Pf_{UAP} \times T_{UAP} + \dots + Pf_{Other} \times T_{Other}$$

Where P, T, and Pf are 2-party preferred, Simulated Party Totals, and 2019 Preference Flows respectively.

The victor of each of the 1000 simulation is recorded in the Inputs and Outputs sheet, as seen in Figure 1, using an if function. A count-if function is then used to record the number of simulations which are won by each party. This is then divided by 1000 to record the percentage probability of a party winning the seat.

**Equation 4:** Simulation Result Formula

$$R = \text{if}(P_{ALP} > P_{Coalition}, ALP, Coalition)$$

Where R, and P are the Simulation Result, and 2-party preferred respectively.

**Equation 5:** Probability of Party Formula

$$P(ALP) = \text{COUNTIF}(R, ALP)/1000$$

Where R is the Simulation Results

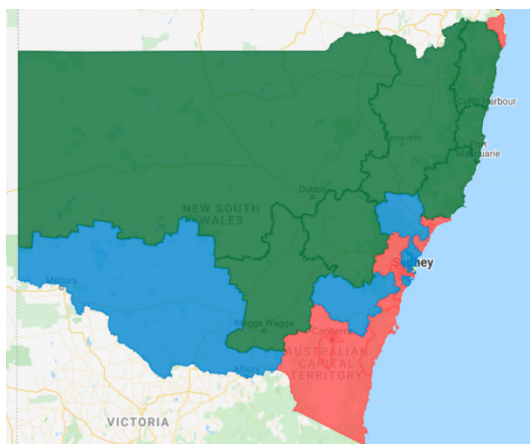
This is then linked to a master spreadsheet which records the probabilities of each seat, and then collates the number of seats for each party.

## Results

Having collated the data on the master spreadsheet, the breakdown of the results on a state-by-state basis is as follows:

### New South Wales and the Australian Capital Territory

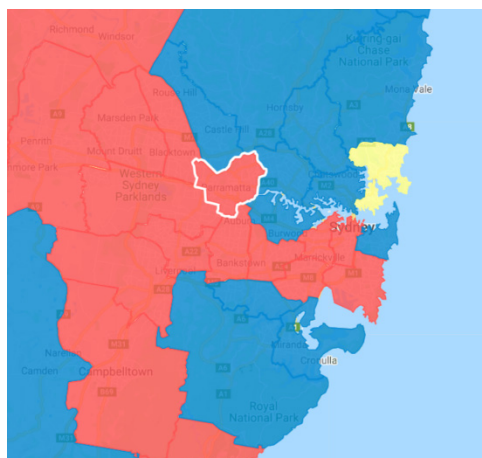
For reference, dark green refers to the National party, blue refers to the Liberal Party, red refers to the Australian Labor Party (ALP), and yellow refers to an independent candidate. The Liberal and National Parties are in a Coalition referred to as the Liberal-National Coalition (“the Coalition”).





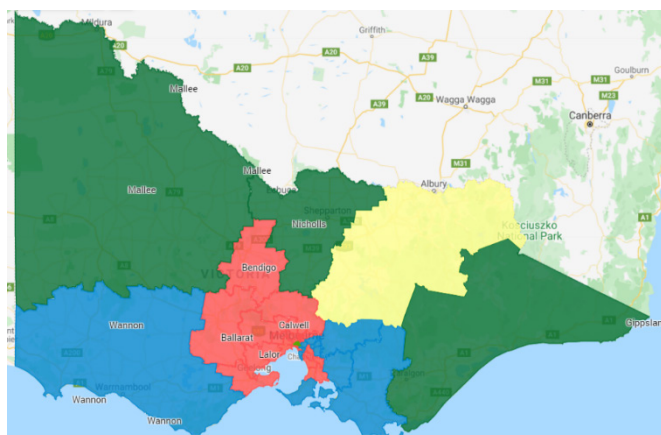
**Figure 4.** Forecast 2022 Electoral Map (New South Wales and Australian Capital Territory)

While the electoral map for Regional NSW (Figure 4) is largely the same as in 2019, the coal seat of Hunter, currently held by retiring Labor MP Joel Fitzgibbon, has a 63% chance of falling to the National party. Fitzgibbon was a member of the ALP's right-wing faction and was vocal in his opposition to the abolishment of Coal, and, hence, his retirement makes it highly likely that the Right-wing Nationals will pick up this seat.



**Figure 5.** Forecast 2022 Electoral Map (Urban New South Wales)

If we take a more detailed look at the urban centre of New South Wales (Figure 5), we can see that Northern Sydney, which is generally richer and more European than other parts of Sydney, are largely held by the Liberal party. South-Western Sydney, meanwhile, which is made up of more diverse, and less rich populations, is largely held by the ALP. Apart from Hunter, the only other seats with possibilities of falling in NSW are Reid, Wentworth, and North Sydney, to Labor, and Independent candidates Allegra Spender and Kylea Tink respectively.



