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Changes in the Voting Behaviour and Survival of Authoritarianism in Malaysia: Statistical Analysis on Election Results from 2004 to 2018

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Abstract

How does the voting behaviour of Malaysian electorates affect Malaysian politics? Does it change? Is it fixed? And how does it affect political regimes in Malaysia? This paper analyses the general election (GE) results in Malaysia from GE11 to GE14 and discusses Malaysia's voting behaviour and authoritarianism. The analysis is conducted with several Bayesian regression models diverging from one underlying model. The results show that there were changes in the voting patterns. Two crucial changes in the voting patterns emerged, i.e., the ethnic voting patterns and the economic voting patterns. Ethnically-mixed constituencies were the stronghold of Barisan Nasional in GE11. From GE12, Malay voters supported Barisan Nasional (and also PAS in GE14), and Chinese voters supported Pakatan Rakyat (and Pakatan Harapan in GE14). Middle-classes were supportive of Barisan Nasional in GE11 and GE12. This tendency changed from GE13. Moreover, in GE14, there was a negative correlation between income and the vote shares of Barisan Nasional, while FELDA residents had been consistently its stronghold. These changes in the voting behaviour did not contribute to the rise of a two-party (coalition) system in Malaysia due to the authoritarianism in Malaysia. This paper considers that the strategies of authoritarianism in Malaysia to garner seats are composed of two parts. Firstly, Barisan Nasional's regime abused authoritarian electoral rules that forced opposition parties to fight elections under unfair conditions. Secondly, Barisan Nasional's long-lived regime resorted to *ethnic populism* that appealed to ethnic sentiments of the ethnic majority and *developmentalism* that hid social issues from citizens and portrayed the state as a prime mover of economic growth in which material merits were provided to them, i.e., ideologies to retain political loyalties of people which have side effects. The authoritarianism will probably continue. The regime change in GE14 was an exceptional regime change due to a national-level severe contest between Barisan Nasional and PAS for Malay votes, which coincidentally helped Pakatan Harapan. There are several conditions necessary for the following regime change in Malaysia, namely: (1) elimination of authoritarianism, (2) a national-level competition between UMNO and other Malay-supporting parties, such as PAS, and (3) mobility of the voting behaviour.

Keywords: Malaysian Politics, General Election, Authoritarianism, Populism, Developmentalism, Voting Behabiour, Ethnicity, Class, Economy

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1.0 Authoritarian Dictatorship and Voting Behaviour

It has been argued that Malaysia's political system is authoritarian. Levitsky & Way (2002: 52) cite Malaysia alongside Vladimir Putin's Russia as an example of a competitive authoritarian state. Pepinsky (2009: 88-89) pointed out that "Malaysia has recently played a central role in the comparative study of dominant-party authoritarian regimes". Levitsky & Way (2002: 53; 2010: 5) pointed out that periodic elections are held under competitive authoritarian regimes, but competition (elections) between the ruling and opposition parties is conducted under unfair conditions. The recognition of authoritarianism in this paper follows the above points. This paper firstly refers to the minimal definition of authoritarianism by Frantz (2018).

> *[T]he distinguishing factor separating authoritarian regimes from democratic ones is whether government selection occurs via free and fair elections. This definition is minimalist. It does not integrate human rights violations or repressive acts unless they pertain to the ability of the opposition to have a reasonable shot of competing in the electoral process* (Frantz 2018: 6).

According to Przeworski et al. (2000: 14), the relationship between democracy and authoritarianism (in their book, authoritarianism and dictatorship are used interchangeably) is dichotomous. And the minimalist definition by Przeworski et al. (2000: 15) is as follows:

> *[D]emocracy, for us, is a regime in which those who govern are selected through contested elections. This definition has two parts: "government" and "contestation"* (Przeworski et al. 2000: 15).

At least, to be a democratic regime, it needs to be elected through a competitive election. As for the case of Barisan Nasional, as we can see in the result of GE13, it obtained less than half the votes but won more than 60% of the seats. Simultaneously, there has been an issue regarding the disparity of votes. Barisan Nasional had taken advantage of the disparity of votes to expand its seats. This paper will discuss that the state under the Barisan Nasional regime had distributed more electoral districts to areas where Barisan Nasional obtained more votes. This mal-apportionment issue is a typical example of authoritarianism in Malaysia.

As noted by Frantz (2018), it is the minimal definition, and authoritarianism in Malaysia is a combination of unfair conditions in elections and repressive acts, which will be discussed later. This paper monitors the latter component specifically.

Let us now consider authoritarianism in Malaysia. The draconian constitution has threatened freedom of association and freedom to criticise the government without reprisal, such as the Internal Security Act 1960 and Security Offences Act 2012. There is also the issue of the disparity of votes. In GE13, Pakatan Rakyat (Pakatan Rakyat), which won a simple majority, received fewer seats than Barisan Nasional (Barisan Nasional). However, about half of the votes in GE12 and GE13 were cast for Barisan

Nasional. In order to pretend to be a democratic regime, it is necessary to win a certain number of votes in elections (note that many authoritarian regimes these days tend to pretend to be democratic (Frantz 2018). For this reason, Barisan Nasional was forced to give up power after losing a significant number of votes in GE14. The Barisan Nasional regime tried to retain the political loyalties of the Malaysian people. A co-optation (a co-optation that targets a specific ethnic group, too) is often used to maintain people's political commitments (Frantz 2018). In Malaysia, *ethnic populism* has played an important role. Frantz (2018) also referred to a tendency of authoritarian regimes to resort to economic growth.

Since approximately half of the votes were cast for Barisan Nasional, the Malaysian authoritarian regime has been partly maintained by Malaysian voters' voting behaviour. In other words, authoritarianism in this paper refers to a political system that uses a strategy of winning elections under conditions unfavourable to opposition parties and maintains the political loyalties of voters (co-optation of certain ethnic groups and economic growth are often used for the survival of authoritarian regimes (Frantz 2018)). These two ideologies often tend to have side effects, which can lead to *ethnic populism* and *developmentalism*. With this in mind, this article analyses the voting behaviour and election results in Malaysia.

A characteristic of populist authoritarian regimes is that they maintain their political raison d'etre by satisfying the majority and marginalising the dissatisfied minority (Uyama 2017: 40).

> *Populism's key feature is hostility not to elitism but to pluralism. [...] Kaczyñski is not representing all Poles but the "true Poles". Almost half of Turkey opposes Erdo¢gan's policies, but he feels sure that he is the only spokesperson for the people because the "true Turks" vote for him. It is populism's exclusionary identity politics that bears out Jowitt's grim vision* (Krastev 2016: 8).

> *While a state feeds a herd [i.e. citizens) and kindly takes care of sick sheep [i.e. weak citizens], it also does not hesitate to remove sheep which have a risk of threatening the herd* (Sugita 2015: 67).

In other words, it distinguishes between "true people" and "people who have a risk" and clarifies who should be cared for and who should not be. It corresponds to the distinction between Bumiputera (indigenous people), especially the Malays, and non-Bumiputera, specifically the Chinese.

> *A communal populist approach continues to be used to deflect the economic grievances of the Malay labouring classes against capitalist exploitations into a race based ideological allegiance to the Malay ruling class* (Kua 2015: 5).

A specific example was the NEP (New Economic Policies) introduced in 1971.

> *The NEP was intended, among other things, to achieve economic parity between the politically dominant Malays and the commercially ubiquitous Chinese by "restructuring society" to eliminate the identification of race with economic function* (Jomo 1997: 238).

With the NEP, the state intervened in economic activities to increase Malay capital and their opportunities for higher education. Contrary to the objectives of the NEP, i.e., the elimination of race identification with economic function and the eradication of poverty (Lestari 1997: 2-3), the NEP was, to some extent, considered racial.

> *The controversy over ethnic quotas for public university admissions has continued to the present. The vast majority of students in private tertiary institutions have been non-bumiputera. However, most of the thousands of bumiputera students abroad are believed to be government-funded, compared to only a small proportion of non-bumiputeras* (Jomo 2004: 16).

Due to this tendency, perceptions towards the NEP varied by ethnic groups. "[M]any ethnic Malays concerned about their fate if the NEP is discontinued, while much ethnic Chinese hope for an end to ethnic discrimination, especially in the form of quotas, after 1990" (Jomo 1990: 469). Since this paper does not discuss ethnic discrimination in the NEP, we avoid discussing further. Instead, this paper only points out policies that have satisfied the ethnic majority, which is the characteristic of the ethnic populism of Barisan Nasional's authoritarian regime, leading to the more intensified ethnic conflict between Bumiputera and non-Bumiputera.

In Malaysia, "[t]he state explicitly uses racism as an ideological tool to retain the loyalty of a whole 'Bumiputera' community" (Kua 2015: 2). The NEP was the typical example. In the 1970s and 1990s, during and immediately after the implementation of the NEP, Barisan Nasional's vote shares had been higher than those after the 2000s. Between 1974 and 1999, Barisan Nasional's percentages ranged from at least 50% to 60%.

> *[T]he middle classes, or the new middle class, that emerged in Malaysia are a class of Bumiputera created by government initiative and intervention. This is a major reason for its politically conservative character. Having obtained their business and education opportunities under government policy--i.e., protection--they will surely continue to support the government as long as it guarantees their economic interests* (Torii 2003: 241).

While ethnicity determined the beneficiaries of economic policy, the non-Malay middle classes would have supported Barisan Nasional due to the rapid economic growth during the same period (Torii 2003: 241).

> *A vote for the Barisan Nasional was a vote for stability, for uninterrupted economic growth, for rising incomes, for maintaining certain standards of living and a consumerist lifestyle* (Loh 2002: 48-49).

Barisan Nasional needs to garner widespread support through economic growth while maintaining Malay political loyalty to ensure its political raison d'être. In this respect, Malaysia's political system is developmentalist. A definition and a problem of developmentalism are below.

> *Developmentalism is defined as a set of ideas which emphasise the political primacy of economic development as dynamics of institutions and policies and as the fundamental means of political legitimacy. The end product of developmentalism is authoritarian development* (Yü 1996: 21).

> *The problem of developmentalism is not to pursue economic growth per se but rather to regard economic growth as the only and foremost solution to various social issues. In this way, the means become the goal and thus create more social problems* (Ho 2010: 7).

It can be said that the political system in Malaysia of gaining the support of electorates through economic growth in the face of various social problems, such as ethnic conflict (note that ethnicity and race are used interchangeably in Malaysia), is precisely based on this ideology of developmentalism. On the other hand, the voting behaviour in recent years has shown that it is difficult to win support from electorates just by resorting to its developmentalism. Details regarding it will be discussed in the following sections.

Barisan Nasional lost many votes in GE12, GE13, and GE14. While there is a study discussing that Barisan Nasional's losing its vote shares in GE12 was not due to "economic grievances", and instead, it was due to "non-Malays in peninsular Malaysia rejecting the Barisan Nasional and voting for secular opposition parties" (Pepinsky 2009: 88). Other researchers pointed out that "political parties that can identify with the rising demands of voters on bread and butter issues like the increasing cost of living, social justice, corruption, and basic human rights may gain the upper hand in future general elections" (Ng et al. 2013a), and that unemployment and inequality have influenced the results of GE14 (Lee 2019). As shown above, there are various views on the election results in recent years. These studies analyse the outcome of a single election and do not provide an overview of recent changes. Therefore, opinions differ depending on authors and periods. Thus, this paper analyses and compares the results from GE11 to GE14 and discusses how ethnic and economic factors have influenced electoral outcomes and changed[1].

