

HOW DO ELECTORAL SYSTEMS AFFECT REPRESENTATION

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ABSTRACT

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The project is to discuss the micro-foundations of how electoral institutions impact political representation. The micro-foundations are built upon the citizens' decisions on how to express their policy preferences in elections. The beginning of political representation is political participation, the decision of voting or not. Moreover, since not all people decide to vote, the accuracy of the citizens' preferences expressed through voter turnout is essential in political representation. Furthermore, the authorization of the citizens' preferences is related to the selection of political agents who have the power to speak for the people's will in the government. These three topics are the main themes of this project.

The central finding of this project is that various types of electoral systems (i.e., proportional representation (PR henceforth) and single majoritarian (SMD henceforth) systems have their own advantages and disadvantages on three components of political representation. I first show that the micro-foundations of why PR systems are associated with higher turnout than SMD systems are built upon the calculus of voting and spatial theory. Individual evaluations of the B term in the calculus of voting are affected by spatial party competition framed by electoral institutions. Then I ask the question of how electoral institutions affect the degree of political representation through the perspective of comparing the distribution of voter preferences versus that of all electorate. Different types

of electorate according to their relative locations in the distribution of voter preferences have various incentives to voting. Finally, I argue that electoral systems create the convergent and non-convergent electoral incentives with substantial impacts on the position-taking strategy of political parties through mechanisms of the electoral formula, and the district magnitude. The pattern of party positioning is also modified by the type of government (i.e., majority and coalition) and voter turnout rates depending on electoral systems. These two aspects cause lower policy dependence under SMD and higher policy dependence under PR.

To my father, and my mother

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CHAPTER 1

INTRODUCTION

Political representation is one of the necessary requirements of democracy. Representative democracy means that the government is delegated to a group of people through regular elections. The idea of political representation is to realize the basic concept of democracy — rule by the people — by asking delegates to express their constituents' interests.

Political representation is a complex concept with conflicting sub-definitions. Any analysis based on a single dimension of political representation is insufficient. This study proposes to explain the meanings of political representation from the perspective of responsiveness to bridge different characteristics of political representation. In particular, I focus on three main components of political representation: electoral participation, vertical accountability, and political competition. Meanwhile, this chapter intends to put these components of political representation in the context of electoral systems and systematically examine how electoral institutions affect political representation via various mechanisms.

An electoral system is a collection of electoral rules, which function in an organized way to decide how political representation works. A particular system contains many separate electoral rules which may look disorderly but work together to achieve the particularity of an electoral system. For instance, different combinations of the rules have dissimilar effects on the degree of proportionality between votes and seats. The change of one rule in the system may cause serious or unintentional consequences on political representation.

The basic features of an electoral system include the number of votes that each citizen

can cast, how many delegates are selected within one district, and the electoral formula which defines how the winner is determined. From the perspective of comparative rational choice, ‘it pays attention to the constraints on and the strategic interactions among the actors whose aggregated choices produce the outcome of interest’ (Levi 2009, 122). The rules of electoral institutions not only frame how choices are presented to citizens but also determine how choices are picked through preference aggregation. Importantly, electoral institutions are a context factor framing the interactions between voters and parties. Institution-induced incentives influence individual decision-making, i.e., electoral participation, vote choice, and political competition in electoral campaigns and policy-making process. Therefore, the filtering process of citizens’ preferences through electoral institutions deserves investigation. The focus of this study is how disparate equilibriums of electoral behavior created by the different rules of the game in electoral institutions affect political representation.

The main thesis of the project is to discuss the micro-foundations of how electoral institutions impact political representation.¹ The micro-foundations are built upon the citizens’ decisions on how to express their policy preferences in elections. This study adopts the forward-looking aspect of political representation examining the integration of the citizens’ preferences into final policy outcomes. The beginning of political representation is political participation, the decision of voting or not, which is the first step of the linkage between the citizens’ preferences and the government policies. Moreover, since not all people decide to vote, the accuracy of the citizens’ preferences expressed through voter

¹ The variable of electoral systems is treated exogenous in the project. The origin and selection of varied types of electoral institutions are not the topic of this research. For endogeneity of electoral systems, see Boix (1999) and Benoit (2004) for more information.

turnout is essential in political representation. The fidelity of the preferences in voter turnout to the counterparts in the whole eligible citizens ensures the latter represented in the policy outcomes faithfully. Furthermore, the authorization of the citizens' preferences is related to the selection of political agents who have the power to speak for the people's will in the government. These three topics are the main themes of this project.

The central finding of this project is that various types of electoral systems (i.e., proportional representation (PR henceforth) and single majoritarian (SMD henceforth) systems have their own advantages and disadvantages on three components of political representation. I first show that the micro-foundations of why PR systems are associated with higher turnout than SMD systems are built upon the calculus of voting and spatial theory. Individual evaluations of the B term in the calculus of voting are affected by spatial party competition framed by electoral institutions. Then I ask the question of how electoral institutions affect the degree of political representation through the perspective of comparing the distribution of voter preferences versus that of all electorate. Different types of electorate according to their relative locations in the distribution of voter preferences have various incentives to voting. Finally, I argue that electoral systems create the convergent and non-convergent electoral incentives with substantial impacts on the position-taking strategy of political parties through mechanisms of the electoral formula, and the district magnitude. The pattern of party positioning is also modified by the type of government (i.e., majority and coalition) and voter turnout rates depending on electoral systems. These two aspects cause lower policy dependence under SMD and higher policy dependence under PR.²

² The detailed definition of policy dependence is in Chapter 4. The wording of policy

1. Why the Focus of Micro-Foundations of Political Representation?

The object of political representation is the citizens' preferences constituted by individuals. In modern democracies, representatives are elected by the citizens' action of voting. The citizens' preferences are revealed by the decision to vote and the selection of political agents. The context of this process of political representation is electoral systems to aggregate individual choices. The investigation of micro-foundations of political representation restrained by electoral institutions should give us a better understanding of the functioning of political representation.

How the represented is defined has long been ignored or assumed pre-existent in the research of political representation. The citizens' preferences expressed by voting are an important dimension of the represented to facilitate democratic operation. The formation of the represented is the judgment of good representation because the quality of the latter is evaluated by the standard of the former. The importance of the object to be represented hinges on itself as the starting point of the chain of democratic representation.

In the traditional research of political representation, the discussion of the content of the represented is limited due to the attention to the typologies of the representatives. In the classic work of Pitkin's *The Concept of Political Representation* (1967), she implicitly considers the represented as known and puts forward the meanings of types of political representation. Recently, Mansbridge (2003) expands more categories of representation to account for what representation does in practice. These categorizations point out the ways the representatives perform their jobs. Moreover, Young 'conceptualize[s] representation as a differentiated relationship among political actors engaged in a process extending over

dependence is just a shortcut to indicate the contrasting policy-making processes under SMD and PR (Martin and Stevenson 2001; Powell 2000).

space and time' (Young 2000, 123). She argues that there are different social perspectives from group representation to facilitate the democratic process. Saward considers the formation of the represented important and 'careful attention to how citizens can make well-informed judgments about the ways in which they are represented (or not) is vital' (Saward 2010, 30).