Victoria

**Figure 6.** Forecast 2022 Electoral Map (Victoria)

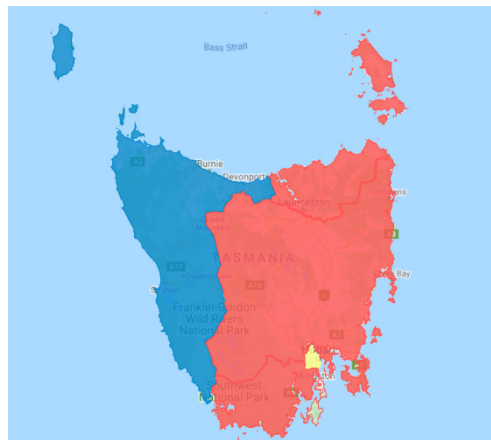


**Figure 8.** Forecast 2022 Electoral Map (Queensland)

The state of Queensland is likely to continue to be a major issue for the ALP, with 2019 results expected to be replicated. The only potential change in Queensland is the seat of Longman, which has a 47% chance of falling to Labor. Katter's Australian Party is certain to hold on to the regional seat of Kennedy, depicted in brown in Figure 8.

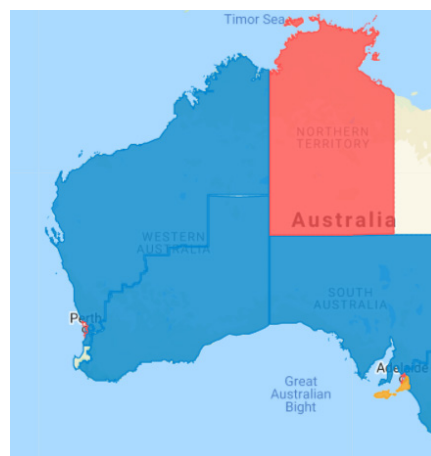
The seat of Brisbane is a possibility to fall to Labor, although the Coalition remains favourites to hold the seat (58%).

## Tasmania



**Figure 9.** Forecast 2022 Electoral Map (Tasmania)

Despite having elected a Liberal Government in the 2021 state election, Labor is widely expected to gain at least one seat in Tasmania. The seats of Bass and Braddon are in play, with Bass being more likely to fall to Labor, while Braddon is marginally likely to stay with the Coalition. The seat of Clark is certain to be held by Independent MP Andrew Wilkie, as depicted in yellow in Figure 9.

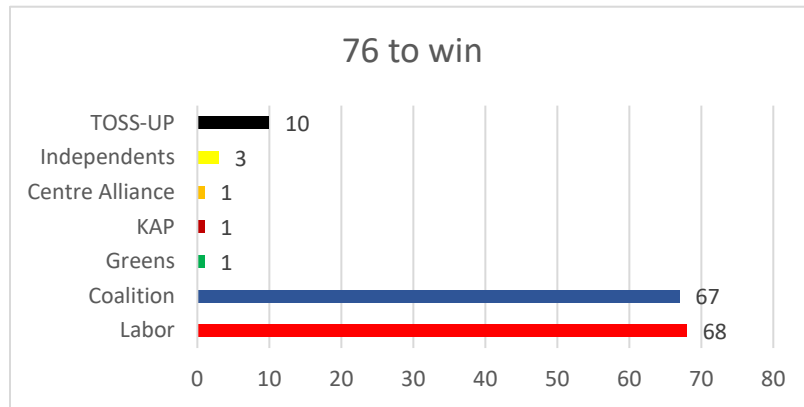


South Australia (SA), Western Australia (WA), and the Northern Territory (NT)

**Figure 10.** Forecast 2022 Electoral Map (SA, WA, and NT)

While almost all seats in SA and the NT are likely to be held by the incumbents, the seat of Boothby (SA) is likely (62%) to fall to Labor as the only marginal seat in the state. Western Australia is greatly intriguing due to the immense popularity of Labor State Premier Mark McGowan meaning that the Coalition has very little resources in the state. Due to this, marginal seats such as Pearce, and Swan, are possible gains for Labor, with Swan having a 50% chance of falling.

Having defined TOSS-UP seats as those with probabilities between 43-57%, the makeup of the House of Representatives is as depicted in Figure 11.



**Figure 11.** House of Representatives Makeup (>60%)

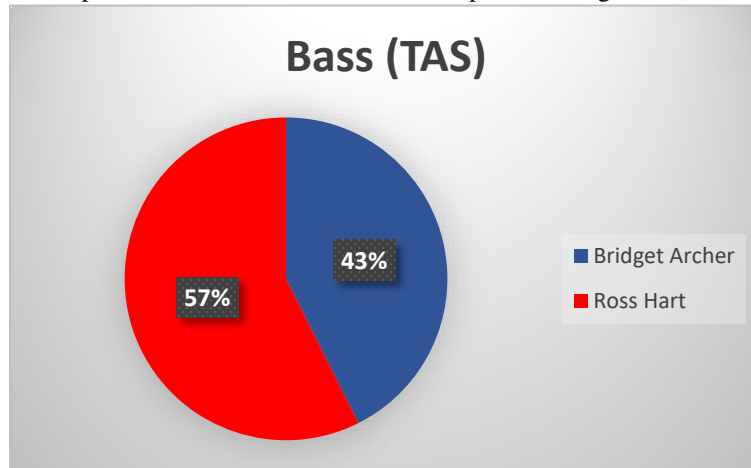
For reference, if this methodology is retrospectively used to predict the result of the 2019 Federal Election in Queensland, which was the state which deviated from the polls the most, the method correctly predicts all but two seats – Flynn and Longman – which were both in the 43-57% TOSS-UP range,

### Key seats

The 10 toss-up seats (Figure 11) are as follows:

### *Bass*

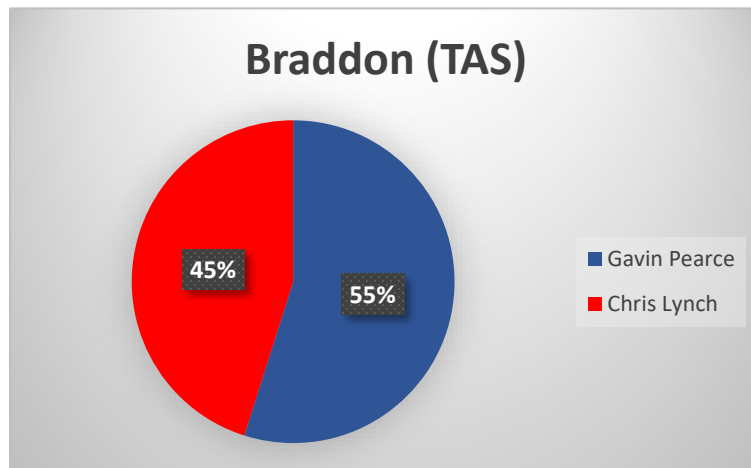
The north-eastern Tasmanian seat is currently held by Liberal MP Bridget Archer, but as seen in Figure 12, Labor challenger Ross Hart is likely to take the seat of Bass. The strong performance of the Tasmanian state Coalition in the 2021 state election, however, provides the Coalition with some hope of holding on to Bass.



**Figure 12.** Bass probabilities

### *Braddon*

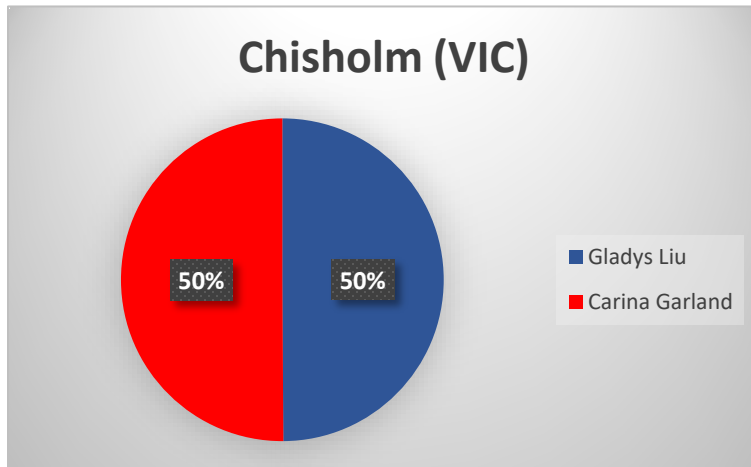
Braddon is another key seat in Tasmania and is currently held by Liberal MP Gavin Pearce. It is, however, under considerable threat from Labor Challenger Chris Lynch (Figure 13).



**Figure 13.** Braddon Probabilities

### *Chisholm*

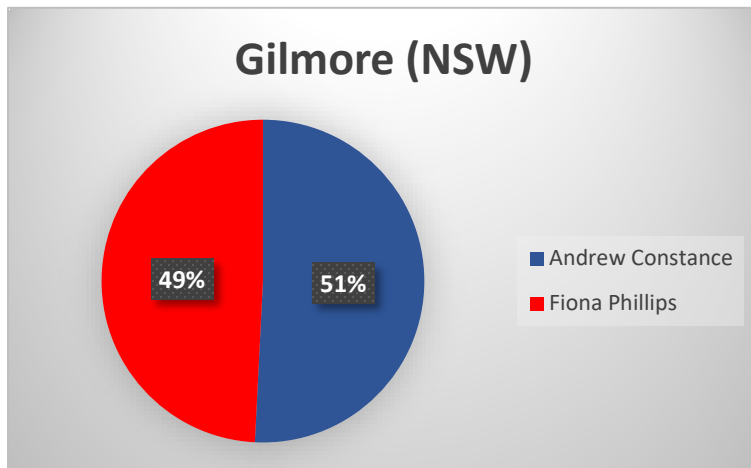
Chisholm is one of the most marginal seats in the nation and is currently held by Liberal MP Gladys Liu. However, tensions with China have led many in the Australian-Chinese community to grow resentful of the Coalition Government, leading to a possibility of a Labor gain due to the large Chinese diaspora in Chisholm. Liu's Chinese heritage, however, may enable the Coalition to hold on.



**Figure 14.** Chisholm Probabilities

*Gilmore*

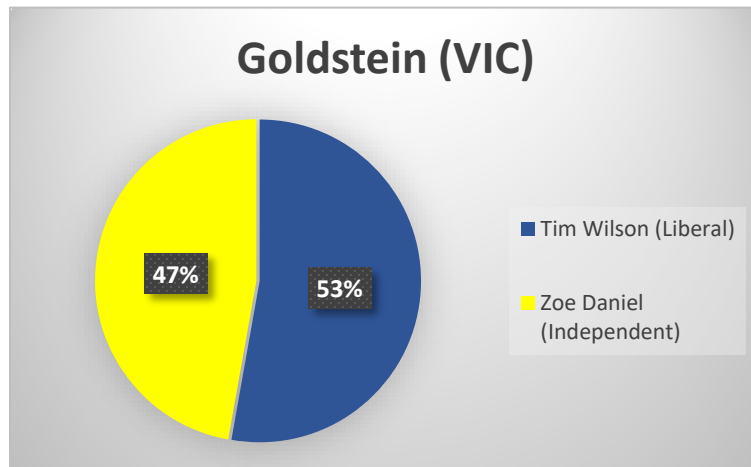
The regional NSW seat of Gilmore is currently held by Labor MP Fiona Phillips but will be under severe pressure from the Coalition due to Former NSW Transport Minister Andrew Constance running in the seat (Figure 15). The failures of the Federal Coalition during the Black Summer bushfires in 2019-20 may still have an impact, despite the strong candidacy of Constance. Further, while conclusions drawn from state byelections are fraught with danger, Labor’s victory in the overlapping state seat of Bega in the February 2022 NSW By-Elections for the first time in its history will likely give Phillips some optimism in holding on to Gilmore.