Ng et al. (2013a) noted that voters might be aware of the economic situation. These people are specifically in urban areas because urban citizens in developing countries are affected by economic conditions (Pacek & Radcliff 1995: 754), leading to Barisan Nasional's landslide defeat specifically in urban areas (Yagi 2019a; 2019b). Ng et al. (2013a; 2013b; 2021) used ethnicity and urbanisation[2] as variables to statistically

[1] There is a study conducted by Ali et al. (2020) which covers the results of general elections from 1995 to 2008. The largest difference between this paper with the study is that this paper uses two crucial factors, i.e., ethnicity and economy. Ali et al. (2020) used percentages of Malay voters as their independent variable. As explained by Iiduka (2020: 118), "we can establish different models to the same data, and each statistical model produces different results."

[2] This paper considers that economic growth and urbanisation are strongly related. For the details, see Yagi (2019a; 2019b).

analyse the results in GE13 and GE14, finding that both factors affected the results. Based on the findings of previous studies, this paper considers changes in the economic voting patterns.

It is also necessary to pay attention to the voting patterns of the Chinese, as pointed out by Pepinsky (2009). Ng et al. (2013a; 2013b; 2021) and Pepinsky (2013) did quantitative analyses on the ethnic voting patterns and the effects of urbanisation. These previous studies analysed the results of GE13. They showed that the Malays tended to support Barisan Nasional, and the Chinese were supportive of Pakatan Rakyat. Nakamura (2015) analysed the election results from 1959 to 2013 when developing the debate on *power-sharing*. His analysis shows that from 1959 to 2004, Barisan Nasional's share of votes tended to be higher in ethnically-mixed constituencies where percentages of the Malay were more than 25% but less than 75%. As he pointed out, "the distribution of points [in his scatterplots] in the 2008 and 2013 elections has almost linearly risen to the right" (Nakamura 2015: 110-111). In other words, the voting patterns have changed since GE12. In GE11, electorates in ethnically-mixed constituencies voted the most for Barisan Nasional. However, since GE12, the Malays have voted for Barisan Nasional, and the Chinese have voted for Pakatan Rakyat (and Pakatan Harapan in GE14). This paper will visualise this change in a later section.

> *In most aspects of social life, there are social fissures along ethnic lines, and "ethnic politics" is selecting one's representatives through ethnic frameworks to coordinate and solve problems* (Yamamoto 2008: 5).

If we consider ethnic politics, which is explained by (Yamamoto 2008: 5), the tendency of electorates in ethnically-mixed constituencies to vote for Barisan Nasional makes sense. It is because a relatively neutral Barisan Nasional was favoured in ethnically-mixed constituencies. However, this tendency has changed since GE12.

Before summarising the discussion so far, let us confirm the research question and motivation of this paper. The central questions are: *has the voting behaviour changed? And if so, how has the voting behaviour changed?* If the voting behaviour has changed, it may perhaps have affected the authoritarian regime. Hence, this paper, too, monitors how the changes have affected it. The former question will be analysed in sections 2 and 4. And we will discuss the latter issue in section 5.

The followings are a summary of the above discussion (and these are tentative answers to the former question), i.e.,

- before GE11, electorates in ethnically-mixed constituencies tended to vote for Barisan Nasional
- the Malays have tended to support Barisan Nasional since GE12
- the Chinese have been supportive of Pakatan Rakyat (and Pakatan Harapan) since GE12
- electorates are aware of economic trends
- middle-class electorates were supportive of Barisan Nasional because of their politically conservative characters

- recent economic issues may have altered middle-class electorates' conservative tendencies.

The ideologies used by Barisan Nasional's authoritarian regime can be summarised as follows i.e.,

- ethnic populism (Barisan Nasional has tried to maintain the political loyalty of the Malays)
- developmentalism (while it has also tried to gain votes by providing people economic incentives).

Ethnic populism and economic incentives have helped Barisan Nasional's authoritarian regime survive. There are also issues in which opposition parties had to fight under unfavourable conditions, e.g., "mal-apportionment in constituency demarcation, gerrymandering, the manipulative distribution of postal votes" (Khoo 2013: 31). These will be discussed in detail in a later section. This section only points out the hypothesis that Barisan Nasional had survived by using populist (or more precisely, ethnic populism) and developmentalist ideologies to consolidate its supporters and authoritarian methods (mal-apportionment and gerrymandering) to distribute more seats to its stronghold.

Note that this paper only analyses result in Peninsular Malaysia. Thus, results in both Sabah and Sarawak will not be discussed.

2.0 Hypothesising Voting Behaviour

The previous section discussed and summarised the characteristics of Malaysia's voting behaviour and authoritarian regime. Here, we make hypotheses that enable us to test the voting behaviour quantitatively. The ethnic voting patterns are below, i.e.,

- Barisan Nasional's vote shares increased in constituencies with a high proportion of the Malays
- accordingly, the Malays have not been supportive of Pakatan Rakyat (and Pakatan Harapan in GE14)
- the higher the percentage of the Chinese, the lower Barisan Nasional's vote shares
- the Chinese have been supportive of Pakatan Rakyat (and Pakatan Harapan in GE14)
- these differences have become more apparent.

These are the basic understandings of the ethnic voting patterns. However, we should add one more piece of advanced knowledge about the results of GE14. As Oliver & Ostwald (2018) pointed out, in addition to Barisan Nasional and Pakatan Harapan, PAS was also competing for votes as a significant player in GE14. There is a study which

showed that the influence of PAS to the possibilities of Barisan Nasional and Pakatan Harapan to win in GE14 was insignificant (Ng et al. 2020). Nevertheless, this paper considers that the three-cornered fight surely eroded the possibilities of Barisan Nasional to win, due to the overlapping voting blocs. The author of this paper quantitatively analysed the three-cornered fight, and found that in electoral districts where Barisan Nasional and PAS were severely contesting, the possibilities of Pakatan Harapan to win increased (Yagi 2019a; Yagi 2019b). This difference is perhaps due to the difference in models. PAS is an Islamic political party with the Malays as its main voting bloc. Thus, we consider the possibility that PAS's voting bloc overlapped with Barisan Nasional, specifically in GE14.

The economic factors can be hypothesised as follows, i.e.,

- electorates who were the beneficiaries of Barisan Nasional's economic policies were supportive of Barisan Nasional
- specifically, middle-class electorates were Barisan Nasional's main voting bloc
- however, a bad economic situation in recent years, such as the rising cost of living, might have affected these electorates adversely for Barisan Nasional.

In addition to this basic understanding of the economic voting patterns, FELDA is one of Barisan Nasional's main voting blocs because FELDA residents are the beneficiaries of its economic policies. The author used data from FELDA districts to analyse the results of GE14 (Yagi 2019b). Thus, the prior knowledge about FELDA should be added to quantitative models in this paper.

So far, we have discussed the hypotheses. Let us return to the research question in this paper. One of the primary motivations for this paper is to analyse election results from GE11 to GE14 to understand the ethnic and economic voting patterns and their changes in Malaysia. Its purpose is to show that the voting behaviour of electorates is, more or less, contributing, consciously or unconsciously, to the survival of the authoritarian regime in the state. In other words, about half of the votes were cast to Barisan Nasional at least until GE13.

We then make an underlying substantiating the hypotheses quantitatively. This paper uses multiple regression models to estimate parameters. The underlying model is shown below, i.e.,

$$\mu_i = Intercept + \beta_1 \%EthnicGroup_i + \beta_2 HouseholdIncome_i + \beta_3 \%FELDA_i$$
$$\%VoteShare_i \sim Normal(\mu_i, \sigma^2)$$

is the underlying model. Here, *Intercept* and σ are the intercept and standard deviation parameters. $\beta_{1:3}$ are the regression coefficients. μ_i is the predicted value, and $\%VoteShare_i$, the dependent variable, is randomly distributed around μ_i. The independent variables are $\%EthnicGroup_i$, $HouseholdIncome_i$, and $\%FELDA_i$, which indicate proportions of ethnic groups, median household income, and shares of FELDA residents in each constituency, respectively. These data are aggregated on a constituency level. Note that all data are standardised beforehand.

In this paper, parameters are estimated with a Bayesian approach. Therefore, this is not the traditional frequentist approach generally used in political research[3]. The reason for adopting a Bayesian approach is its flexibility in modelling.

To express theories specific to each field, the constraints of linear models are not necessary. In order to develop specialised areas, mathematical models need to be created more freely in accordance with what is explained (Hamada et al. 2019: 128).

"[T]he ability in Bayesian software to create flexible and meaningful models that are appropriate for describing the data" (Krushcke 2018: 174) motivates this paper to use this approach. This paper will modify the underlying model based on data distributions. Fitting by a quadratic curve and estimating parameters using a conditional branch will be carried out. The Bayesian approach is flexible enough to accommodate such modifications.

In adopting a Bayesian approach, it is necessary to establish prior distributions for parameters to be estimated. The parameters to be estimated are as follows, i.e., Intercept, σ, and $\beta_{1:3}$. Publicly recognised prior knowledge is used to establish prior distributions. However, it is difficult to say that there is a publicly recognised prior knowledge in Malaysian political science[4]. Perhaps, we can assume whether a regression coefficient is positive or negative. Nevertheless, it is challenging to consider how large the coefficient value is. Since it is necessary to set a prior under these circumstances, we employ the process of setting vague priors used by Kruschke et al. (2012). This paper employs the same way of establishing prior distributions.

> *For the standardised data, the prior on the intercept and regression coefficients was a normal distribution with a mean at zero and a standard deviation of 100. [...] The prior on the standard deviation parameter [...] was a uniform distribution from zero to 10. [...] Thus, the prior places essentially no bias on the posterior distribution* (Kruschke et al. 2012: 727).

This paper uses Markov chain Monte Carlo (MCMC) sampling to estimate parameters. Therefore, this paper checks the Potential Scale Reproduction Factor (PSRF or R) and Effective Sample Size (ESS) to monitor whether the MCMC sampling is well converged and not autocorrelated. This paper uses 95% credible intervals and mean values of each estimated parameter to discuss posterior distributions.

So far, this paper has described the underlying model and the process for parameter estimation. Let us confirm whether the underlying model reflects the actual data precisely. Graph 2.1 indicates the ethnic voting patterns of the Malays and the Chinese from GE11 to GE14. Both linear and quadratic fittings are applied to Graph 2.1. The

[3] For example, this paper does not use the rejection of the null hypothesis using the p-value. Instead, we discuss the estimated parameters' range (95% Credible Interval).

[4] Nakamura (2015: 119 -120) used proportions of Malay voters to predict Barisan Nasional's vote shares. Looking at his regression coefficient, it was 0.8718 in GE13. In the regression analysis of Ng et al. (2013a: 182), the regression coefficient for Bumiputera voters was -0.0014 (note that there was no significant difference). These differences in regression coefficients were perhaps due to differences in the models they employed. Nakamura (2015) used a nonlinear regression model. Ng et al. (2013a) used a multiple regression model. Variables in their studies were also different. Nakamura (2015) used proportions of Malay voters, and Ng et al. (2013a) used numbers of ethnic groups. Due to these differences, deciding a precise prior knowledge about regression coefficients in Malaysia's voting behaviour is challenging.

left scatter plots in Graph 2.1 indicate that quadratic fittings precisely reflect the data in GE11. In constituencies where the proportions of the Malays or Chinese proportions were low, Barisan Nasional's vote shares were low. They were higher in constituencies with average Malay and Chinese proportions, i.e., ethnically mixed constituencies. In constituencies where proportions of the Malays or the Chinese were high, Barisan Nasional's vote shares became lower again. From GE12 to GE14, linear fittings are much more precise for the estimation. The more ratios of the Malays were, the higher Barisan Nasional's vote shares became. The voting patterns of the Chinese voters were precisely the opposite, demonstrating that they have no longer supported Barisan Nasional since GE12. Therefore, this paper uses quadratic fittings for the results in GE11 and linear fittings from GE12 to GE14.