In the previous research of electoral systems, scholars discuss the effects of electoral institutions on the relationship between seats and votes without putting the object of the represented into consideration. These effects are measured by the proportionality between seats and votes (Lijphart 1994; Rae 1967; Taagepera and Shugart 1989). The procedural representation does not care about citizens' needs (Powell 2004). Lately, some research of electoral institutions has shifted their focus to the congruence of citizens' preferences and government policy (McDonald et al. 2004; Powell 2006; Powell and Vanberg 2000). This development signifies the essential of the content of the represented.

With emphasis on looking at constitutive side of the represented, this research views participation the core of political representation to characterize citizens' preferences. Participation in elections is rudimentary for democracy to work because it not only decides what the people want but also determines the authorization of the representatives. Political participation has a wide range of dimensions and this project narrows the topics down to the decision to vote and the choice of politicians.

What do citizens' preferences represent? After the justification of citizens' preferences as the ineradicable component of political representation, we need to pin down the meanings of citizens preferences. Citizens' preferences are a complex idea including multiple aspects such as policy, gender, culture, economy, ethnicity and so forth. Each attribute can be used as the criterion for representation efficacy. For instance, if the gender

perspective of male and female ratio is 1:1 in the population, a good representation is that the men and women members of parliament should be 1:1 as well. This example indicates that the qualities of representatives should mirror the same counterparts of citizens. In other words, the characteristics of the representatives need to portray those important qualities of the citizens. As Saward points out, 'There is an indispensable *aesthetic* moment in political representation because the represented is never just given, unambiguous, transparent' (Saward 2010, 74). This basic type of representation is denoted as descriptive representation in Pitkin (1967). Thus, there are two requirements for democratic representation to work. First is to understand how the object of the represented is formed. Second is to represent what should be represented impartially through democratic procedures. Only when both conditions are met can good democratic representation be achieved.

Following the convention of Downs' (1957) spatial theory analysis, I choose policy as the main attribute of citizens' preferences. I pick it for several reasons. First, the influence of policy preference in citizens' decision of voting is well-established. Spatial theory specifies that voters have instrumental motivations for voting by evaluating policy outcomes. Specifically, in the utility function for the judgment of their own welfare, voters assess the distance between their own ideal points and the perceived policy position of political agents. Rational voters, as utility maximizers, will always support the candidate whose policy position is closest (Enelow and Hinich 1984). Then I am able to build my arguments based upon past research. Second, research on the effects of electoral systems on political parties is fully-fledged in past few decades. Since the target of this project is to tackle the impacts of electoral systems, by picking the policy attribute I can connect the institutional effects on voters' decisions through party positioning strategies in campaign.

Spatial theory is an appropriate tool for my research because spatial theory has two useful parts in my project: voting utility function and party positioning strategy. With the combination of both pieces, I can investigate the effects of electoral systems on representation. Furthermore, spatial theory can be used as a unifying theory accounting for three subtopics of the project. By the usage of spatial theory for analyzing the policy positions between voters and parties, I can develop more systematic assertions for various aspects of voters' decisions.

By confining my attention to the policy attribute, it means that other properties of citizens' preferences are not covered. This is not saying other components of citizens' preferences unimportant. Every attribute of citizens' preferences has its own significance. For example, culture needs being common for the principal and agent to let them communicate with each other because it put them under the same circumstance. The practical reason of excluding other properties is the impossibility to discuss so much idea in such a limited space of a dissertation project.

Even within the policy attribute of citizens' preferences, there exists a problem of multiple dimensionalities. There are different issues related to voters' utility function, for example, civil rights, health care, education, social welfare, defense and so forth. To make cross-national analysis feasible, it is necessary to have a common issue spectrum. Left-right ideology enables us to generate claims not constraining by country borders. The terms 'left' and 'right' have been shown that they are widely used in party competition and are common language between citizens and political parties (Huber and Inglehart 1995). This phenomenon exists not only in experts' judgments but also in citizens' minds with evidence from survey data (Pierce 1999). The left-right issue dimension does serve as mutual

understanding between citizens and political parties. The recent research of electoral systems on the congruence between citizens' median and government policy also utilizes left-right ideology as the common dimension for cross-country comparison (Blais and Bodet 2006; Budge and McDonald 2007; Golder and Stramski 2010; Huber and Powell 1994; McDonald and Budge 2005; McDonald et al. 2004; Powell 2000, 2006, 2009; Powell and Vanberg 2000). Following the heritage, I employ the left-right scale as the main issue for its comprehensiveness.

To achieve commonality is to omit specifics because the salient issue varies across countries and even across elections in the same country. Although the salient issue changes across countries, it is not independent from the left-right scale. In other words, the positions of the salient issue are correlated with those on the left-right dimension. The major assumption I make is that the positions of the salient issue can be mapped onto the left-right dimension without reversing their initial orders. This means that the variance of positions on the left-right scale can explain most of the counterpart on the salient issue (Jackman 2001; Poole and Rosenthal 1985). This idea is closely related to factor analysis in statistics. The left-right scale is the hidden general dimension and the specific issues are observable variables. Each issue should have some factor loadings on the left-right dimension, with the situation that the salient issue is one of them. These scores on the left-right scale are derived from distinctive issues because the original positions are transformed spatially onto a more general dimension. Therefore, the left-right scale can be used as the proxy for the salient issue in voters' utility function.

The concentration of issue voting in the project restricts the applicability of my arguments in some post-communist countries in Europe, new democracies in Latin democracies and parts of Africa. The issue voting model, which is also called responsible

party model in the citizen-politician linkage, cannot explain the voting behavior in the aforementioned areas. Citizens in these areas put more weight on clientelistic, party-voter linkage in voting consideration (Kitschelt and Wilkinson 2007). To state the concept alternatively, these voters increase their voting utility function by material inducements or side-payments more than derived benefits from issue similarity with their identified political parties. I do not dismiss this differentiated type of linkage, but it does show the limitation of those mechanisms in my project. The extent of generalizability of my dissertation does not include these areas. Let me unpack my thesis below.

2. Conceptualizations: Representation, Responsiveness, and Electoral Institutions

The concept of political representation needs to be clarified before any further discussion. The formal definition is that the citizens (the principal) would like the representatives (the agent) to act in their interest or on her behalf under the setting of institutional contexts. According to this account, political representation implies that the agent is selected to act in the government by aggregating the citizens' preferences. In democratic settings periodical and regular elections usually work as part of the institutional mechanism for agent selection (Manin 1997) .³ The object to be represented is the principal's interest, whose best judgment is the citizens' preferences. The agent, on the other hand, faces a dilemma: should they function as a delegate acting for the principal's wish or as a trustee acting for the common good since citizens may not have enough expertise to realize their best interests or because there is no Condorcet winner among the majority of citizens' preferences (Arrow 1951). The problem is further

³ For examples of nondemocratic representation, see Rehfeld (2006).

complicated by information asymmetry. The relationship between citizens and representatives is a principal-agent one because the agent holds information not revealed to the principal (Brennan and Hamlin 2000; Salanié 2002). The agent can shirk out of self-interest and her action may not be detected by the principal.