**Figure 15.** Gilmore probabilities

### Goldstein

The seat of Goldstein is currently held by the Assistant Minister for Industry, Energy and Emissions Reduction, Liberal MP Tim Wilson. Goldstein has historically been one of the safest seats for the Coalition in the nation, with a First Preference vote of over 50% in 2019. In 2022, however, the aforementioned “Voices of” campaign have strong chances in Goldstein, with former Australian Broadcasting Corporation (ABC) correspondent Zoe Daniel being



chosen to run as an independent.

Figure 16. Goldstein probabilities

### Higgins

Higgins is currently held by Liberal MP Dr Katie Allen MP but is under considerable threat from both the Greens and Labor. While in 2019, a messy campaign from the Greens undermined Labor’s vote, and led to the Coalition holding Higgins, 2022 promises to be more coordinated. However, Labor’s decision to install Michelle Ananda-Rajah, a doctor who was outspoken in her opposition to the AstraZeneca COVID-19 vaccine, is likely to hurt their chances.

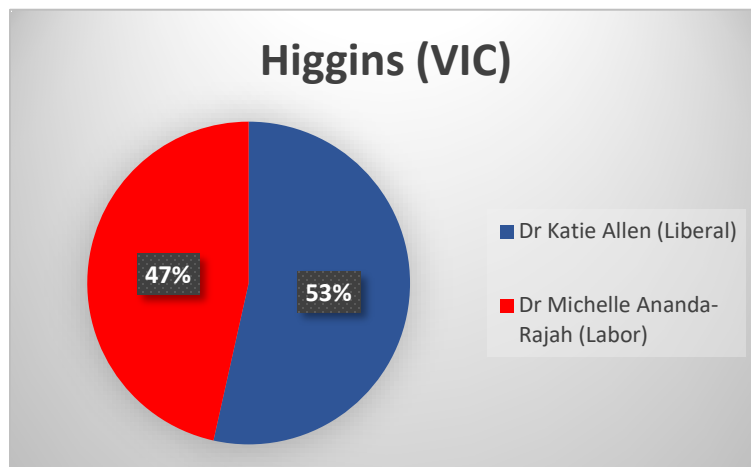
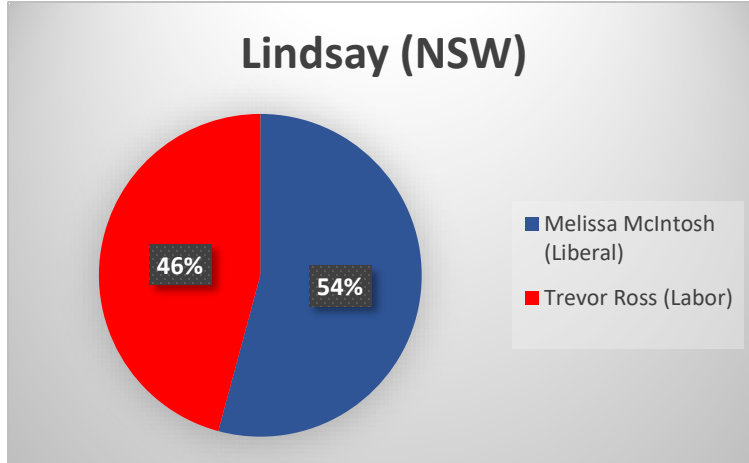


Figure 17. Higgins probabilities

### *Lindsay*

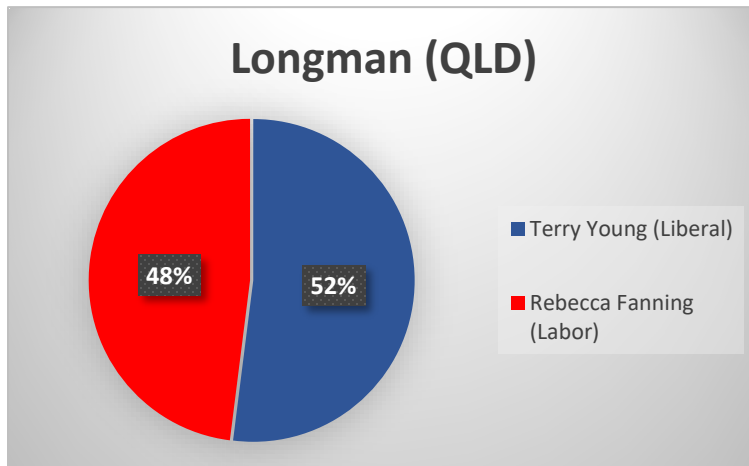
Currently held by Liberal MP Melissa McIntosh after gaining the seat from Labor in 2019, the bellwether Western Sydney seat of Lindsay is a possibility to fall back to Labor due to issues surrounding NSW's "one-city, two-rules" lockdown in mid-2021, where Western Sydney endured harsher laws than Eastern Sydney. McIntosh's personal vote, however, could keep Lindsay with the Coalition.