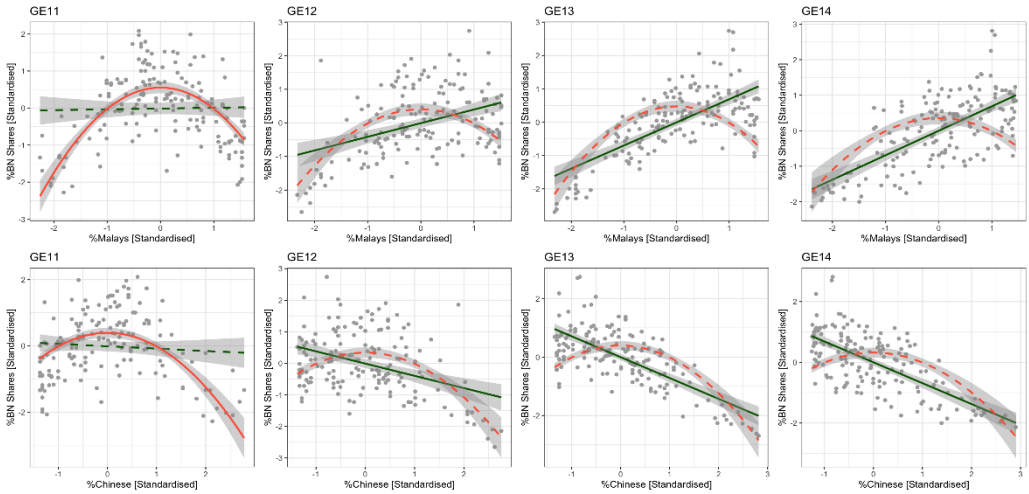
Let us see the economic voting patterns. Graph 2.2 indicates both income and FELDA factors. The higher row shows the correlation between household incomes and Barisan Nasional's vote shares. The lower row shows the correlation between the proportions of FELDA residents and Barisan Nasional's vote shares. To monitor the higher row, it seems much more appropriate to use a conditional branch to estimate parameters of the effects of household income groups, specifically from GE11 to GE13. From GE11 to GE12, the regression lines on the left indicate that Barisan Nasional's vote shares were higher in constituencies with higher median household incomes. The regression lines on the right side, on the contrary, suggest that they were lower in constituencies with higher median household incomes. This paradox is due to the difference in income groups. The left lines represent Barisan Nasional's votes in constituencies with lower median household incomes. The right lines are the results in higher median household incomes. Thus, we can assume the effect of the middle class (e.g., the M40 group) [5]. Where electorates were poor, and their household incomes became high (approximating to the average value), they became supportive of Barisan Nasional. However, their political loyalty became much lesser for wealthier people (e.g., the T20 group). Interestingly, the slope of the regression line on the left side in GE13 approximated 0. Moreover, in GE14, the slope on the left side was almost equal to that on the right side. Therefore, this paper uses a conditional branch to estimate household income parameters from GE11 to GE13, dividing the coefficient β_2 into two coefficients, i.e., $\beta_{2,1}$ and $\beta_{2,2}$. The former will indicate the coefficient in constituencies with lower household incomes and the latter in those with higher household incomes.

As a supplementary note, it may be counterintuitive that vote shares of Barisan Nasional were lower in electoral districts with lower percentages of the Malays, specifically in GE11. There should be several reasons. One of the reasons was that many of these areas were located in the "Malay-belt", which included four states in the northern part of peninsular Malaysia, i.e., Perlis, Kedah, Kelantan, and Terengganu, and in which PAS and Barisan Nasional have severely fought (Jabar 2006: 1-2; Pepinsky 2015: 209; Yagi 2019b).

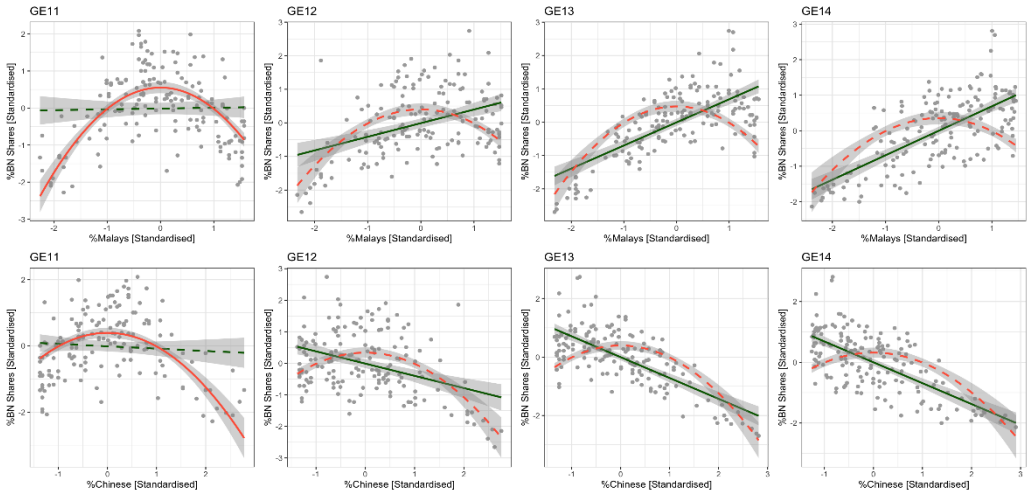
Lastly, we see the effects of the FELDA residents (in the lower row in Graph 2.2). As illustrated in Graph 2.2, there is no significant difference between linear and

[5] In this paper, middle classes specifically mean people with average income or the Middle 40% (M40) group.

nonlinear fittings. For simplicity, this paper employs linear fittings. Note that, as shown in Graph 2.2, there are few FELDA residents, so their effects on the results in general elections may be smaller than the other variables.



Graph 2.1: Ethnic Voting Patterns from GE11 to GE14 in Malaysia



Graph 2.2: Economic Voting Patterns from GE11 to GE14 in Malaysia

3.0 Data and Execution Environment

Sources of data are indicated here. The Data of vote shares for each party (coalition) and proportions of Malay and Chinese voters were obtained from The Star Online and undi.info. In addition, this paper used median household incomes in each administrative district in 2019 obtained from "Household Income and Basic Amenities

Survey Report by State and Administrative District" by the Department of Statistics, Malaysia (2020) to aggregate data on the household income variables for GE14. The proportions of FELDA residents in GE14 were aggregated with data obtained from "Laporan Kajian Semula Persempadanan" published by Suruhanjaya Pilihan Raya (SPR), Malaysia (2018).

Ideally, all analyses should be conducted with observed values. On the other hand, there is a problem with observable and unobservable data in social science. Nevertheless, the inability to quantitatively measure the phenomena and theories discussed in previous studies is also a problem. For this reason, this paper will use observed values and partly use some estimated values which are calculated from observed values. Table 3.1 shows whether observed or estimated values were used for each variable.

Table 3.1
Category of Data

	Vote Shares	**% Malays**	**% Chinese**	**Household Incomes**	**% FELDA Residents**
GE14	Observed	Observed	Observed	Observed	Observed
GE13	Observed	Observed	Observed	Estimated	Estimated
GE12	Observed	Observed	Observed	Estimated	Estimated
GE11	Observed	Observed	Observed	Estimated	Estimated

It is indispensable to avoid arbitrariness when we use estimated values. Therefore, this paper explains the calculation methods of the estimated values. The estimated values were calculated in reproducible manners according to the following procedures. Household incomes from GE11 to GE13 were aggregated from those in GE14. The calculation, to some extent, reflects economic growth in each state. Firstly, we obtain median values of household incomes in each state in the year of the general elections or one year before each general election, i.e., median values of household incomes in 2004, 2007, and 2012[6]. The median values were obtained from "Median monthly household gross income by ethnic group, strata and state, Malaysia, 1970-2019" observed by Economic Planning Unit (EPU), Malaysia (2022). Then, we calculate growth rates in each state and each year. For example, suppose we will calculate the growth rate in Johor state from 2012 to 2019. We have to divide RM6,427 (median values of household

[6] Note that both mean and median values of household incomes are not observed annually. However, the observation was conducted in recent years in 2002, 2004, 2007, 2009, 2012, 2014, 2016, and 2019.

incomes in Johor state in 2019) by RM3,650 (median values of household incomes in Johor state in 2012) to obtain the growth rate from 2012 to 2019. We, then, now know that the household incomes in Johor state as a whole had risen 1.76 times from 2012 to 2019. The observed median values of household incomes in Johor Bahru, one of the constituencies in Johor state, in 2019 was RM7,342, according to EPU, Malaysia. We estimate the median household incomes in the same constituency in 2012 by dividing RM7,342 by 1.76 (the growth rate from 2012 to 2019). The estimated median value of household incomes in Johor Bahru in 2012 will be RM4,170. Similarly, we first calculated the overall growth rate in each state for other constituencies and then applied it to each constituency.

For the proportions of FELDA residents, the same values as GE14 were applied to all general elections because FELDA has no longer established new settlers since 1990 (FELDA 2022). However, the number of FELDA settlers could have shrunk from 2004 to 2018. Thus, the actual effects and estimated effects of FELDA variables may perhaps be slightly different. It is a limitation of this paper.

At the end of this section, we describe the execution environment for the analysis performed in this paper. The overall analysis is conducted with R language (ver. 4.0.4), and RStan (ver. 2.21.2) is used for MCMC sampling. The calculation and standardisation of data are conducted with PostgreSQL (ver. 13.3). The results of the analysis rely on these environments.

4.0 Analysis Results

4.1 GE11

Firstly, we see the results in GE11. There are four models for the results in GE11 (model[1-4]). The basic model is shown below, i.e.,

$$\mu_i = Intercept + \beta_1 GE11\%EthnicGroup_i^2 + \beta_{2,j} GE11HouseholdIncome_i + \beta_3 GE11\%FELDA_i$$

$$GE11\%VoteShare_i \sim Normal(\mu_i, \sigma^2)$$

$$j = \begin{cases} 1, if\ GE11HouseholdIncome_i \leq 0 \\ 2, if\ GE11HouseholdIncome_i > 0 \end{cases}$$

is the basic model for GE11. Model1 and Model2, and Model3 and Model4 indicate Barisan Nasional's vote shares and those of opposition parties, respectively, and are the proportions of the Malays in the Model1 and Model3 and those of the Chinese in Model2 and Model4.

The estimated results are shown in Table Appx[1-4] in Appendix. All R of the estimated parameters are 1, and the ESS of all parameters exceed 10,000. Therefore, the MCMC samplings were well converged and not autocorrelated.

We now see the estimated values of each parameter of Model1. The mean values (hereinafter, we use mean values for our discussion) of $Intercept$ and σ in Model1 are 0.89 and 0,69, respectively. The regression coefficients are: -0.51 (β_1), 0.76 ($\beta_{2,1}$), -0.21 ($\beta_{2,2}$), 0.17 (β_3). The estimated value of β_1 indicates that the voting pattern of

the Malays in GE11 follows the trajectory of the quadratic curve. In constituencies with lower proportions of the Malays (where $GE11\%Malays_i < 0$), the higher the proportions were, the higher Barisan Nasional's vote shares were. There was a negative correlation between the proportions of the Malays and Barisan Nasional's vote shares in constituencies with higher proportions of the Malays (where $GE11\%Malays_i > 0$). This result perhaps reflects the phenomenon Nakamura (2015) pointed out. In constituencies with very low Malay shares, voters may have tended to vote for opposition parties such as DAP, and in those with very high Malay shares, voters were much more supportive of PAS. In other words, these results reflect that the relatively neutral Barisan Nasional's vote shares were higher in ethnically-mixed constituencies.

If we see the income factors, both parameters reflect the trajectory illustrated in Graph 2.2. $\beta_{2,1}$ and $\beta_{2,2}$ reflect the slopes in constituencies with lower and higher household incomes, respectively. The regression coefficients are 0.76 and -0.21, indicating that the higher household incomes in lower-income constituencies were, the more Barisan Nasional obtained votes; in higher-income constituencies, there was a negative correlation between Barisan Nasional's shares and household incomes. We have discussed that the state-led creation of middle classes had advantageous effects for Barisan Nasional in creating its voting bloc. This result reflects it. To see the FELDA variable, as shown in its coefficient: 0.17, residents in FELDA supported Barisan Nasional. In tandem with the state-led creation of middle classes, the state-led rural development was influential in creating Barisan Nasional's stronghold.