To lessen the degree of these complications, this study follows the minimalist definition of political representation. There are seldom universal substantive standards to evaluate political representation, though there is an endeavor to derive what standards of good representation should be (Dovi 2007). Unlike Manin, Przeworski, and Stokes who define representation as ‘acting in the best interest of the public’ (Manin et al. 1999b, 2), my definition emphasizes how the citizens’ preferences can be represented in an unbiased way through democratic procedures. The citizens’ preferences can be represented only when they are expressed in elections and are not altered by electoral institutions. This definition is more in line with Christiano’s (1996) formal account of political responsibility in which the agent is chosen in a certain way by the principal, with Riker’s (1982) in which the practice of the democratic institution should be the focus, and with Mainwaring, Bejarano, Pizarro, and Leongomez (2006) who defines representation as authorizing an agent to act on a principal’s behalf. This kind of definition is minimal because it views representation as merely requiring democratic institutions to work properly.

A successful political representation in democracies also provides responsiveness. The representatives are aware of citizens’ preferences and are able to fulfill or employ those preferences into policies under democratic institutions. To state this alternatively, the agents respond to the principal’s need. This is what Pitkin describes as the meaning of representation, to be ‘acting in the interests of the represented in a manner responsive to them’ (Pitkin 1967, 209). To exemplify the process of political representation,

responsiveness connects citizen preferences and the outcomes of public policies through the linkages of structuring choices, institutional aggregation, and policy making (Powell 2005). This conceptualization of responsiveness amounts to the congruence between citizens' preferences and policy outcomes (Stimson 1999).

Obviously, if the citizens have no means to remove bad agents or hold them responsible for their actions in office, the representation is in crisis. The primacy of citizens lies in voting in elections to control representatives and the electoral system decides how agents are chosen. To further elucidate how electoral systems affect political representation, we have to understand how elections serve as a mechanism for responsiveness. When deciding for a candidate, citizens may engage in retrospective and/or prospective voting (Manin et al. 1999b; Mansbridge 2003; Powell 2000). In the forward-looking version, citizens look at whether representatives will act for the interests of the represented. Citizens select agents who are competent enough to accomplish their campaign promises. In this perspective, voters want to have a mandate government.

On the other hand, in the backward-looking perspective, citizens examine whether incumbent agents have fulfilled their duty during the previous electoral term. Citizens are empowered by the right to get rid of bad politicians who shirk their responsibility and hold them accountable. Citizens' ability to punish or reward agents' past behavior creates accountability. In light of responsiveness, accountability shows that agents do not ignore their constituents and do not just pursue their own goals or career. These two mechanisms disclose that electoral systems are an essential part of democratic representation.

From the systematic perspective, responsive representation helps promote the legitimacy of a democratic political system. Responsive representation maintains political legitimacy through different dimensions of democracy. These dimensions can be divided

into two aspects: procedural and substantive. The procedural dimension involves institutional arrangements that generate five features necessary for effective responsiveness: the rule of law, participation, competition, vertical accountability, and horizontal accountability (Diamond and Morlino 2005, xii). The rule of law shows every individual agrees to play by the rules of the game which can be defined as the constitution; participation means that citizens take their part in the decision-making process; competition means that political parties and lobbyist groups are allowed to form and compete with each other; vertical accountability indicates that political parties are responsible to citizens who have the ultimate sovereignty under democracy, and finally, horizontal accountability shows that the institutional design should have checks and balances to curb government power in order to protect citizens' basic political rights.

Among these qualities, participation, competition, and vertical accountability are directly tied to electoral institutions. Voting in elections is considered a major form of citizens' political participation. Political parties need to compete for the voters' support in elections in order to form the government, and citizens control politicians through elections. To put it different, electoral institutions influence political representation through electoral behavior, party competition, and how voters hold political parties responsible for their actions.

Finally, the substantive dimension involves freedom and equality. The responsiveness of a political system supplies the connection between the procedural and substantive dimensions designated as the important qualities of democracy (Diamond and Morlino 2005).

There are a lot debates related to how electoral systems affect political

representation.⁴ From the experience of established democracies, scholars compare the advantages and disadvantages of SMD with those of PR over the citizens' satisfaction of how democracy works. Many researchers also have disagreements over whether those observations in established democracies can be extended to either developing democracies or ethnically-divided societies. The disagreement mainly comes from which electoral system better produces a good representation beneficial to democratic consolidation. For those who support SMD, they argue that SMD generates clearer accountability, creates a tighter connection between the representative and constituents, and promotes cooperation across ethnicity (Barkan 1995; Horowitz 2003; Lardeyret 1991). Conversely, other scholars who prefer PR contend that PR has better minority representation and is more suited for fragmented societies with a power-sharing political system (Amy 2002; Barber 2000; Lijphart 1991, 2004; Reilly 2002; Reynolds 1995). Some scholars take a moderate position and argue that the solution to building up better representation in divided societies is not unique (Bieber and Wolff 2007).

The controversies in past research arise because the effects of electoral systems on political representation have not been compared systematically under a unified framework. This study tries to access the three electoral institutional-related qualities of democracy across developed and developing countries. This will help us answer the question on which electoral institution will provide a better political representation and under what circumstances.

⁴ The representation refers mainly to elections in parliament or in congress. In another institutional dimension of parliamentary versus presidential systems, there is no comparable election of executive chiefs.

3. The Argument

The representation of the electoral process can be broken down into three connected elements: the individual decision to vote, the preference distribution of those who vote, and how party competition seeks the support of those who turnout. Suppose there is only one dimension policy space⁵ and voters' preferences are distributed uniformly. The first component is how many voters decide to show up in the polling station. The second component describes the post-election preference distributions of voters who actually go out on Election Day. To put it in another way, the question is whether or not the distribution of those regular voters in elections is biased against the whole range of the distribution of the whole society. The third component indicates how political parties compete for the market of those regular voters. These components will be the foci of three empirical chapters and the more detailed idea will be explained in order in the following paragraphs.

First, the incentives of participation are different across electoral systems. Individual decisions of voting or not depend not only on many contextual-specific factors but also on the effects of electoral institutions. The decision to participate or abstain in an election shows whether the eligible citizens can select appropriate deputies to represent their preferences. The central claim is that individual evaluations of benefits, what I refer to as the B term,⁶ in the calculus of voting are affected by spatial party competition framed by electoral institutions. While SMD reduces individual perceptions of the B term, PR helps

⁵ The assumption of unidimensionality is reasonable if the most salient issue exists within a country. The most usual dimension can be assumed to be the left-right dimension. It may be changed depending on the context.

⁶ There are two components in the B term, the F and H factors. The detailed discussion of the two factors is in Chapter 2.

voters acquire higher estimates of the same term. As a consequence, a voter's turnout propensity should be increased more by PR than by SMD, *ceteris paribus*.

Second, not all eligible voters exercise political participation, and it is those who do go to the polling station that hold representatives accountable. Do those types of voters who show up for elections faithfully cover the full range of the policy space? We must know whether voting turnout leaves some parts of the distribution unrepresented. If representatives know that a certain portion of their constituents relinquishes their rights, they may not include their interest in the policy-making process. Thus, after understanding why people go to vote, we need to know the properties of these citizens who turn out to vote. Only these voices are heard through elections and these preferences influence vertical accountability. The relationships between voting turnout and electoral systems should be investigated to understand which types of citizens express their preferences in elections.