**Figure 18.** Lindsay probabilities

### *Longman*

The urban seat of Longman is currently held by Liberal MP Terry Young, after a 4% swing towards the Coalition in 2019, a trend synonymous with other seats in QLD. Further, the strong performance of the right-wing PHON in Longman enabled the Coalition to win the seat with 66% of preferences flowing to them. In 2022, the Coalition is likely to hold the seat, however, if a major swing was to occur against the Coalition and/or PHON, Labor is a possibility in Longman.

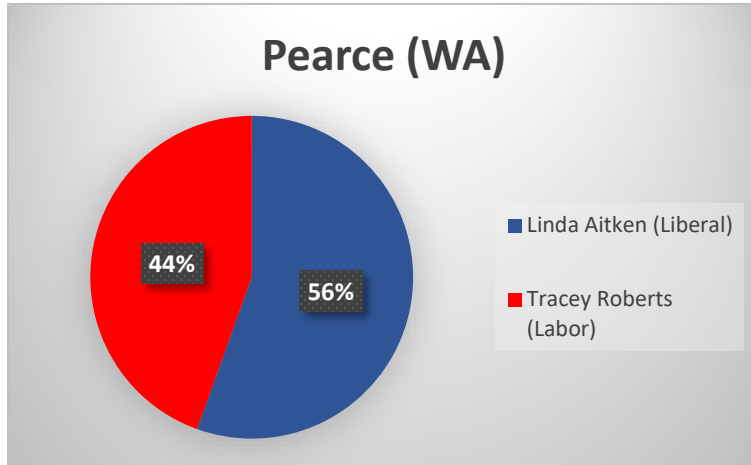


**Figure 19.** Longman probabilities



### *Pearce*

Having recently been redistributed due to the addition of Hawke in Victoria, the Coalition's margin in Pearce has been severely hurt. Further, incumbent Liberal MP Christian Porter has faced sexual assault allegations, and, subsequently, been removed from cabinet. His retirement offers a chance for the Coalition to reset in the seat, but the expected swing

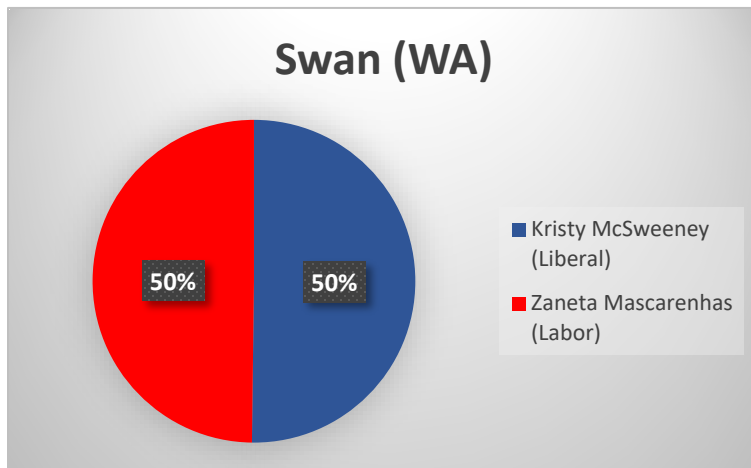


towards Labor across Western Australia gives them a chance in Pearce.

**Figure 20.** Pearce probabilities

### *Swan*

Currently held by Liberal MP Steve Irons, a pre-selection battle in the WA branch of the Liberal Party has led to Sky News commentator Kristy McSweeney being endorsed as the Liberal candidate for Swan. Like Pearce, the expected swing towards Labor, and the non-incumbency of the Liberal candidate, makes this seat a potential gain for Labor.



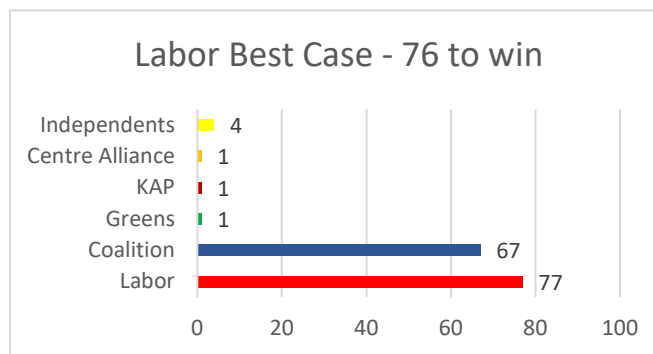
**Figure 21.** Swan probabilities

Based on further analysis of demographic and political data, these seats can be designated as follows (Table 1):