$Intercept$ and σ of Model2 are 0.81 and 0.71, respectively. The regression coefficients are: -0.38 (β_1), 0.98 ($\beta_{2,1}$), -0.23 ($\beta_{2,2}$), and 0.19 (β_3). Both the ethnic and economic voting patterns are the same as those of Model1. Barisan Nasional's vote shares were lower in constituencies with very high and low Chinese shares or household incomes. Its shares were high around constituencies with average Chinese proportions or household incomes. FELDA residents were supportive of Barisan Nasional.

Now, let us see Model3, a model for opposition parties. $Intercept$ and σ of Model3 are -0.91 and 0.66, respectively. The regression coefficients are: 0.55 (β_1), -0.67 ($\beta_{2,1}$), -0.25 ($\beta_{2,2}$), and -0.13 (β_3). As indicated in the regression coefficients, the estimated values of Model3 are opposite to those of Model1 and 2. The quadratics curves of the Model1 and 2 were convex upwards functions. That of the Model3, $0.55GE11\%Malays_i^2$, is a convex downward function, indicating that in constituencies with very high and low Malay shares, vote shares of opposition parties were higher. As shown in the results of $\beta_{2,1}$ and $\beta_{2,2}$, vote shares of opposition parties were higher in lower and higher household income constituencies. If shares of the Malays or household incomes were on average, their vote shares were lower. As discussed earlier, these phenomena were due to ethnic politics and the state-led creation of the middle classes. Electorates living in skewed ethnic shares tended to vote for relatively (or extremely) ethnocentric parties. Those who did not feel any economic merits from Barisan Nasional were not motivated to support it. The FELDA variable is a typical example. Its coefficient is -0.13, indicating that FELDA residents were not supportive of opposition parties.

$Intercept$ and σ of Model4 are -0.90 and 0.67, respectively. The estimated regression coefficients are: 0.44 (β_1), -0.91 ($\beta_{2,1}$), 0.26 ($\beta_{2,2}$), and -0.15 (β_3). Model4 reflects the same results as Model3. If shares of the Chinese were skewed, Barisan Nasional's vote shares were lower. Those who were not beneficiaries of Barisan Nasional's economic policies tended to vote for opposition parties, while beneficiaries, e.g., FELDA residents, supported Barisan Nasional.

A summary of the results in GE11 is below, i.e.,

- in constituencies with lower skewness of ethnic groups, Barisan Nasional's vote shares were higher
- on the contrary, its shares were lower in ethnically skewed constituencies
- those who felt the economic merits of Barisan Nasional's economic policies were supportive of Barisan Nasional
- i.e., middle classes (M40 group)
- and FELDA residents
- on the contrary, votes of those who did not feel any merits were perhaps cast on opposition parties.

4.2 GE12

Let us now see the results in GE12. There are four models for the results in GE12 (model[5-8]). The basic model is shown below, i.e.,

$$\mu_i = Intercept + \beta_1 GE12\%EthnicGroup_i + \beta_{2,j} GE12HouseholdIncome_i + \beta_3 GE12\%FELDA_i$$

$$GE12\%VoteShare_i \sim Normal(\mu_i, \sigma^2)$$

$$j = \begin{cases} 1, if\ GE12HouseholdIncome_i \leq 0 \\ 2, if\ GE12HouseholdIncome_i > 0 \end{cases}$$

is the basic model for GE12. As indicated earlier, linear fittings will be adapted from GE12. Thus, $\beta_1 GE12\%EthnicGroup_i$ is a linear function. Model5 and Model6 are models for Barisan Nasional's vote shares, and Model7 and Model8 are models for Pakatan Rakyat's vote shares. $GE12\%EthnicGroup_i$ is the proportions of the Malays in Model5 and Model7 and those of the Chinese in Model6 and Model8.

The estimated results are shown in Table Appx[5-8] in Appendix. All R of the estimated parameters are 1, and the ESS of all parameters exceed 10,000. Therefore, the MCMC samplings were well converged and not autocorrelated.

$Intercept$ and σ of Model5 are 0.74 and 0.78, respectively. Regression coefficients are: 0.48 (β_1), 1.17 ($\beta_{2,1}$), -0.63 ($\beta_{2,2}$), and 0.22 (β_3). Since $\beta_1 GE12\%EthnicGroup_i$ is a linear function, $0.48 GE12\%Malays_i$ should be a linearly increasing function, indicating a positive correlation between the proportions of the Malays and Barisan Nasional's vote shares. This result is quite different from the results of Model1 and Model2. From GE12, the ethnic voting patterns became apparent. The Malays were supportive of Barisan Nasional. The income and FELDA variables

reflect the same as those of Model1 and Model2. Middle classes and FELDA residents were supportive of Barisan Nasional.

$Intercept$ and σ of Model6 are 0.75 and 0.78, respectively. Regression Coefficients are: -0.46 (β_1), 1.16 ($\beta_{2,1}$), -0.67 ($\beta_{2,2}$), and 0.22 (β_3). These results are the same as those of Model5, except for the ethnic variable. $-0.46GE12\%Chinese_i$ is a linearly decreasing function, indicating that the Chinese were no longer supportive of Barisan Nasional.

Let us now see the models for Pakatan Rakyat. $Intercept$ and σ of Model7 are -0.72 and 0.79, respectively. Regression coefficients are: -0.46 (β_1), -1.12 ($\beta_{2,1}$), 0.63 ($\beta_{2,2}$), and -0.22 (β_3). $-0.46GE12\%Malays_i$ is a linearly decreasing function, indicating that the Malays tended not to vote for Pakatan Rakyat. The economic factors are the same as those of the Model3, and 4. Constituencies with average household income, i.e., middle classes (the M40 group) and FELDA residents, were not supportive of Pakatan Rakyat.

$Intercept$ and σ of Model8 are -0.74 and 0.78, respectively. Regression coefficients are: 0.46 (β_1), -1.13 ($\beta_{2,1}$), 0.66 ($\beta_{2,2}$), and -0.22 (β_3). $0.46GE12\%Chinese_i$ is a linearly increasing function. Thus, we can deduce that there is a positive correlation between shares of the Chinese and Pakatan Rakyat's vote shares, indicating that the Chinese were the stronghold of Pakatan Rakyat in GE12. The economic voting patterns are the same as that of Model7.

A summary of the results in GE12 is below, i.e.,

- the ethnic voting patterns were clear
- the Malays were supportive of Barisan Nasional
- the Chinese were supportive of Pakatan Rakyat
- those who felt the economic merits of Barisan Nasional's economic policies were supportive of Barisan Nasional
- the economic voting patterns are the same as those in GE11.

4.3 GE13

Let us now see the results in GE13. There are four models for the results in GE13 (model[9-12]). The basic model is shown below, i.e.,

$$\mu_i = Intercept + \beta_1 GE13\%EthnicGroup_i + \beta_{2,j} GE13HouseholdIncome_i + \beta_3 GE13\%FELDA_i$$

$$GE13\%VoteShare_i \sim Normal(\mu_i, \sigma^2)$$

$$j = \begin{cases} 1, if GE13HouseholdIncome_i \leq 0 \\ 2, if GE13HouseholdIncome_i > 0 \end{cases}$$

is the basic model for GE13. It is the same as the model for GE12. Model9 and Model10 are models for Barisan Nasional's vote shares, and Model11 and Model12 are models for Pakatan Rakyat's vote shares. $GE13\%EthnicGroup_i$ is the proportions of the Malays in the Model9 and Model11 and those of the Chinese in Model10 and Model12.

The estimated results are shown in Table Appx[9-12] in Appendix. All R of the estimated parameters are 1, and the ESS of all parameters exceed 10,000. Therefore, the MCMC samplings were well converged and not autocorrelated.

We will not go deeply into the estimated parameters because the results in GE13 generally overlap with those in GE12. The ethnic voting patterns in GE13 are the same as those in GE12. The Malays voted for Barisan Nasional; the Chinese did for Pakatan Rakyat. FELDA settlers were supportive of Barisan Nasional.

The most considerable difference is that gradients of $\beta_{2,1}$ $GE13HouseholdIncome_i$ (0.48 and 0.52 for Model9 and Model10, respectively) are smaller than those in GE11 (0.76 and 0.98 for Model1 and Model2, respectively), and GE12 (1.17, and 1.16 for the Model5, and Model6, respectively). As illustrated in the scatterplots in the higher row in Graph 2.2, the slope on the left side in GE13 approximated 0, compared with GE11 and GE12. The correlation between an increase in income and Barisan Nasional's vote shares, or an income elasticity towards Barisan Nasional's vote shares, in lower-income constituencies in GE13, became low compared with GE11 and GE12. The correlation between household incomes and Barisan Nasional's vote shares in higher household income constituencies in GE13 (-0.42 and -0.46 for the Model9 and Model10, respectively) were in the middle between those in GE11 (-0.21 and -0.38 for the Model1, and Model2 respectively) and GE12 (-0.63 and -0.46 for the Model5, and Model6, respectively).

4.4 GE14

Finally, we look at the results of GE14. For the results of GE14, vote shares of the three political parties (party coalitions), i.e., Barisan Nasional, Pakatan Harapan and PAS, are used as dependent variables. As with GE11, GE12, and GE13, the percentages of ethnic groups were calculated using Malay and Chinese voters. The model for analysing the results of GE14 does not use a conditional branch depending on the level of income. In other words, we assume that there is a linear correlation between income and the vote share of political parties (party coalitions). The models for analysing GE14 reflecting these conditions are Model [13 -18]. The basic model is shown below, i.e.,

$$\mu_i = Intercept + \beta_1 GE14\%EthnicGroup_i + \beta_2 GE14HouseholdIncome_i + \beta_3 GE14\%FELDA_i$$
$$GE14\%VoteShare_i \sim Normal(\mu_i, \sigma^2)$$

is the basic model for GE14. The dependent variable for Model13 and Model14 is Barisan Nasional's vote shares. The dependent variable for Model15 and Model16 is Pakatan Harapan's vote shares. The dependent variable for Model17 and Model18 is PAS's vote shares. The percentages of Malay voters are assigned for $GE14\%EthnicGroup_i$ in Model13, Model15 and Model17, and Chinese voters are assigned for $GE14\%EthnicGroup_i$ in Model14, Model16 and Model18. Note that there is neither a conditional branch nor a nonlinear fitting. In other words, simple multiple regressions are used for all of the models for GE14.

The estimated results are shown in Table Appx[13-18] in the Appendix. All R of the estimated parameters are 1, and the ESS of all parameters exceed 10,000. Therefore, the MCMC samplings were well converged and not autocorrelated.

$Intercept$ and σ of Model13 are -0.01 and 0.67, respectively. Regression Coefficients are: 0.54 (β_1), -0.24 (β_2), and 0.22 (β_3). These estimates show that Barisan Nasional's vote shares were higher in constituencies with a high proportion of the Malays and FELDA residents. These results are similar to those in GE12 and GE13. On the other hand, the estimated regression coefficient on income groups of -0.24 shows that in GE14, electorates with lower income supported Barisan Nasional, while electorates with higher income did not support Barisan Nasional. In other words, a negative linear correlation was observed between income and Barisan Nasional's vote shares. The scatter plot for GE14, at the top of Graph 2.2, clearly shows this relationship. This correlation in GE14 is distinctly different from GE11 and GE12, in which Barisan Nasional had its highest vote shares near the median income and partly different from GE13.