Third, knowing which types of voters usually turn out, political parties choose their campaign strategy to seek voter support under electoral systems. The main quest is to know why political parties choose their positions in such a way under an electoral system and how they position themselves under different types of electoral systems. Political parties choose such positions because those are viable positions constrained by the electoral institutions. Therefore, the resulting party position differs vastly under electoral systems.

Alternatively, the aggregation process through electoral systems filters observable vote counts into a small set of representatives also constrained by electoral systems. Political agents positioning themselves differently act as proxies for their constituencies to bargain with one another in the legislature. Since the number of political agents varies across electoral systems, viable issue positions must obtain the majority support of voters. In a

majority system, a single agent occupies this position, while in other systems several positions are needed to form a minimal winning coalition to maintain the majority.

The position-taking strategies under different types of elections are formed by political parties by the recognition of the discussion in the previous paragraph. Electorates make their choices of parties by responding to the relative locations of political parties. Voter choice is the results between how political parties position themselves to attract voters' support and the citizens' response to the former. The patterns of voter choice across electoral systems are the focus of the third chapter.

4. Contributions

Political representation has many paradoxical explanations when assessed from different perspectives in the democratic process. To have a more comprehensive understanding of political representation, the investigation of the concept should be canvassed from multiple angles. This research suggests examining a consistent portion of the meanings of political representation from the perspective of responsiveness. Moreover, this chapter tries to place political representation in the context of electoral systems and to ask how the variations of institutional factors influence the features of political representation, because political representation cannot be isolated from the rules of how representatives are selected. The effects of electoral institutions not only structure how choices are presented to citizens but also determine how choices are picked through preference aggregation. Therefore, electoral institutions have impacts on the interactions between citizens and political parties and on their strategies in the process, which both modify the qualities of political representation.

A few problems still have not been clarified by previous research. First, those studies

do not compare the effects of electoral systems systematically across established and developing democracies. Second, usually aggregate indicators are utilized in exploring the influence of electoral systems, which lack a micro-foundation. Third, political representation is based on individual behavior and the linkage between macro-institutional context and individual decision is seldom explicitly specified.

This study tries to propose a research framework in order to address these deficiencies in past studies. To build a stronger linkage between electoral systems and political representation, we need to have general mechanisms penetrating country borders, but accounting for essential features of how political representation works without the loss of too much attention to contextual factors. Under this balanced approach, we can have a better understanding of how electoral systems affect political representation in different countries.

5. Outline of the Project

5.1 Uncovering the Micro-foundations of Turnout and Electoral systems (Participation)

The second chapter intends to tackle the micro-foundations of why PR is associated with higher turnout than SMD. The micro-foundations are built upon calculus of voting and spatial theory.

The central claim is that individual evaluations of the B term in the calculus of voting are affected by spatial party competition framed by electoral institutions. While SMD constrains the number of political parties and creates large centripetal forces for party competition, it reduces individual perceptions of the B term. In contrast, PR which allows more political parties to survive does not generate many centripetal forces, and helps voters

acquire higher estimates of the B term. Building upon insights from spatial voting theories, this chapter argues that a voter's turnout propensity increases as the distance between her position and the policy position of her most favored party decreases. Conversely, a voter is more likely to turn out if the policy distance between her and her least favored party increases.

This thesis is operationalized and tested by survey data from the round 1 and 2 of the Comparative Study of Electoral Systems (CSES henceforth) across 64 recent elections. The method is multilevel modeling because individual voting decisions are influenced by aggregate contextual variables and personal characteristics at the same time. The empirical findings confirm that the voting mechanism holds under both SMD and PR while PR has a stronger tendency of voting due to the policy distance between her and her least favored party. Moreover, the mechanism holds both in established and non-established democracies.

Traditionally, the electoral institution school argues that countries with PR are associated with higher turnout (Blais and Carty 1990; Jackman and Miller 1995; Franklin et al. 1996; Radcliff and Davis 2000). Despite this strong empirical regularity, we know little about the underlying mechanism that drives higher turnout under PR systems. In addition, the effect of electoral systems seems to considerably weaken in the context of new democracies (Blais and Dobrzynska 1998).

Previous research does not provide an explicit linkage between individual characteristics and contextual variables (i.e., how aggregate factors affect individual variables that also alter a citizen's propensity to vote). A more thorough procedure includes the following: first, examining how institutions shape the incentives of individual behavior; second, verifying how institutional effects change electoral behavior; third,

showing how individual incentives influence the decision to vote. This chapter intends to bridge the gap and discuss the micro-foundations of voter turnout across electoral systems.

5.2 The Impacts of Electoral Systems on Political Representation (Vertical Accountability)

Political representation is considered a basic requirement for democracy to work. Citizens use elections as a means both to express their preferences and take the government to account. However, there is no consensus regarding whether the PR or SMD system is better in generating a more representative government. The disagreement has ignited a lot of research over the past decade. The general argument is that SMD lacks minority representation and PR produces obscure accountability.

Despite these known facts, there is no systematic research focusing on how representative a government is based upon electorates who actually turn out to vote across electoral systems. A representative government should have electoral support as a mirror image of the whole country by the aspects such as issues, ethnicity, languages and religions. The tenure of the government is also renewed by those who do vote in elections. In particular, a representative government should be elected by a miniature of eligible electorates.

The goal of the third chapter is to explore if political representation is biased by electoral systems through comparison between the profiles of voter turnout and those of the country as a whole. An electoral system induces a representative government when voter turnout possesses features similar to the whole population. More specifically, in light of spatial theory, the distribution of ideal points of voter turnout in an issue dimension should be representative of the whole society by excluding those who do not vote. The

examination can be extended to other dimensions like ethnicity, languages, and religions. Survey data from CSES the same as those in the previous chapter are utilized to investigate which electoral system creates a more representative voter turnout.

The collective congruence analysis at the country level shows that PR has a higher probability to induce biases into the distribution of citizen preference because more extreme voters are more likely to find a viable political party to support. The previous research which focuses on the congruence between the citizen preferences and the median party in the legislature or the government policy outcome, basically conclude that PR has the advantages at creating the congruence and thus, producing a better political representation (Huber and Powell 1994; McDonald et al. 2004; Powell and Vanberg 2000; Powell 2006).

These preceding studies do not take into account the effects of electoral institutions on the voter side. By bringing the consideration of the influence of electoral systems on voter participation back, I find that PR has a higher chance to generate the disproportionality into voter preference distribution. The argument is in line with Blais and Bodet (2006) and Golder and Stramski (2010). Although Powell (2009) conclude that the different conclusions are due to the data in a later time period, this study provide another explanation why the effects of PR in the congruence between the citizen preferences and the government policy are balanced by the biases it introduces in the voter turnout. Moreover, I discuss the micro-foundations of why PR introduces more biases thorough higher voter turnout and corroborate the mechanisms by multilevel analysis.

5.3 Party Campaign Strategy under Electoral Systems (Competition)

Party campaign strategy is evaluated from the voter's perspective to examine which

type of party campaign strategy is more effective in attracting support. The evidence for how effective the party campaign strategy is voter choice because it is the results of electorates' response to political parties' actions. I argue that electoral institutions influence the patterns of political competition.