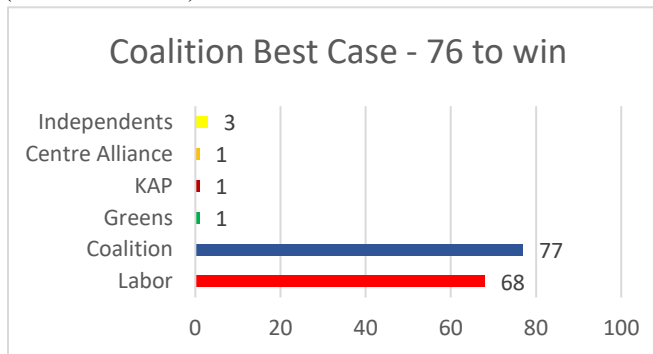
**Table 1.** Key Seat Results

Seat	Result
Bass (TAS)	Labor (LAB GAIN)
Braddon (TAS)	Liberal (LNP HOLD)
Chisholm (VIC)	Labor (LAB GAIN)
Gilmore (NSW)	Liberal (LNP GAIN)
Goldstein (VIC)	Liberal (LNP HOLD)
Higgins (VIC)	Liberal (LNP HOLD)
Lindsay (NSW)	Labor (LAB GAIN)
Longman (QLD)	Liberal (LNP HOLD)
Pearce (WA)	Liberal (LNP HOLD)
Swan (WA)	Labor (LAB GAIN)

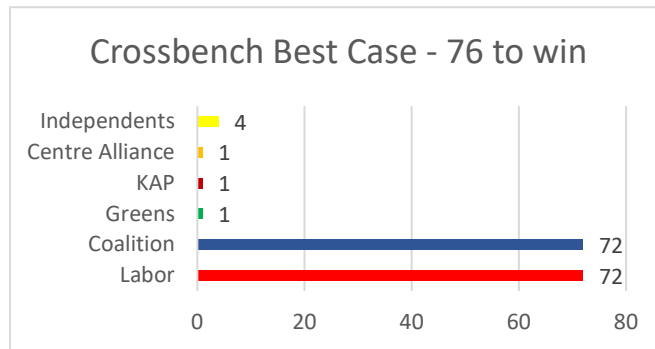
Having completed this analysis, there are 4 major outcomes – Labor Best Case, Coalition Best Case, Crossbench Best Case, and most likely, as seen in Figures 22-25.



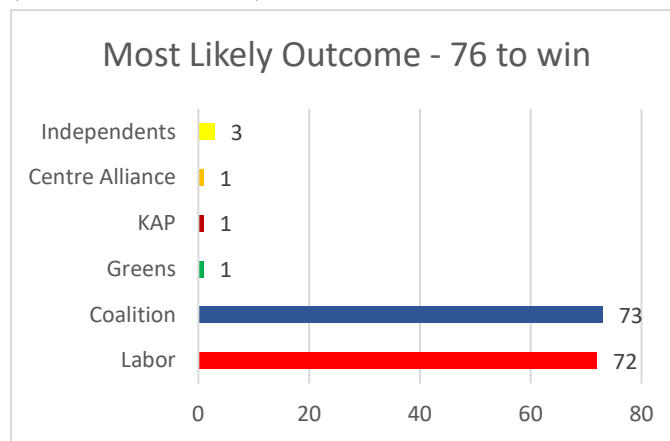
**Figure 22.** Final Outcome (Labor Best Case)



**Figure 23.** Final Outcome (Coalition Best Case)



**Figure 24.** Final Outcome (Crossbench Best Case)



**Figure 25.** Final Outcome (Most Likely)

## Discussion

As can be seen in Figures 22-25, the likelihood of a majority government in the 47<sup>th</sup> parliament is very slim. The main reason for this is the simple inability of the ALP to cut through to voters frustrated with the Coalition. This is largely down to two main factors: the fine line that the ALP must walk between angering its traditional working-class base, and the younger, more socially progressive voters arguing for radical change.

Further, the promised reopening of Western Australia to the rest of the nation in February 2022 was expected to have some possibility of eroding public goodwill towards Premier Mark McGowan, however, the subsequent decision to cancel that reopening is likely to make that erosion a certainty. The decision will likely lead Western Australians to question the credibility of messaging from the Labor State Government, and potentially hurt Federal Labor’s chances in the state, enabling the Coalition to hold on in Pearce and Swan.

The “Voices of” campaign in seats across urban Australia such as Goldstein, Kooyong, Mackellar, North Sydney, and Wentworth, provides an intriguing subplot to the Election. If they were to reduce the Liberal primary vote in those seats to below 45%, they could take most of the seats they are contesting, and, potentially, cause major issues for the Coalition. However, the impact of COVID-19 and reduced scope for campaigning means there is only one seat – Goldstein – wherein they have a credible chance in installing an Independent MP.

As in most recent Federal Elections, however, there remains a tangible unknown in the performance of the United Australia Party (UAP) and Pauline Hanson’s One Nation (PHON). The UAP’s strong showing in 2019 was widely accepted as a major reason for the Coalition’s re-election, due to strong preferences flowing to them. PHON

was also relatively strong in QLD, and, if they have a strong showing there it will be almost impossible for Labor to emerge with majority government. The Shooters, Fishers and Farmers (SFF) party could also help the Nationals hold onto their seats in regional NSW if they had strong performances in those seats.

The increased perceived power of state governments during the COVID-19 pandemic could affect how much the electorate benefits the Coalition Federal Government for Australia’s relatively strong performance during the pandemic. It is likely, however, that, particularly in urban seats, the Federal Government’s failures during the Black Summer bushfires have mainly been somewhat forgotten due to the pandemic. Further, Labor leader Anthony Albanese’s reluctance to announce many major policies due to a fear of being politically attacked by the Coalition could either be a masterstroke or lead to voters preferring to preserve the status quo.