$Intercept$ and σ of Model14 are -0.01 and 0.68, respectively. Regression Coefficients are: -0.53 (β_1), -0.24 (β_2), and 0.17 (β_3). This result shows that the Chinese did not support Barisan Nasional. Barisan Nasional's vote shares were higher in constituencies with lower incomes and a higher proportion of FELDA residents in GE14.

$Intercept$ and σ of Model15 are 0.00 and 0.35, respectively. Regression Coefficients are: -0.79 (β_1), 0.23 (β_2), and -0.06 (β_3). As shown by the estimated values of both β_1 and β_2, the Malays did not support Pakatan Harapan, and Pakatan Harapan's vote shares were high in constituencies with higher incomes. The 95% credible interval for β_3 is [-0.12, -0.01]. It does narrowly not include 0.

$Intercept$ and σ of Model16 are 0.00 and 0.39, respectively. Regression Coefficients are: 0.77 (β_1), 0.24 (β_2), and -0.06 (β_3). As shown by the estimated values of β_1 and β_2, both Chinese voters and electorates in higher-income constituencies supported Pakatan Harapan. 95% credible interval of β_3 includes 0. Thus, we cannot make any conclusion about this variable. Regarding Model16, it can be concluded that Pakatan Harapan obtained more vote shares in constituencies with higher Chinese proportions and higher income.

$Intercept$ and σ of the Model17 are -0.01 and 0.61, respectively. Regression Coefficients are: 0.75 (β_1), -0.14 (β_2), and -0.04 (β_3). As shown by the estimated value of β_1, Malay voters voted for PAS. There was a severe contest between PAS and Barisan Nasional on a national level. β_2 shows a negative correlation between income and PAS's vote shares. 95% credible interval of β_3, [-0.15, 0.06], includes 0. Thus, Model17 concludes that the Malays were supportive of PAS, and there was a negative correlation between income and PAS's vote shares.

Lastly, $Intercept$ and σ of Model18 are 0.01 and 0.61, respectively. Regression Coefficients are: -0.71 (β_1), -0.17 (β_2), and -0.06 (β_3). β_1 and β_2 show that Chinese voters did not vote for PAS, and PAS's vote shares were high in constituencies with lower income. 95% credible interval of β_3, [-0.17, 0.05], includes 0. Therefore, this paper avoids making any conclusion about this variable.

The primary purpose of this paper is to discuss from a macro perspective the transformation of the ethnic and economic voting patterns in the outcomes from GE11 to GE14, i.e., the changes in the general trends of the voting behaviour. Thus, there should have been some Malay voters who voted for Pakatan Rakyat/Pakatan Harapan; Chinese voters supported Barisan Nasional/PAS. Nevertheless, on the macro level, we can summarise the results of GE14 as follows i.e.,

- the Malays supported both Barisan Nasional and PAS
- this result indicates that there was a severe contest between Barisan Nasional and PAS for Malay votes on a national level
- the Chinese, on the contrary, voted for Pakatan Harapan
- both vote shares of Barisan Nasional and PAS were higher in constituencies with lower income
- there may perhaps have been some contests between Barisan Nasional and PAS over constituencies with lower income
- constituencies with higher income were the stronghold of Pakatan Harapan
- FELDA residents were supportive of Barisan Nasional
- as shown by the estimated value of β_3 in Model15, FELDA residents were perhaps not supportive of Pakatan Harapan
- on the other hand, the estimated values of β_3 in Model[16-18] include 0
- thus, it is not easy to conclude the correlation between FELDA residents and Pakatan Harapan and PAS vote shares.

5.0 Changes in Voting Patterns and Authoritarian Regime

In section 4, we analysed the election results from GE11 to GE14, estimated the parameters of each independent variable, and discussed them. This section unifies each discussion and marshals these arguments. The changes in the voting trends from GE11 to GE14 can be summarised as follows, i.e.,

- in GE11, Barisan Nasional's vote shares were high in ethnically mixed electoral districts where both shares of Malay and Chinese voters did not predominate over the others
- due to the changes in the voting patterns since GE12,
- Malay voters supported Barisan Nasional from GE12 to GE14,
- and Chinese voters supported Pakatan Rakyat in GE12, and GE13, and Pakatan Harapan in GE14,
- showing that there have been continuous and precise ethnicity-party relations between the Malays and Barisan Nasional and the Chinese and Pakatan Rakyat/Pakatan Harapan since GE12
- nevertheless, some Malays were supportive of PAS,

- leading to a national-level severe contest between Barisan Nasional and PAS in GE14
- if we see the income variable,
- both results in GE11 and GE12 clearly show that the middle-class (e.g., M40 is a typical example) supported Barisan Nasional generally
- but this tendency became not functional in GE13, in which the income elasticity towards Barisan Nasional's vote shares in lower household income groups became comparably smaller than those in GE11, and GE12
- furthermore, there was a negative correlation between income and Barisan Nasional's vote shares irrespective of income groups in GE14
- FELDA residents consistently have supported Barisan Nasional from GE11 to GE14
- there might have been negative correlations between FELDA residents and oppositions/Pakatan Rakyat/Pakatan Harapan
- nevertheless, as shown by the results of Model[16-18], it is difficult to conclude the FELDA variable in GE14 (ceteris paribus).

There have been clear and continuous changes in both ethnic and economic voting patterns from GE11 to GE14. Quadratic fittings were appropriate for the ethnic voting patterns in GE11, meaning that Barisan Nasional's vote shares were the highest around the average value of the proportions of both Malay and Chinese voters. As Nakamura (2015) noted, it reflects that Barisan Nasional's vote shares were the highest in ethnically-mixed electoral districts until GE11. In GE12, this tendency became different. Since then, linear fittings have been appropriate for the ethnic voting patterns. Malay voters supported Barisan Nasional (or PAS in GE14); the Chinese were supportive of Pakatan Rakyat/Pakatan Harapan. The ethnicity-party relations became clear and immobilised. The strategy of the state-led creation of the middle-class (M40) became not functional from GE13, from the perspective of making electorates conservative. In both GE11 and GE12, Barisan Nasional's vote shares were high in constituencies where income approximated the average. In other words, Barisan Nasional's vote shares tended to decrease in constituencies deviating from the average income. In constituencies with lower income in GE13, Barisan Nasional's vote shares were relatively constant; in GE14, there was a negative correlation irrespective of income groups.

Thus, the question here is why there were changes in the ethnic voting patterns. One of the main reasons is that Chinese voters/electorates used the veto against Barisan Nasional's long-lived authoritarian regime. The denial had been made step by step from GE12 to GE13. In GE12, Chinese *voters* or *turnouts* denied Barisan Nasional's political framework of its ethnic politics. Under Barisan Nasional's ethnic politics framework, voters first vote for Barisan Nasional's component parties, regardless of ethnicity, so that its electoral candidates win each election. Then, ethnic interests will be negotiated and distributed along ethnic lines. This process will be done among politicians who

belong to Barisan Nasional and represent each ethnic group. For this reason, specifically in ethnically-mixed electoral districts, voters had been motivated to vote for Barisan Nasional, which is relatively moderate. It had been the pillar of Barisan Nasional's power-sharing regime.

As opposed to elections until GE11[7], in GE12, those who did not feel any merits to Barisan Nasional's ethnic politics, i.e., Chinese *voters*, turned to vote for Pakatan Rakyat. Several factors demotivated them from voting for Barisan Nasional, which were intricately intertwined. One of the most significant factors was Barisan Nasional's racial policies. The NEP was the typical example. Through the NEP, which was conducted from the 1970s to 1990s, the Barisan Nasional-led state intended to enhance the economic status of the Malays (although how much they benefitted is skeptical).

> *Hence, "restructuring" has come to be associated with "positive discrimination" or "affirmative action" on behalf of the mainly Malay bumiputeras. Such state interventions have resulted in significantly greater bumiputera wealth ownership, business participation, educational opportunities and public sector employment and promotion, as well as representation among professionals and managers/administrators* (Jomo 2004: 1).

However, the policies introduced by Barisan Nasional were, for the Chinese, the seed of discontent, e.g., [t]he controversy over ethnic quotas for public university admissions has continued to the present (Jomo 2004: 16). In addition to the economic aspect, ideological, and identity aspects, such as the memory of the 'racial riots' in 1969 may, to some extent, have led to their disloyalty. These past experiences may have influenced their voting patterns, and real-life experiences and what is going on now and then also influence them, e.g., recruitment practices in civil servants, which have been seen to have a tendency of favouring the Malays (Woo 2015). Due to their real-life experiences from past to present, their political disloyalty reached the critical threshold, leading to the changes in their voting patterns. Chinese 'voters' who thought to be discriminated against and alienated and did not feel any merit to support Barisan Nasional's ethnic politics due to its racial policies and ethnic conflicts turned to deny the status quo. And also, recent political events such as Bersih Rallies may have motivated the Chinese to vote for Pakatan Rakyat/Pakatan Harapan.

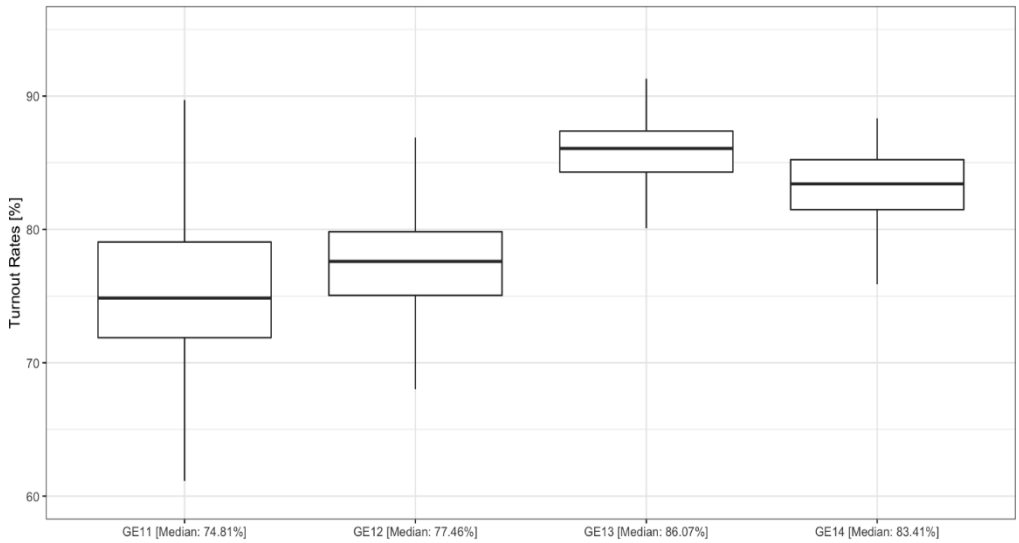
On the other hand, in GE13, there was another but critical change in Chinese *electorates*. It made Chinese denial much more severe. So far, we have discussed the voting patterns of *voters*. However, there was another but essential change in *electorates*. Here, tentatively let us consider a situation in which two parties are contesting. These parties are: party A and party B. Electorates have three choices: 1. to vote for party A, 2. to vote for party B, and lastly, 3. neither vote for party A; nor vote for party B. Both option1 and option2 will be counted as turnout rates. However, option3 will not be counted. Graph 5.1 shows the turnout rates from GE11 to GE14. The median values of the turnout rates in GE11 and GE12 are 74.81% and 77.46%. The median turnout rate

[7] Because of limited space, this paper avoids discussing elections before GE11. For these elections, see the analysis done by Nakamura (2015), which has shown that Barisan Nasional had obtained higher votes in ethnically-mixed areas in elections from 1959 to 2004.

rose by approximately 10% to 86.07% in GE13. Although in GE14, it decreased a bit, it continued at a high level (83.41%).