The SMD and PR electoral systems have institutional consequences on the interactions among political parties in the decision-making process in parliament. SMD tends to produce a manufactured majority held by a single political party while PR has a majority coalition formed by several political parties with the principle of minimum winning coalition (Powell 2000; Rae 1967). In other words, SMD usually creates a mandate delegated to a single political party and PR has a power-sharing system with more than one political party.

The policy implication of these properties of the two types of electoral systems is the policy dependence of political parties within them. Under SMD, a political party can foresee that if it wins the election, it can implement the policy position it campaigns for. On the other hand, under PR, a political party usually needs other political parties' help to form a majority coalition and it has to compromise with other members in the coalition. When voters ponder which political party to support, they can see whether or not there is policy dependence among political parties under SMD or PR. Through the perspective of spatial theory, the policy positions of political parties are represented a number in a single-dimension issue space. Under SMD, the policy outcomes are more probable to be the issue position of the winning party. In other words, the policy positions of political parties under SMD can be viewed independently. But under PR, the policy outcomes are located among a range of several issue positions of the coalition parties in government. Final policy outcomes are closer to the issue positions of the coalition parties with higher correlation.

Thus, the degree of policy dependence is larger under PR than SMD.

The voting utility of a citizen to a political party is defined as random utility model comprising two parts: systematic and unobservable utilities. The former is captured by collectable and available variables in the data sets and the latter includes all remaining properties influencing voter choice. Because the variable of policy dependence is not measured in the survey data set, it is relegated into the error term. More specifically, the error term of voting utility contains the institutional effects of electoral systems. The concept of no policy dependence under SMD is equivalent to independence of irrelevant alternatives (henceforth IIA) related to a statistical model called multinomial logit (henceforth MNL). The multinomial logit deals with the problem of the dependent variable with multiple unordered categories. The model assumption is that the error terms of all choices are independent with each others. Another model which relaxes the IIA assumption is multinomial probit (henceforth MNP) which allows policy dependence in our case.

In order to fully capture the effects of electoral systems on vote choice, we have to examine whether MNL or MNP has a better model fit under two types of electoral systems. Since two statistical models are non-nested, we have to conduct the model comparison through Bayesian factor with MNL over MNP. Bayesian factor can be standardized over the range from negative infinity to positive infinity. A positive number means favoring the model in the nominator, which is MNL in this case. We have to compare across different electoral systems across countries to see if the pattern holds up. The purpose is to choose a better fit model for each country to better control the effects of electoral systems.

The current research on political representation investigates the relationship between voters' preferences and the policy positions of political parties; research on the latter uses

either announced platforms in elections (Adams 2001; Adams et al. 2005; Kedar 2005; Schofield and Sened 2006) or the compromise of party positions in the government decision-making process resulting policy outcomes (McDonald and Budge 2005; Powell 2006). The first approach emphasizes the importance of party positioning strategies for being elected while ignoring the policy-making process. On the other hand, the second approach correctly focuses on the government process but fails to pay attention to how political agents are chosen in elections in the first place. Although there is research that discusses the consistency between election pledges and subsequent government policy actions (Thomson 2001), these studies fail to take account of how voter choices in elections are affected by the government policy-making process.

To measure the effects of party position-taking strategies, the policy distance between political parties and voters is incorporated into the representative component. The policy dependence among political parties is manifested in the correlation in the error terms. While MNL imposes the IIA assumption to make the error terms uncorrelated, MNP relaxes it. Therefore, MNL is suitable for voter choice under SMD but MNP is more appropriate for voter choice in PR.

CHAPTER 2

UNCOVERING THE MICRO-FOUNDATIONS OF TURNOUT AND ELECTORAL SYSTEMS

Voter turnout is arguably one of the fundamental features of democracy. Normatively, turnout represents the most direct form of political participation and low turnout reflects disenchantment among citizens. Declining rates can even indicate the political system is experiencing a crisis of legitimacy (Powell 1982). Empirically, turnout is often low and even eroding in most contemporary democracies. The continuing and worrisome decline of turnout has raised serious concerns among scholars (Franklin 2004; Norris 2004).

Such scholarly concern over voter turnout has spawned a large body of exciting research over the past few decades.⁷ Among the various approaches, the importance of the electoral system has received particularly strong attention from the scholarly community. According to the electoral institution school, countries that use proportional representation systems are associated with higher turnout (Blais and Carty 1990; Jackman and Miller 1995; Franklin et al. 1996; Radcliff and Davis 2000). Despite this strong empirical regularity, we know little about the underlying mechanism that drives higher turnout under PR systems. In addition, the effect of electoral systems seems to considerably weaken in the context of new democracies (Blais and Dobrzynska 1998). As Blais forcefully puts it: ‘Most of the literature supports the view that PR fosters turnout, but

⁷ Briefly summarized, the determinants of turnout can be organized into three complementary categories: social and economic, cultural, and institutional. One can also categorize the determinants as individual or contextual depending upon the unit of analysis. See Blais (2006) and Geys (2006) for a detailed review.

there is no compelling explanation of how and why, and the pattern is ambiguous when the analysis moves beyond well-established democracies' (Blais 2006, 116).

Previous research does not provide an explicit linkage between individual characteristics and contextual variables (i.e., how aggregate factors affect individual variables that also alter a citizen's propensity to vote). A more thorough procedure includes the following: first, examining how institutions shape the incentives of individual behavior; second, verifying how institutional effects change electoral behavior; third, showing how individual incentives influence the decision to vote.

I use the spatial theory of voting as a unified framework in explaining individual incentives to vote. The calculus of voting has a long history of development (Downs 1957; Riker and Ordeshook 1968; Palfrey and Rosenthal 1983). The probable decisiveness of one's vote and its potential benefits are major components of self-interested voting behavior. While the expected benefits account for turnout in one election, changes in expected benefits from environmental variables are effective in explaining variations of decisions regarding whether to turn out or not (Dowding 2005). A voter's belief, which is the basis of her calculation, is shaped by the strategies that political parties or candidates adopt to respond to political environments. For instance, political institutions should induce separate equilibriums between political agents and voters, which are recognized by voters, and thereby form different sets of beliefs across democracies. Hence, how contextual effects influence individual perceptions in a political system is crucial to understanding variation in voting rates across democracies.

This chapter seeks to uncover the micro-foundations linking electoral systems and voter turnout. Building upon insights from spatial voting theories, this chapter argues that

a voter's turnout propensity increases as the distance between her preferred policy position and the policy position of her most-favored party decreases. Similarly, a voter is more likely to turn out if the policy distance between her and her least-favored party increases. Utilizing survey data from the Comparative Study of Electoral Systems across 64 recent elections and controlling for a set of individual as well as contextual factors, I find strong empirical support for these claims. Furthermore, the mechanism works stronger under PR than under single-member district systems. Moreover, this argument applies not only to established democracies but also extends to non-established democracies.