If the outcome in Figure 25 eventuates, the party which would form government is incredibly difficult to predict. In Australia, if no party reaches 76 seats, parties must form deals with enough members of the “Crossbench” (Independents and Minor Parties) to have 76 seats. This is known as a minority government. The last time this eventuated was in 2010, when Labor formed a minority government with the Greens and three Independents. In that election, both Labor and the Coalition won 72 seats, with the 4 crossbench seats enabling Labor to cross the 76-seat threshold. With the 47<sup>th</sup> parliament possibly looking similar, it is possible that similar deals would allow Labor to form government and Anthony Albanese installed as Prime Minister in coalition with the Greens and two independents. However, the nature of the political sphere in the next parliament is very different to that of 2010. The Independents in Parliament today campaign on issues of integrity and Climate Change, as well as local representation. While the member for Clark, Andrew Wilkie, was in Parliament in 2010 and sided with Labor then, both Helen Haines, the member for Indi, and Zali Steggall, the member for Warringah, were first elected to Parliament in 2019. While we can assume that Wilkie will side with Labor, the other two independents have intriguing subplots. Steggall has voted with the Coalition Government on 59% of legislation, while she has voted with the Labor opposition on 37% of legislation (Australian Parliamentary Library, 2021). Haines has voted with the government on 52% of legislation, while she has voted with the opposition 45% of the time (Australian Parliamentary Library, 2021).

Based on these figures, both could likely side with the Coalition. However, with Climate Change and a Federal Anti-Corruption body being their major platforms, it is highly possible that they could side with the slightly more ambitious Labor party to attempt to get more climate action than with the Coalition. They could also use this balance of power to get promises for emissions reductions more than 50% on 2005 levels by 2030, which most scientists agree is what is required for Australia to avoid catastrophic global warming.

Bob Katter, the KAP member for Kennedy, is almost certain to side with the Coalition, as he did in 2010. Rebekha Sharkie, the Centre Alliance member for Mayo, however, is much more complex. She has voted with the Government and the Opposition 43.2% of the time each (Australian Parliamentary Library, 2021). Like Warringah and Indi, Mayo has historically been a safe Liberal seat, and Sharkie has previously worked for the Liberal party in 2010-2012.

Hence, the following is the potential split of the Crossbench (Table 2):

**Table 2.** Crossbench Supply and Confidence split

Name (Party)	Seat (State)	Party supporting
Adam Bandt (GRN)	Melbourne (VIC)	Labor
Zali Steggall (IND)	Warringah (NSW)	Liberal
Helen Haines (IND)	Indi (VIC)	Labor
Andrew Wilkie (IND)	Clark (TAS)	Labor
Bob Katter (KAP)	Kennedy (QLD)	Liberal
Rebekha Sharkie (Centre Alliance)	Mayo (SA)	Labor

Based on Table 2, the Coalition would, in essence, have 75 seats, while Labor would have 76, enabling a Labor Minority Government. Further, if Labor was to have a good election night, they could pick up Casey, Brisbane, Pearce, La Trobe, Reid, and Gilmore, enabling Majority Government. If, however, any of Helen Haines, Andrew Wilkie, and Rebekha Sharkie were to switch to the Coalition, they would be able to form minority government. Further, if the Coalition was able to hold on to two seats out of Chisholm, Lindsay, or Swan, they would also be able to form minority government. Furthermore, the seat of Boothby (SA), despite having a 62% chance of falling to Labor, has historically been volatile and if the Coalition was to have a strong showing on election day, they could hold onto that and form majority government. If the “Voices of” campaigns have strong performances, however, North Sydney, Wentworth, and Goldstein, could all fall to Independents, clearing the path for a Labor Government.

However, the most likely outcome, based on all the analysis conducted, is a Labor minority government, with Anthony Albanese installed as Prime Minister in a supply and confidence deal with the Greens, Centre Alliance, Helen Haines, and Andrew Wilkie.

## Conclusion

The methodology in this study has proven to be effective when used on results in Queensland during the 2019 election, despite that being far from the predictions based on traditional methods of election forecasting. This is evidence that its nature of being simulation-based enables more accurate process in predicting swings and eventual victors.

As is evident through the results and discussion sections, the 2022 Australian Federal Election will be incredibly close. The actuarial methodologies used in the study, by their simulated nature, enable a more adaptable process to the preferential, representative voting system used in Australia. This methodology provides a more appropriate forecast, as it specifically analyses the probabilities for each electorate, and uses preference data to form more accurate representations of each race.

Through this analysis, as shown in Figure 26, we can find that Labor is likely to win one more seat than the Coalition. However, as explained in the results section, the 10 seats defined as “TOSS-UP” seats can realistically go to either party, such is the marginality of those seats.

The most likely scenario, however, remains a Labor Minority Government as written in the discussion section.

## Acknowledgments

I would like to thank my mentor Stuart Madgwick for helping me with this project.