As we can see in Graph 5.1, the turnout rates were higher in both GE13, and GE14, compared with those in GE11, and GE12, clearly indicating that electorates had been much more interested in politics during the period of GE13 and GE14. Let us recall the formula of Riker & Ordeshook (1968), i.e.,

$$R = (PB) - C + D.$$



Graph 5.1: Turnout Rates from GE11 to GE14, in Peninsular Malaysia

Here, the variables are as follows: R is 'the reward, in utiles, that an individual voter receives from his act of voting,' P is 'the probability that the citizen will, by voting, bring about the benefit,' B is 'the differential benefit, in utiles, that an individual voter receives from the success of his more preferred candidate over his less preferred one", C is "the cost to the individual of the act of voting", and D is the "sense of citizen duty" (Riker & Ordeshook 1968: 25; 36). The reward (R) will be determined when these variables are uniquely determined. The benefit and probability are specifically significant. In terms of probabilities, it is not a numerical probability but a probability that voters themselves subjectively imagine. For example, one vote is given to each voter. In constituencies with 10,000 voters, the influence of such voters is 1/10,000, and the influence of one person's vote on the election results is numerically insignificant. Voters themselves will experience it. On the other hand, in a situation where two candidates are severely competing for votes, that is, in a tight race, voters may subjectively feel that their votes are much more influential. The probability here means such a subjectively estimated probability. The value obtained by multiplying the probability and the benefit is considered proportional to the reward, i.e., $R \propto PB$.

With this in mind, let us consider an 8.61% increase in turnout rates from GE12 to GE13. If $R \propto PB$, P or B (or both) should have risen (ceteris paribus). P represents the closeness of contests. When P influences R, closeness in vote shares will enhance turnout rates. Firstly, this paper will analyse whether there was such an influence during the period from GE12 to GE13. We use the following variables to see whether they are correlated, i.e.,

- $\Delta Turnout_{GE13,GE12}$
- $Closeness_{BarisanNasional,PakatanRakyat;GE12} = |VoteShare_{BarisanNasional;GE12} - VoteShare_{PakatanRakyat;GE12}|$

are the variables. The variable, $\Delta Turnout_{GE13,GE12}$, is the difference in turnout rates in the same constituency between GE12 and GE13. $Closeness_{BarisanNasional,PakatanRakyat;GE12}$ is an absolute value of the difference in vote shares obtained for Barisan Nasional and Pakatan Rakyat in GE12. If contests were severe, $Closeness_{BarisanNasional,PakatanRakyat;GE12}$ would approximate 0. On the other hand, if P positively influences R, there should be a negative correlation between $\Delta Turnout_{GE13,GE12}$ and $Closeness_{BarisanNasional,PakatanRakyat;GE12}$, for when $Closeness_{BarisanNasional,PakatanRakyat;GE12}$ is small, it means that Barisan Nasional and Pakatan Rakyat were severely contesting for votes, and if this closeness influenced turnout rates in GE13, $\Delta Turnout_{GE13,GE12}$ would have, on the contrary, increased.

Hereinafter, we use an interpretation method of correlation coefficients explained by Mukaka (2009: 71] as a rule of thumb. Correlation coefficients of ".30 to .50 (-.30 to -.50)", means "[l]ow positive (negative) correlation"; ".50 to .70 (−.50 to −.70)" means "[m]oderate positive (negative) correlation"; ".70 to .90 (−.70 to −.90)" means "[h]igh positive (negative) correlation".

The linear correlation coefficient between $\Delta Turnout_{GE13,GE12}$ and $Closeness_{BarisanNasional,PakatanRakyat;GE12}$ is 0.03. Thus, this paper regards that there was no influence of *P* towards *R* from GE12 to GE13. In other words, the closeness of the contests in GE12 did not enhance the turnout rates in GE13. Hence, the other candidate is *B*.

We have already discussed that Barisan Nasional's ethnic politics could not functionally retain votes from the Chinese. More importantly, there were the ethnic voting patterns in Malaysia. If *B* influenced *R*, it could be along ethnic lines because ethnicity has more or less determined political or economic benefits for citizens. Hereinafter, this paper calculates linear correlation coefficients between $\Delta Turnout_{GE13,GE12}$ and $GE13\%Malays$; $\Delta Turnout_{GE13,GE12}$ and $GE13\%Chinese$ (both $GE13\%Malays$ and $GE13\%Chinese$ are the variables which we have discussed in section 4).

Graph 5.2 shows scatter plots of the correlations between them. These plots are stratified. The triangle dots indicate correlations between them in constituencies with turnout rates lower than the average in GE12; the circle dots are those in constituencies with higher turnout rates. In constituencies with lower turnout rates in GE12, there was no correlation. The correlation coefficients in these constituencies are as follows, i.e.,

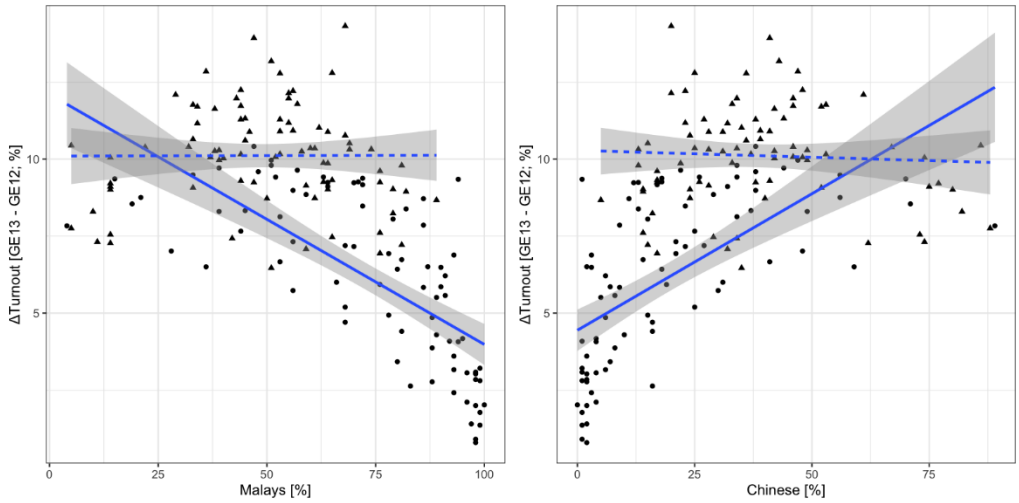
- $Correlation(GE13\%Malay, \Delta Turnout_{GE13,GE12}) = 0.00$
- $Correlation(GE13\%Chinese, \Delta Turnout_{GE13,GE12}) = -0.05.$

On the other hand, in those with higher turnout rates, the correlation coefficients are from moderate to high, i.e.,

- $Correlation(GE13\%Malay, \Delta Turnout_{GE13,GE12}) = -0.70$
- $Correlation(GE13\%Chinese, \Delta Turnout_{GE13,GE12}) = 0.63.$

To see the intercepts and slopes, those constituencies with lower turnout rates in GE12 (triangle dots and dashed regression lines) indicate that although there were variances, turnout rates in these constituencies increased by approximately 10% in GE13. In those constituencies with higher turnout rates in GE12, whether turnout rates increased depended on ethnicity. The positive correlations between $\Delta Turnout_{GE13,GE12}$ and $GE13\%Chinese$ indicate that turnout rates in those constituencies with higher percentages of Chinese electorates increased more.

Let us marshal our arguments regarding the increase in turnout rates in GE13. Graph 5.1 indicates that in GE13, turnout rates increased in Peninsular Malaysia. The severe contest between Barisan Nasional and Pakatan Rakyat did not contribute to the increase in turnout rates in GE13. Thus, we tried to explain the increase from the perspective of benefits. We discussed that constituencies with lower turnout rates in GE12 saw an approximately 10% increase in GE13. On the other hand, whether constituencies with higher turnout rates in GE12 increased their turnout rates in GE13 depended on shares of Chinese electorates. The increase in turnouts rates indicates that the interests of each electorate on a national level increased in GE13, but specific interests of Chinese electorates increased drastically.



Graph 5.2: Correlations between $\Delta Turnout_{GE13,GE12}$ and $GE13\%Malays$; $\Delta Turnout_{GE13,GE12}$ and $GE13\%Chinese$ (Stratified with Turnouts Rates in GE12; Circle Dots Are Constituencies with Higher Turnount Rates, and Triangle Dots Are Contituencies with Lower Turnout Rates in GE12)

The abrupt ruptures (the linear ethnic voting patterns starting from GE12; the sudden increase of turnout rates, specifically Chinese ones, in GE13) and the gradual changes (changes in the correlations between income and vote shares) indicate evident changes in the voting behaviour in Malaysian electorates. The voting behaviour in GE14 was quite different from that in GE11. These changes in themselves could possibly have influenced Malaysian politics. Nevertheless, it is difficult to anticipate a collapse of authoritarianism in GE14 by merely mentioning the regime change in GE14 and those changes in the voting behaviour. Instead, these changes may contribute to a continuation of the authoritarian regime after the regime change without an election (note that Perikatan Nasional now governs Malaysia due to a political crisis in 2020 and 2021) or forge a much more robust authoritarian regime.

The ideologies used by Malaysia's authoritarian government, specifically under Barisan Nasional, are twofold: 1. retaining political loyalties from the Malay communities and 2. obtaining votes from Malaysian electorates by resorting to material or economic incentives. These ideologies can be paraphrased as follows: 1. *ethnic populism*, which relies on ethnic conflicts and racism, and 2. *developmentalism* which tries to offset social problems such as ethnic conflicts and makes Malaysian people focus on economic growth.

We have already discussed issues of racism and ethnic conflicts above. A dichotomy between 'Bumiputera' (native) and 'non-Bumiputera' (immigrants), historical memory of the 'racial riot' in 1969, and, recently, a political knife act in a UMNO gathering are examples.

> *One delegate was reported to have said by the Singapore Straits Times: "UMNO is willing to risk lives and bathe in blood to defend the race and religion. Don't play with fire. If they mess with our rights, we will mess with theirs"* (Bendeich 2007).

> *The non-Malay/non-Bumiputera communities have long regarded themeselves as being discriminated against in economic and political matters; many among them accused the Government of treating them as "second class citizens"* (Ali 2008: 124).

Symbolising the majority as the *true nation* that should be protected and a regime as the safeguard and retaining them by resorting to ethnic populism are efficient strategies for winning the game of elections.

"Ethnic identity is a fiction created subjectively", and "it is generally accepted that ethnic groups derive from a common ancestor and maintain continuity through kinship" (Kosakai 2011: 45). Simultaneously, "identity exists in social relationships with others and does not indicate any fixed psychological state" (Fukushima 1998: 899-900). By finding common points among groups of people who have differences and finding differences among groups of people with various common points, binary oppositions such as *our group/other groups* and *we/others* arise. Ethnic groups are *discovered* through religious differences, statistical categories, minor physical differences, and other factors. Multiracial states encompass these separately found groups. Ethnic populism is an ideology to provide favours to the majority among these *discovered* ethnic groups and keep their political loyalties.

Because identity formation is situational, two persons who are members of different groups in one context will be members of the same group in another context. Now consider two students of the same major from the same university in Kuala Lumpur. One is Malay, and the other is Chinese. They are both 21 years old. They speak English in university and speak to their families in their *native* languages. Coincidentally, they both hope to work in the same industry after graduation. When will their ethnic identity come to light? If they work for the same company, they will share the same identity in the category of co-workers, which is different from ethnic identity. All of these identities depend on the situation. For this reason, the strategy of portraying the ethnic majority as the *true nation* and pretending to be the safeguard of their ethnic interests is effective in winning electoral games, for the ethnic majority accounts for approximately half of the population and if a government successfully retains their political loyalties, is regime will be robust. However, these are not fair and ineffective in the political sphere, which must deal with various problems, irrespective of ethnicity/race.

> *[S]ince politics uses the rest of the sciences, and since, again, it legislates as to what we are to do and what we are to abstain from, the end of this science must include those of the others, so that this end must be the good for man* (Aristotle 350 B.C.E Book1. Chapter 2).