In section two, I use calculus of voting and spatial theory to explain individual voting decisions conditioned by contextual effects. Drawing on these theories, I derive three hypotheses. Section three reviews the empirical measurement and operationalization of the theory. To ensure that the political environment does shape the calculation of individual incentives, a preliminary test will be performed using aggregate measures. The test provides a brief illustration corroborating how rational choice theory helps us understand voting motivations. Next, I develop a more comprehensive multilevel voting model to investigate how electoral systems, social cleavages, and other political institutions influence voting decisions. Finally, I review the study's conclusions and make suggestions for future research.

1. Literature Review

Many studies identify electoral systems as an important factor in explaining cross-national variation of voter turnout. The central argument in the literature is that PR fosters voter turnout. Powell (1986) and Jackman (1987) find nationally competitive

districts, a feature of PR, important. Jackman (1987) also finds significant effects for other characteristics of PR on the turnout rate, namely multipartyism and electoral disproportionality. Following this research agenda, Jackman and Miller (1995) compare institutional and cultural factors and corroborate the turnout-enhancing effect of PR. Radcliff and Davis (2000) bring back the party-group linkage emphasized in Powell (1986) and unionization, and find that district magnitude and multipartyism have substantial effects on voter turnout. Blais and Dobrzynska (1998) inspect country-level socio-economic attributes and reiterate the importance of PR on voter turnout. Franklin (2004) emphasizes the uniqueness of elections across countries and confirms that disproportionality contributes to voter turnout.⁸ While the scope of previous studies is confined to western democracies, the research in post-communist countries makes the same inference (Kostadinova 2003).

Furthermore, scholars have proposed various research designs to validate the effects of PR. Franklin, van der Eijk, and Oppenhuis (1996) test the same hypotheses on European Parliament elections and conclude that proportionality is essential. Ladner and Milner (1999) verify that PR enhances voter turnout using lower-level elections in Switzerland when fully controlling for the country context. Perea (2002) computes an individual incentive index formed by electoral institutions and shows that a lower average of the threshold of representation boosts the incentive to vote. Norris (2004) employs survey data to explore the effects of institutional and cultural explanations on voting behavior and finds that institutional variables are indispensable.

⁸ Franklin (2004) proposes to control for majority status, margin of victory, time since last election, postal voting and weekend voting.

Consequently, the underlying mechanisms that drive higher turnout under PR can be summarized as three factors: nationally competitive districts, multipartyism, and electoral disproportionality. The effect of these PR attributes on turnout hinges on an individual's rational expectation of how institutions work in a political system (Jackman 1987). The mechanisms rely on the assumption how individuals will react to institutional contexts. Nationally competitive districts lead to higher turnout because political parties have incentives to mobilize voters widely across a country and thus, citizens have a higher probability of voting. More political parties decrease voter turnout since the decisiveness of a single vote is reduced. Finally, electoral disproportionality increases the propensity of voting because people believe their votes will count under PR.

Further scrutiny, however, reveals that these mechanisms are less than satisfactory in explaining why PR fosters voter turnout. First, they yield conflicting predictions regarding the effect of PR (Blais and Carty 1990; Blais and Aarts 2006). On the one hand, PR is predicted to foster turnout because voters have more choices with great mobilization and also think that their ballots are more important. On the other hand, PR can be pernicious to turnout because PR reduces the decisiveness of a single vote in light of a coalition government. Second, these factors deemed beneficial to voter turnout do not work in developing regions, such as Latin America (Pérez-Liñán 2001; Fornos et al. 2004). Blais argues these results are evidence that the general pattern of PR having positive effects on voter turnout is not robust (Blais 2006). Norris concurs, stating: '...The link between the broader institutional context and how voters perceive and weigh the costs, choices, and decisiveness of elections is poorly understood' (Norris 2002, 63).

The modest goal of this chapter is to propose universal micro-foundations explaining

why people vote across established and non-established democracies. In the spirit of the literature on the calculus of voting and spatial theory of party competition, I argue that a citizen is more likely to go to the poll either when her favorite party or candidate has a closer policy position to her own or when her least favorite political agent has a more distant issue position. These hidden perceptions of party distance are individual characteristics shaped by electoral institutions. I consider the variation in individual perceptions about policy positions of political parties or candidates as the key to providing the micro-foundation of higher voter turnout in PR systems.

2. A Comparative View of the Calculus of Voting in Spatial Theory

2.1 Why the Calculus of Voting?

To uncover the underlying mechanism between PR and turnout, this chapter resorts to the classic rational choice model. Accordingly, a citizen makes up her mind whether to vote through a simple cost and benefit analysis. A voter's calculus follows the well-known $P*B-C$ formula, where P is the probability of casting a decisive ballot, B is the benefit derived from changing electoral outcomes from a voter's least preferred choices to her most preferred choices, and C is the cost of voting. Specially, the rational choice model predicts that a voter will vote when $P*B-C$ is positive; namely, she decides to vote when the expected benefits of voting are greater than the costs.

Because voting is individual behavior, cross-national variations in turnout should be tracked back to how individual voting decisions are made. Thus, the calculus of voting formula is utilized to explain a voter's voting propensity in an election within a specific political system. It is critical to examine what individual variables might affect the P , B ,

and C terms, to provide some understandings of why turnout rates vary across countries.

Interestingly, it is the rational choice model's unintended implications, not the above prediction, that echo most strongly within the scholarly community. The logical extension of the rational choice model is that rational voters should never vote. The probability of casting a decisive vote in a large electorate pool is extremely small, which in turn makes the expected benefits lower than the costs. Yet, in reality, a substantial proportion of citizens do vote, and this "paradox of voting" has become one of the most discussed issues in political science.⁹

Note that this chapter does not seek to resolve the voting paradox; instead, this paper follows the insight of the marginalist view (Aldrich 1993) and examines whether the comparative statics derived from the rational choice model can shed any light on turnout decisions.¹⁰ In a mathematical sense, this paper applies the concept of a partial derivative to the $P*B - C$ equation. The target relationship is how the small changes in the three elements, especially B , will impact a citizen's decision to vote. This paper examines whether, *ceteris paribus*, the probability of turnout increases as the value of parameter B increases. As stated by Blais, 'the prudent solution is to focus on the core elements of the model and to determine whether they do affect the decision to vote' (Blais 2000, 10).

2.2 Reinterpreting the Calculus of Voting in Spatial Theory

The classic rational choice model conceptualizes the B term as the net benefit a voter

⁹ See Blais (2000) for more discussion of the voting paradox.

¹⁰ I recognize that issue voting only explains a portion of the B term because the whole term includes other considerations. Nonetheless, I take the stance that the changing benefits derived from issue voting represents the marginal effects of the B term.

would derive if her preferred candidate instead of the other candidate wins the election. This paper extends this Downsian logic from the setting of simple plurality with two candidates to multiple candidates. The key innovation of this paper is explicitly specifying the B term by embedding spatial theory in the rational choice model.

Spatial theory states that voters have instrumental motivations for voting with an eye toward policy outcomes. Specifically, voters assess the distance between their own ideal points and the perceived policy position of political agents. The voter's utility function is assumed to be single-peaked and symmetric. Rational voters, as utility maximizers, will always choose the candidate whose policy position is closest (Enelow and Hinich 1984).