## References

- 9News. (2019, May 20). *Sportsbet expected to lose at least \$5.2 million after election bungle*. Retrieved from 9News: <https://www.9news.com.au/national/federal-election-2019-sportsbet-expected-to-lose-at-least-52-million-after-election-bungle/358fad0d-ed93-47c3-bddf-6aa175e6ca64>
- Biswas, A. (2021, November 5). *Why do Opinion Polls make Wrong Predictions?* Retrieved from The India Forum: <https://www.theindiaforum.in/article/why-do-opinion-polls-make-wrong-predictions>
- Cameron, S., & McAllister, I. (2019). *The 2019 Australian Federal Election: Results from the Australian Election Study*. Canberra: Australian National University, School of Politics and International Relations.
- FiveThirtyEight. (2016). *2016 Election Forecast*. Retrieved from FiveThirtyEight: <https://projects.fivethirtyeight.com/2016-election-forecast/>

- Green, A. (2019, August 28). *Party Totals*. Retrieved from Australian Broadcasting Corporation News: <https://www.abc.net.au/news/elections/federal/2019/results/party-totals>
- Green, A. (2021, July 26). *2021 Federal Redistribution – Boundaries Finalised for Victoria*. Retrieved from Antony Green's Election Blog: <https://antonygreen.com.au/2021-federal-redistribution-boundaries-finalised-for-victoria/>
- Haines, H. (2021, November). *How I vote*. Retrieved from Helen Haines MP: <https://www.helenhaines.org/about/how-i-vote>
- Iowa Electronic Markets. (2016). *2016 US Presidential Election Markets*. Retrieved from Iowa Electronic Markets: <https://iemweb.biz.uiowa.edu/markets/pres16.html>
- Iowa Electronic Markets. (2016, November). *Price History: PRES16\_VS*. Retrieved from Iowa Electronic Markets: [https://iemweb.biz.uiowa.edu/pricehistory/PriceHistory\\_GetData.cfm](https://iemweb.biz.uiowa.edu/pricehistory/PriceHistory_GetData.cfm)
- Kelly, J. (2021, December 5). *Latest Newspoll*. Retrieved from The Australian: <https://www.theaustralian.com.au/nation/newspoll>
- Leigh, A., & Wolfers, J. (2006). Competing approaches to forecasting elections: economic models, opinion polling and prediction markets. *IZA Discussion papers*.
- Raue, B. (n.d.). *Electoral Maps (2022)*.
- Rhodes, C. (2018, December 24). *A brief history of Opinion Polls*. Retrieved from Museum of Australian Democracy: <https://www.moadoph.gov.au/blog/a-brief-history-of-opinion-polls/#>
- Roy Morgan. (2022, January 20). *ALP (56%) increases lead over the L-NP (44%) in January as 'Omicron surge' causes problems around Australia*. Retrieved from Roy Morgan: <http://www.roymorgan.com/findings/8879-federal-voting-intention-january-2022-202201200425>
- S. Erikson, R., & Wleizen, C. (2012). Markets vs. polls as election predictors: An historical assessment. *Electoral Studies*, 532-539.
- Sharkie, R. (2021, April). *My Voting Record*. Retrieved from Rebekha Sharkie MP: [https://www.rebekhasharkie.com.au/about\\_rebekha/voting\\_record](https://www.rebekhasharkie.com.au/about_rebekha/voting_record)
- Sjolin, S. (2016, November 10). *Trump win sparks 'betting armageddon' as bookies get election wrong*. Retrieved from MarketWatch: <https://www.marketwatch.com/story/trump-win-sparks-betting-armageddon-as-bookies-get-election-wrong-2016-11-09>
- Steggall, Z. (2021, December). *My Voting Record*. Retrieved from Zali Steggall OAM MP: Federal member for Warringah: [https://www.zalisteggall.com.au/my\\_voting\\_record](https://www.zalisteggall.com.au/my_voting_record)
- Tennery, A. (2016, November 7). *Betting sites see record wagering on U.S. presidential election*. Retrieved from Reuters: <https://www.reuters.com/article/us-usa-election-gambling-idUSKBN1320HW>
- Totalisator Agency Board. (2022). *Australian Federal Politics*. Retrieved from TAB: <https://www.tab.com.au/sports/betting/Politics/competitions/Australian%20Federal%20Politics>
- W. Rhode, P., & S. Strumpf, K. (2004). Historical Presidential Betting Markets. *Journal of Economic Perspectives*, 18(2), 127-142.
- Wikipedia. (2022, January). *Candidates of the 2022 Australian federal election*. Retrieved from Wikipedia: [https://en.wikipedia.org/wiki/Candidates\\_of\\_the\\_2022\\_Australian\\_federal\\_election](https://en.wikipedia.org/wiki/Candidates_of_the_2022_Australian_federal_election)
- Wolfers, J., & Leigh, A. (2002). Three Tools for Forecasting Federal Elections: Lessons from 2001. *Australian Journal of Political Science*, 37(2), 223-240. Retrieved 2022, from <http://users.nber.org/~jwolfers/Papers/AJPS%20Three%20Tools%20Article.pdf>
- Wright, S., & Koslowski, M. (2019, May 8). *What the betting markets tell us about the seats set to fall on election night*. Retrieved from Sydney Morning Herald: <https://www.smh.com.au/federal-election-2019/what-the-betting-markets-tell-us-about-the-seats-set-to-fall-on-election-night-20190508-p5116h.html>

Ydstie, J. (2016, May 17). *When It Comes To Economic Election Prediction Models, It's A Mixed Bag*. Retrieved from National Public Radio: <https://www.npr.org/2016/05/17/477823032/when-it-comes-to-economic-election-prediction-models-its-a-mixed-bag>

Zhou, Z., Serafino, M., Cohan, L., Caldarelli, G., & A. Makse, H. (2021). Why polls fail to predict elections. *Journal of Big Data*, 8(137). Retrieved from <https://journalofbigdata.springeropen.com/track/pdf/10.1186/s40537-021-00525-8.pdf>