What about the strategy to retain electorates' political loyalties by resorting to material interests? If the state intervenes appropriately, it can benefit the people as a whole. Government funding advances technological innovation and improves living standards (Stiglitz & Greenwald 2015: 21). What is essential for economic growth is a government's provision of appropriate financial assistance. By improving the level of education, the technological innovation necessary for economic growth will be pushed forward. Education is specifically crucial in developing countries. '[T]he poor catch up with the rich to the extent that they achieve the same level of technological know-how, skill, and education, not by becoming the property of the wealthy' (Piketty 2014: 71). "[S]imple assembly production may be relocated to remote areas [i.e., Third World], to ensure easy access to cheap and unorganised labor" (Goldsmith & Blakely 2010: 96). In order to achieve further economic growth in developing countries, it is necessary not only to inject simple foreign capital but also to make appropriate interventions to sustain their economic growth.

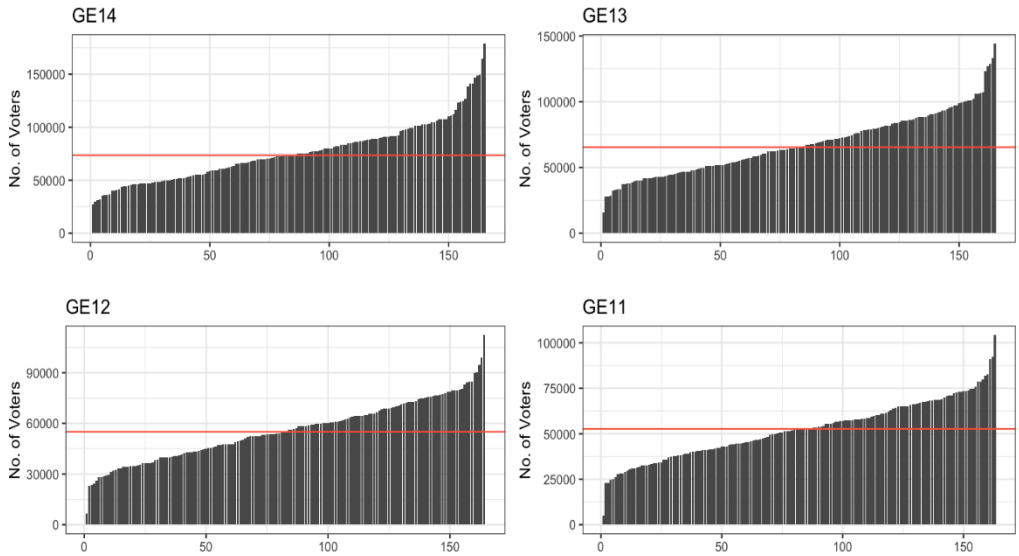
For its economic growth, the Malaysian government can do more. Nevertheless, the problem of developmentalism exists in a different area from securing political raison d'etre by such economic growth. Developmentalism hides various social problems by focusing the public's attention on economic trends. Ethnic conflicts and racial discrimination are typical examples. Also, are there any examples where people's interests and social justice are neglected in the name of economic growth and development? One example is 1MDB, which was set up in the name of domestic economic development and was used to launder large sums of money. Mahathir, a long-time prime minister and one of the leaders of Pakatan Harapan who brought about regime change, has also been suspected of nepotism (Kua 2015: 18). Corruption in the

public sector has also been a source of citizens' frustration (Woo 2015: 232). It has already been pointed out that employment in the public sector, such as civil servants, GLCs, and FELDA, has been a stronghold of UMNO. FELDA was incorporated into the model in this analysis and has consistently contributed to an increase in Barisan Nasional's vote share. Despite its high average household income, Putrajaya is an administrative city and has been a voting bloc in Barisan Nasional. Thus, under a developmentalist political system, it is possible to secure the ruling party's votes by securing direct employment from the government on a large scale. However, the problems of inefficiency and irregularities in intervention in the public sector and the state's economic activities have not been solved.

The analysis found a linear class-party (or income group-party) relations gradually emerged from GE13 and later, especially in GE14. It can lead to problems similar to the above relationship between ethnic identity and politics. Let us suppose that the economic classes determine which party (coalition) people support—for example, those with lower than average income and those with higher than average income. In GE14, there was a clear trend in which Barisan Nasional won in lower-income constituencies and Pakatan Harapan won in higher-income constituencies. Will this lead to a two-party (coalition) system? The dichotomy between Barisan Nasional, supported by lower-income groups, and Pakatan Harapan, supported by higher-income groups, may look like the rise of the two-party system. In addition, a linear relationship between ethnic identity and political party support is evident, making it possible to enclose voters along with the ethnic and economic voting patterns. These patterns may make the rise of the two-party system seem inevitable. However, the development of the two-party system is likely to be hampered by authoritarian mechanisms. As Levitsky & Way (2002: 53) pointed out, under competitive authoritarian regimes, periodic elections are held, but the competition (elections) between the ruling party and the opposition party is conducted under unfair conditions. Gerrymandering and malapportionment are prime examples.

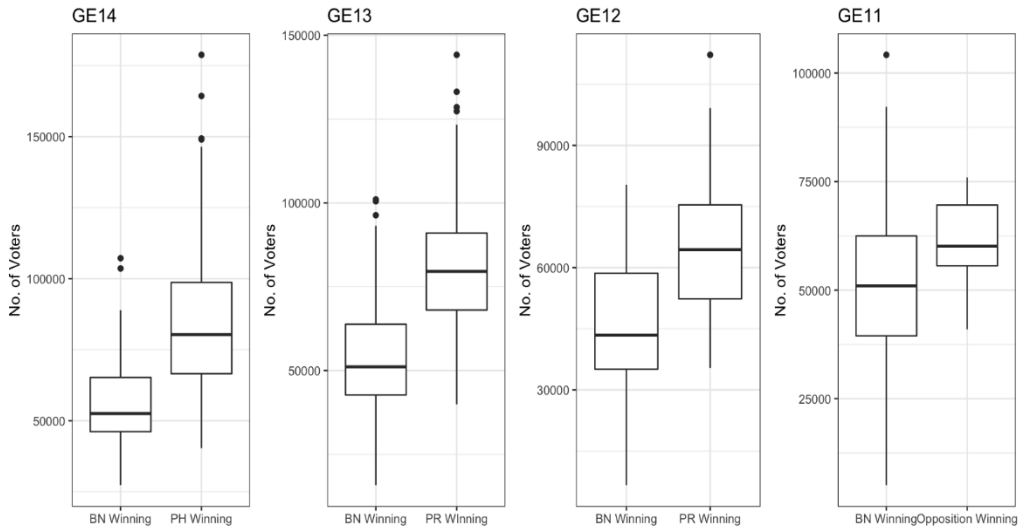
The constituency with the most significant number of voters in GE14 had 178,790 voters. Meanwhile, in the constituency with the lowest number of voters, the number was 27,306. Graph 5.3 shows the number of voters in each constituency, from GE11 to GE14. Median values are shown as horizontal lines. Graph 5.3 clearly shows that there had been a single vote disparity in Malaysia. Graph 5.4 shows the number of voters in each constituency from GE11 to GE14 as box-and-whisker charts. The charts are stratified. On the left side, constituencies that Barisan Nasional won are shown; on the right side, constituencies which other parties won are shown. Graph 5.4 shows that Barisan Nasional has been winning in constituencies with fewer voters. The median values of voters from GE11 to GE14 are shown in Table 5.1. This table is also stratified. The median value of voters in districts won by Barisan Nasional in GE11 was 50,983 and that in districts won by the opposition was 60,123. It became 52,524 in constituencies won by Barisan Nasional and 80,309 in constituencies won by others (Pakatan Harapan and PAS) in GE14. In GE11, there was already a vote gap, with opposition parties winning in constituencies with relatively large numbers of voters and

Barisan Nasional winning in constituencies with relatively small numbers of voters. This trend became more and more apparent in GE12, GE13, and GE14.



Graph 5.3: Numbers of Electorates from GE11 to GE14
(Horizontal Lines Are the Median Values)

As can be seen from the above discussion, it is clear that there is a vast gap between votes in Malaysia. In addition, Barisan Nasional has been winning in constituencies with small numbers of electorates. This tendency becomes more and more pronounced with time. What can we deduce from this tendency? Barisan Nasional and other political parties have different burdens to get candidates elected. It is consistent with Levitsky & Way (2003: 53), who pointed out that under competitive authoritarian regimes, periodic elections were held, but competitions (elections) between the ruling and opposition parties were conducted under unfair conditions. Barisan Nasional abused this tactic, winning 60% of the seats in GE13 with 47.38% of the vote (Yagi 2019b). It is the evidence of the abuse of authoritarian methods in elections. In addition, there is a high probability that arbitrary redelineation will continue to be used in the future due to the ongoing abuse of authoritarian methods. The ruling party, which is in power, will continue to allocate more seats to its voting bloc and win the election under favourable conditions.



Graph 5.4: Numbers of Electorates from GE11 to GE14
(Stratified; Barisan Nasional Winning Constituencies and Others Winning Constituencies)

Table 5.1
Median Values of Electorates from GE11 to GE14 (Stratified; Barisan Nasional Winning Constituencies and Others Winning Constituencies)

	Barisan Nasional Winning	**Others Winning**
GE14	52,524	80,309
GE13	51,102	79,558
GE12	43,428	64,418
GE11	50,983	60,123

The following is a summary of what has become apparent from the analysis so far, i.e.,

- the voting behaviour is changing
- as a result, there is a clear voters' preference for political parties (coalitions) along ethnic and class lines
- Barisan Nasional's favourable electoral system (an authoritarian approach) gave the opposition a tough fight.

So why was Pakatan Harapan able to bring about the regime change in GE14? The main reason for this was probably the triangular struggle between Pakatan Harapan, Barisan Nasional and PAS. As we have seen, Barisan Nasional and PAS have overlapping constituencies, creating a competitive situation. Yagi (2019 a; 2019 b) analysed this three-cornered fight and showed that the closer the neck-and-neck race between Barisan Nasional and PAS was, the more likely Pakatan Harapan's candidates would win. So this is not a victory for Pakatan Harapan in the two-party system but an exceptional victory for Pakatan Harapan due to the Malay vote split between Barisan Nasional and PAS.

Let us summarise the discussion so far. In this paper, we have analysed the election results from GE11 to GE14 and have discussed how the voting behaviour in Malaysia has changed. The results show that the voting patterns have continuously changed in the wake of GE12 and GE13. The voting patterns are as follows: the ethnic and economic voting patterns. In GE11, Barisan Nasional's vote shares tended to be higher in ethnically-mixed constituencies and constituencies with incomes close to the average. Results of GE10 and earlier are not included in this analysis. However, previous research has found that Barisan Nasional's vote shares were higher in ethnically-mixed constituencies in those elections (Nakamura 2015). It has already been pointed out that the state-created middle class tended to support Barisan Nasional (Torii 2003). From these facts, it is appropriate to consider that the same tendency would be observed before GE10. The voting patterns have been changing since GE12. First, the ethnic voting patterns became apparent. The economic voting patterns are also becoming evident. The changing trends have been found in the ethnicity-party and class-party (or income group-party) relations.

A national-level alliance was formed in the opposition camp, and competition arose at the national level between the ruling camp led by UMNO and the third force, PAS, resulting in the change of government in GE14. It was an unprecedented political phenomenon in Malaysian history. This experience will probably be taken into account by the alliance that came to power without an election due to Pakatan Harapan's split in 2020 and 2021. In this sense, this paper considers the regime change in GE14 to be an exceptional phenomenon. This paper hopes that a government that immediately reflects the will of the people will be established instead of maintaining a rigid dictatorship by a single ruling coalition, which resorts to authoritarian methods such as mal-apportionment. At the end of this section, let us summarise the conditions under which the following regime change may occur, i.e.,

- a party (coalition) with a simple majority vote immediately becomes the ruling party by eliminating authoritarian methods, specifically gerrymandering and malapportionment
- a competition arises at the national level among Barisan Nasional, Perikatan Nasional, and the Muafakat Nasional
- the voting behaviour changes, increasing the mobility of currently fixed ethnicity-party and class-party (or income group-party) relations.