This paper decomposes the two complementary parts of the traditional B term of two-agent competition into two factors: (1) how close the policy position of a voter's preferred candidate is to her most preferred policy (henceforth F); (2) how far that of her least-liked candidate is from her most preferred policy (henceforth H). The former describes the degree of representation and the latter indicates the severity of threat. The difference in final policy implemented by two agents with roughly equal vote shares summarizes into a quantity to represent the voter's recognition of the traditional B term, the differential of the two components, F and H . The calculation depends on that the expected vote shares of two agents are close. However, in a multi-agent game, the voting utility depends upon several issue distances from agents with unequal vote shares and does not hinge on a quantity as previously described. The voter's derivation of F and H are the weighted issue distances, the product of the issue proximity and the expected vote share of agents, because agents with larger vote shares have the advantage in forming a coalition government and pull the final policy outcome toward their issue platforms (Baron 1991).

Thus, regardless of two-agent or multiple-agent competition, the voter's calculation of F and H is the weighted distance based on the expected vote shares of agents and the competition of multiple agents with unequal vote shares necessitates the decomposition of the B term.

Voters acquire information regarding the agents' issue positions and form expectations about the distribution of vote shares through pre-election polls (Cox 1997; Fey 1997; Myerson and Weber 1993). The assumption of the distribution of vote shares is equal in two-agent spatial modeling and that of multiple-agent competition is model specific.

Conditional on two-agent unidimensional competition, the calculation of the B term can be referred to as how differently two candidates position themselves in the issue space. If voters' locations are more extreme than candidates' positions, the differential quantity of F and H factors is the identical length between the two candidates' positions. Such voters are called *peripheral*. If a voter's stand is within two candidates' positions, the segment is divided into two portions. These voters are labeled *interior*. If the two segments are equal, the disparity is zero. When they are not symmetric, their difference is the benefit of voting.

With three-agent competition, the calculation of the F and H factors relies on the final policy implementation. Without loss of generality, suppose that the distribution of voters' policy preferences is unimodal and three agents, denoted as L , M , and R , place themselves from left to right. Voters expect that two parties are large, L and R , and one is small, M . The six types of voters are two peripherals (a , f) and four interiors (b , c , d , e). It suffices to discuss the calculation of the left side of the distribution because the right side is symmetric and the same logic applies. First, when L or R obtains a majority of votes, the logic for

peripheral (a) and interior (b, c) voters, is the same as under two-agent competition by just L and R . Second, when (L, M) or (R, M) reaches over 50% of votes under the principle of a minimum winning coalition (Riker 1962), the policy outcome is the mean of the policy locations of the two members in the coalition. The B term calculation of two-agent competition still applies, depending on the compromise of two partners' locations. The voting incentive increases as the position of L or R gets further away from voter's ideal point.

In four-agent competition with similar assumptions that L_1 and R_1 are extreme and L_2 and R_2 are moderate, voters evaluate the menace of extreme agents by the H factor under the coalition-risk arrangement. Assume L_2 or R_2 is the core party (defined as more than 0.33 vote share). The possible coalition combinations are (L_1, L_2) , (L_2, R_2) , and (R_2, R_1) . From left to right on the distribution's left side, there are eight types of voters: a, b, c, d with the right side's mirror-image as h, g, f, e . The peripheral a (h) and interior b (g) voters decide to turn out to increase the weight of their favorite agent L_1 and to deter the formation of other coalitions excluding their favorite. The interior c, d (f, e) voters cast a ballot to get their favorite agent into the status of the plurality party or the policy result will be pulled away by R_1 (L_1). Moreover, if no agent acquires more than a third of the vote share, (i.e., all agents are about equal-size), the combinations of any two agents are needed to build a majority coalition. Moreover, the additional logic, namely that voters conceive of extreme parties as threats, also holds true in this case.

In spatial competition with more than four agents, the issue positions occupied by

candidates have a wider range (Eaton and Lipsey 1975), and thus, a political agent whose platform is further from the median voter, may have a higher probability of influencing the policy outcome. When some large agents obtain higher vote shares than others, albeit without the majority, they need to form a coalition with agents whose voter share is smaller. The moderate issue position of large agents is compromised by that of small agents and smaller agents usually place themselves more extremely. On the other hand, when the vote shares of agents are fragmented and nearly equal, the extreme small agents have a higher chance to coalesce with others in order to govern; thus, the coalition government becomes the norm under multi-agent competition. Downs clearly describes the idea that ‘in a multiparty system, the victory of a party at the end of the scale opposite to a voter’s position may usher in policies he bitterly opposes’ (Downs 1957, 148).

As these examples of multi-agent competition demonstrate, a more extremely positioned agent can influence the final policy outcome of a PR election; given the complexity of coalition outcomes, it is essential to disentangle the traditional B term. For the voter in multiple-candidate competition, the segment between her most- and least-preferable candidates’ positions varies by taking into account their vote shares, while the focus of two-candidate competition is just the differential segment of two candidates’ policy positions.

The F factor, the first component of the B term, describes a voter's perception of how closely her ideal point will be reflected in government policy as the proximity increases between her position and the position of her most-favored party. This argument is valid regardless of the number of candidates. Yet, the issue proximity only represents half of the picture no matter how many candidates compete. Using Powell’s (2000) language, the

vision of two-candidate elections, mostly in SMD systems, is majoritarian and that of multiple-candidate elections, usually in PR, is proportional. The former sees elections as instruments to control the concentrated policy-making power and the latter consider elections as an indirect route to influence factions in the dispersed counterpart.

In voters' minds, they need to check the H factor, the second component of the B term, in both types of elections. In the majoritarian view, citizens worry how distant their less preferable candidate is since the policy-making power is delegated to either their favorable or unfavorable candidate. In the proportional view, voters think about the policy positions of all representative agents, who will enter the bargaining process and about how their least preferable agent will weigh in after elections. More accurately, the attempt to maximize issue proximity is similar across all types of elections; however, how voters assess the seriousness of threats from their least preferable candidates under SMD and PR relies on the second component—the perceived distance between their ideal point and their least preferred candidate.

The H factor captures the distance between a voter's ideal point and her least preferred party under both SMD and PR. Assume that the issue positions of political agents are predetermined and the first component, the F factor, is a constant. Under both SMD and PR, citizens have higher incentives to vote when the second component is larger.¹¹ However, the mechanism under PR needs to include the post-election negotiation process. If a voter's least favorite party gets more ballots and her favorite one does not have enough support, without her action the policy outcome will deviate further away

¹¹ This argument also applies to SMD because if one party moves toward the median voter position under two-party competition, the other party will be more moderate. This results in less differentiation due to indifference (Adams and Merrill 2003).

from her position. If voters in multiple-candidate competition envision the negotiation process with fully rational expectations, they are able to use their ballots efficiently to achieve the desired final policy outcome. A similar line of argument can be found in Kedar's (2009) compensational voting model, where voters keep the policy position of the viable extreme party in mind because it will pull the policy outcome away from the voters' preferred direction. Citizens support a more extreme preferable political party to counteract the effect of their least preferable one. The insight I draw is to include in the calculation of the B term a measure of the degree to which a voter's least favorite political party is extreme.