When one or more conditions of the above occur, the possibility of regime change may increase.

6.0 Conclusion

This paper quantitatively analysed the election results from GE11 to GE14 and various data related to them. The analysis showed changes in voters' voting patterns. They can be divided into ethnic and economic ones. This paper divided the ideologies of Barisan Nasional's authoritarian regime into two components. Firstly, Barisan Nasional had used authoritarian methods in which opposition parties were forced to fight elections under unfair conditions, e.g., gerrymandering and malapportionment. Secondly, it tried to retain the electorates' political loyalties. Two ideologies have done this process. One is *ethnic populism* which tries to symbolise the largest ethnic group to be the *true nation* which should be protected by Barisan Nasional, which portrays itself to be the leader of them, e.g., the NEP and warning to the immigrants with a keris dagger in a UMNO gathering. The other is *developmentalism* which hides many social problems, e.g., racism, ethnic conflicts, corruption of civil servants and politicians and nepotism. It emphasises the importance of economic growth and development. It portrays the state as a prime mover to provide financially stable lives for citizens, e.g., massive employment in public sectors, such as civil service and GLCs.

The voting patterns have changed. Nevertheless, these have also helped Barisan Nasional's authoritarian regime survive. In GE11, voters from the middle class (average income) and those in ethnically-mixed constituencies were the main voting bloc of Barisan Nasional. These tendencies changed from GE12. The ethnic voting patterns became clear from GE12. The Malays supported Barisan Nasional (and also PAS in GE14); The Chinese were supportive of Pakatan Rakyat/Pakatan Harapan. The state-led creation of middle classes became not efficient from GE13, while FELDA residents have consistently been the stronghold of Barisan Nasional. Barisan Nasional, which won mostly in constituencies with the average income in GE11 and GE12, won mainly in lower-income constituencies in GE13 and GE14. Thus, a clear trend has been found in the attributes of ethnicity and class and the preference of the supporting party. Barisan Nasional had used authoritarian methods, e.g., gerrymandering and malapportionment, to hold political powers efficiently. Since the voting patterns in Malaysia are easy to detect, it is easy to target them by resorting to ethnic populism and developmentalism and also easy to retain political powers by utilising or furthermore abusing authoritarian methods.

Due to authoritarianism in Malaysia, it was difficult for opposition parties to bring about regime change. The regime change in GE14 was due to the three-cornered fight, which led to Barisan Nasional's landslide in constituencies with higher percentages of Malay voters because of its severe contest with PAS. Thus, the regime change was exceptional. Whether there will be a rise of a two-party (coalition) system will depend on the following three conditions: (1) elimination of authoritarianism, (2) a national-level competition between UMNO and other Malay-supporting parties such as PAS, and (3) mobility of the voting behaviour.

This paper has several limitations. Firstly, this paper used some estimated values calculated from other observed values, e.g., median values of household income in GE13 were estimated from those values in GE14. Understandably, this paper tried estimating those values without arbitrariness. Nevertheless, the estimated values, more or less, could be different from the actual values. Thus, the results should be no more than a tentative assumption. An analysis using observed values will help solve this issue. Secondly, there are several methodological limitations. This paper avoided using specific prior distributions and setting the region of practical equivalence (ROPE), which Bayesian analysts often use to measure whether an independent variable has effects or not for its analysis. Instead, this paper used various prior distributions and discussed the posterior distributions by merely checking whether 95% credible intervals included 0 or not. It was because there were no generally recognised values for setting both the prior distributions and ROPE ranges. This paper hopes that this paper can contribute, to some extent, to the settings of these values. Lastly, and importantly, this paper discussed the macro trends in Peninsular Malaysia. Thus, micro factors and the trends in Sabah and Sarawak were not included. These are this paper's limitations.

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Appendix

GE11

Table Appx.1
Model1 (GE11, Barisan Nasional, %Malays, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	0.89	0.67	1.10	13036	1
β_1	-0.51	-0.60	-0.41	20837	1
$\beta_{2,1}$	0.76	0.45	1.06	13081	1
$\beta_{2,2}$	-0.21	-0.41	-0.01	14089	1
β_3	0.17	0.06	0.28	21149	1
σ	0.69	0.62	0.77	20617	1

Table Appx.2
Model2 (GE11, Barisan Nasional, %Chinese, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	0.87	0.64	1.09	12436	1
β_1	-0.38	-0.46	-0.30	19749	1
$\beta_{2,1}$	0.98	0.67	1.30	13500	1
$\beta_{2,2}$	-0.23	-0.44	-0.02	14816	1
β_3	0.19	0.07	0.30	23821	1
σ	0.71	0.64	0.74	22177	1

Table Appx.3
Model3 (GE11, Opposition, %Malays, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	-0.91	-1.12	-0.71	12510	1
β_1	0.55	0.46	0.64	19615	1
$\beta_{2,1}$	-0.67	-0.97	-0.38	13245	1
$\beta_{2,2}$	0.25	0.05	0.44	14123	1
β_3	-0.13	-0.24	-0.03	20308	1
σ	0.66	0.59	0.74	21362	1

Table Appx.4
Model4 (GE11, Opposition, %Chinese, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	-0.90	-1.11	-0.70	12750	1
β_1	0.44	0.36	0.51	20135	1
$\beta_{2,1}$	-0.91	-1.20	-0.62	13589	1
$\beta_{2,2}$	0.26	0.06	0.45	14331	1
β_3	-0.15	-0.26	-0.05	22585	1
σ	0.67	0.60	0.74	20802	1

Table Appx. 5
Model5 (GE12, Barisan Nasional, %Malays, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	R
Intercept	0.74	0.49	0.99	12224	1
β_1	0.48	0.32	0.63	17802	1
$\beta_{2,1}$	1.17	0.79	1.55	13066	1
$\beta_{2,2}$	-0.63	-0.86	-0.40	14723	1
β_3	0.22	0.10	0.34	21009	1
σ	0.78	0.70	0.87	20065	1

Table Appx. 6
Model6 (GE12, Barisan Nasional, %Chinese, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	R
Intercept	0.75	0.51	1.01	12488	1
β_1	-0.46	-0.61	-0.31	18758	1
$\beta_{2,1}$	1.16	0.79	1.54	13011	1
$\beta_{2,2}$	-0.67	-0.90	-0.45	14842	1
β_3	0.22	0.10	0.35	21313	1
σ	0.78	0.70	0.87	21617	1

Table Appx. 7
Model7 (GE12, Pakatan Rakyat, %Malays, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	R
Intercept	-0.72	-0.97	-0.47	12125	1
β_1	-0.46	-0.61	-0.30	18323	1
$\beta_{2,1}$	-1.12	-1.50	-0.75	13795	1
$\beta_{2,2}$	0.63	0.40	0.86	15393	1
β_3	-0.22	-0.34	-0.09	22153	1
σ	0.79	0.71	0.88	21221	1

Table Appx. 8
Model8 (GE12, Pakatan Rakyat, %Chinese, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	R
Intercept	-0.74	-0.99	-0.48	11729	1
β_1	0.46	0.31	0.61	1766	1
$\beta_{2,1}$	-1.13	-1.51	-0.75	12572	1
$\beta_{2,2}$	0.66	0.43	0.89	13432	1
β_3	-0.22	-0.35	-0.10	21154	1
σ	0.78	0.70	0.87	20506	1

Table Appx.9
Model9 (GE13, Barisan Nasional, %Malays, Stratified Income, %FELDA)

Table Appx.9
Model9 (GE13, Barisan Nasional, %Malays, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	0.36	0.15	0.57	12273	1
β_1	0.62	0.50	0.75	19002	1
$\beta_{2,1}$	0.48	0.16	0.80	13239	1
$\beta_{2,2}$	-0.42	-0.62	-0.23	14680	1
β_3	0.18	0.07	0.29	20373	1
σ	0.66	0.59	0.74	20046	1

Table Appx.10
Model10 (GE13, Barisan Nasional, %Chinese, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	0.39	0.20	0.59	11933	1
β_1	-0.65	-0.77	-0.53	19759	1
$\beta_{2,1}$	0.52	0.22	0.82	12634	1
$\beta_{2,2}$	-0.46	-0.65	-0.28	14229	1
β_3	0.17	0.06	0.27	21795	1
σ	0.63	0.57	0.71	21150	1

Table Appx.11
Model11 (GE13, Pakatan Rakyat, %Malays, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	-0.40	-0.61	-0.18	13576	1
β_1	-0.60	-0.73	-0.47	20634	1
$\beta_{2,1}$	-0.54	-0.86	-0.21	14581	1
$\beta_{2,2}$	0.44	0.24	0.65	15257	1
β_3	-0.19	-0.30	-0.08	22237	1
σ	0.69	0.57	0.77	20939	1

Table Appx.12
Model12 (GE13, Pakatan Rakyat, %Chinese, Stratified Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	-0.43	-0.63	-0.22	12051	1
β_1	0.65	0.53	0.77	19001	1
$\beta_{2,1}$	-0.59	-0.90	-0.28	12738	1
$\beta_{2,2}$	0.47	0.28	0.66	14238	1
β_3	-0.17	-0.28	-0.07	21883	1
σ	0.65	0.58	0.72	20752	1

GE14

Table Appx. 13
Model13 (GE14, Barisan Nasional, %Malays, Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	R
Intercept	-0.01	-0.11	0.10	28584	1
β_1	0.54	0.42	0.66	26168	1
β_2	-0.24	-0.36	-0.11	24708	1
β_3	0.18	0.07	0.28	28286	1
σ	0.67	0.60	0.75	26271	1

Table Appx. 14
Model14 (GE14, Barisan Nasional, %Chinese, Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	R
Intercept	-0.01	-0.11	0.10	27798	1
β_1	-0.53	-0.65	-0.41	26582	1
β_2	-0.25	-0.37	-0.13	26028	1
β_3	0.17	0.06	0.27	28328	1
σ	0.68	0.61	0.76	26370	1

Table Appx. 15
Model15 (GE14, Pakatan Harapan, %Malays, Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	R
Intercept	0.00	-0.05	0.05	27590	1
β_1	-0.79	-0.86	-0.73	24199	1
β_2	0.23	0.17	0.29	23410	1
β_3	-0.06	-0.12	-0.01	26589	1
σ	0.35	0.31	0.39	26425	1

Table Appx. 16
Model16 (GE14, Pakatan Harapan, %Chinese, Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	R
Intercept	0.00	-0.06	0.06	31229	1
β_1	0.77	0.70	0.84	26130	1
β_2	0.24	0.17	0.31	26385	1
β_3	-0.06	-0.12	0.01	27361	1
σ	0.39	0.35	0.44	28250	1

Table Appx.17
Model17 (GE14, PAS, %Malays, Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	0.01	-0.09	0.11	28422	1
β_1	0.75	0.63	0.86	26054	1
β_2	-0.14	-0.25	-0.02	26816	1
β_3	-0.04	-0.15	0.06	28231	1
σ	0.61	0.54	0.69	25307	1

Table Appx.18
Model18 (GE14, PAS, %Chinese, Income, %FELDA)

Parameter	Mean	2.5%CI	97.5%CI	ESS	*R*
Intercept	0.01	-0.10	0.11	27190	1
β_1	-0.71	-0.83	-0.60	26606	1
β_2	-0.17	-0.29	-0.05	24086	1
β_3	-0.06	-0.17	0.05	26082	1
σ	0.64	0.57	0.72	23996	1