2.3 The Role of Electoral Systems

Electoral systems are critical for turnout because they determine the policy positions chosen by political agents, which cause the B term at the individual level to differ. In other words, the B term is embedded in how political parties react to the institutional arrangements, and voters evaluate their likely benefit from voting based on policy positions held by agents under electoral systems. Hence, we bring electoral systems back into the calculus of voting to capture the incentives of turnout among individuals.

Electoral systems shape the behavior of political agents. To maximize its electoral support in an electoral system, political agents strategically choose a policy position after considerations of other political actors' potential strategic responses. Adams et al. (2005), and Schofield and Sened (2006) have demonstrated the applicability of the vote maximizing assumption in multiparty competition under differing electoral systems. The convergent or divergent positioning strategy is determined by an agent's valence related to

its honesty and competence.¹²

Different electoral rules shape distinctive styles of competitions among political agents. This suggests that the estimations of the B term are heavily dependent on the characteristics of electoral systems. In other words, the voting decision process is analogous to a Stackelberg game in which political agents move first and voters move second. Political agents' positions are made known to voters through campaigns. Hence, the calculus of voting depends on a set of strategically configured policy positions chosen by political agents responding to electoral institutions.

The political effects of electoral systems are the constraints they place on the number of political parties. The effective threshold of representation in PR is lower than SMD (Lijphart 1994; Taagepera 2007). The entry threshold of a political party in PR is shown to be less restricted than SMD (Greenberg and Shepsle 1987; Palfrey 1984). As a result, the effective number of parties is higher under PR (Amorim Neto and Cox 1997).

In addition, the parties or candidates under PR occupy a wider range of policy platforms (Downs 1957). Cox (1990a) classifies electoral systems into centripetal and centrifugal types based on whether electoral laws lead political agents to take converging or dispersed positions in the electoral space. SMD is the most centripetal, whereas PR is the most centrifugal. The more centripetal an electoral system is, the more convergent issue positions political agents will choose. Empirical evidence confirms the existence of such a pattern across electoral systems (Dow 2001).

The mechanical effects of electoral systems that constrain the number of political parties and influence elites' position-taking strategies produce different policy-making

¹² See similar results in Adams, and Merrill (2009) with policy-seeking motivations.

processes. The distinction is between the majoritarian vision under SMD and the proportional vision under PR (Powell 2000).¹³ This difference is manifested by higher disproportionality of vote-to-seat transformation under SMD than PR.

The contingent policy deviation fulfilled by electoral-institution-caused types of government can be judged by the H factor. The threat under SMD comes from the two-leading agents since one agent is usually delegated with policy-making power. While the coalition government under PR includes the median party most of the time, the enacted policy relies on its vote share (Laver and Schofield 1990; Martin and Stevenson 2001). The influence exerted by its potential partners will be reduced as the median party gains more votes. The median party faces a threat from the existence of small extreme parties who can pull the policy outcome away if the median party does not have enough votes. Furthermore, the policy outcome of the minority government controlled by the plurality party must negotiate with other agents (Laver and Schofield 1990).

Moreover, the presence of pre-election agreements may appear among allied parties which form the left or the right ideological coalition (Golder 2006). The exclusion of specific extreme or antisystem parties may not always be the case due to the change of the international circumstance such as the formation of European Union (Strøm et al. 1994, 315-319). These coalition conditions indicate that the government policy can be represented by the weighted positions of coalition parties by seat shares which are susceptible to more extreme agents with certain weights as a potential partner (Powell 2006).

¹³ SMD can also induce national multipartyism if the vote share of a political party is concentrated in a region or several districts (as in Canada and India).

Citizens decide whether to vote by assessing both the vote share of their favorite agents and the deviated issue distance of adverse agents capable of influencing government policy outcomes. Voters will turn out to support their favorite party to increase the party's bargaining chips in the government formation. This is one type of expressive voting (Brennan and Hamlin 2000). Voters balance the policy outcome by compensatory voting with the recognition that the viable extreme parties are capable of changing the policy in the opposite direction (Kedar 2009).

The psychological effects of electoral systems force voters to coordinate when voting for political agents (Duverger 1954). The motivation for strategic voting lies in the expected vote share of a political agent relative to its winning probability. The coordination requirement is the most stringent under SMD because the district magnitude (M) is one in SMD. Voters strategically support top- $M+1$ vote getters because these are agents who will have influence on the policy outcome. The primary purpose of strategic voting is to maintain the closeness of final policy outcome and a voter's ideal position. For example, in three-agent competition as described in the previous section, under SMD with L and R as front runners, c (d) voters may choose L (R) and desert M because they feel the threat from R (L). Under PR, c (d) voters will not abandon M because they can make it king-maker.

In the situation of four-agent competition with the assumptions that L_2 is the core party and R_1 is a possible coalition partner, voters a , b , c , d all acknowledge the threat from R_1 if political agents on their side of the issue space do not get enough votes to form a coalition, (L_1, L_2) , (L_2, R_2) or (L_1, L_2, R_2) . In the second scenario (L_2, R_2) , voters a , b

may vote strategically for L_2 because L_1 may not gain enough of the vote share to enter the coalition. In the third scenario (L_1, L_2, R_2) the final outcome, the average of the three agents, is to the left of the position of L_2 ; thus, although the closest agent to voters c is L_2 , they may strategically support L_1 to pull the policy closer to their ideal point. Accounting for the vote shares of political agents and plausible coalitions, the evaluations of the F factor may be affected by strategic voting, but not the H factor.¹⁴ A similar line of arguments has been proven by Austen-Smith and Banks (1988) under three-agent competition under PR.

In particular, in an electoral system with more median-convergent stimuli, the utility derived from the first component of the B term tends to become smaller and decreases the propensity of voting. In contrast, a more centrifugal electoral system increases the utility of the second component of the B term and thus, enhances the incentive to vote.

Electoral institutions have two joint effects on the behavior of political parties via the number of parties and position-taking strategies. The SMD system produces fewer viable political parties and stronger centripetal forces for political parties to move toward moderation. Conversely, in the centrifugal PR system, a political agent does not have to choose the median voter position or to merge with other agents in order to win a seat.

¹⁴ Although strategic coordination is a common observation in various types of electoral systems (Cox 1997), sincere voting can explain a significant portion of voting behavior because compared to SMD, other types of systems suffer less from strategic voting (Cox and Shugart 1996). Moreover, individual-level observations on voting behavior can be explained by-and-large by sincere voting (Degan and Merlo 2006). Voting considerations under a majoritarian system with one ballot are largely sincere and there is a reduction of strategic voting in other electoral systems.

SMD tends to decrease the utility of the two components of the B term while PR is likely to enlarge it. Thus, compared to SMD, PR shortens the average distance between a voter and her most-preferred party while increasing the average distance between a voter and her least preferred party.

2.4 Definition of Partial Change of the B Term

The B term is composed of two elements: (1) how close a voter's most-preferred and (2) least-preferred political agent are from her own ideal point. The first component, denoted as F , can be written as the following equation:

$$(2-1) \quad F_{ij} = -1/\nu_k (D_i - S_f)^2$$

where D_i is her ideal point, S_f is the issue standpoint of her most favorite political agent and ν_k is the expected vote share. Following the conventional spatial voting framework, the property of the utility function is a quadratic loss function such that the larger squared distance with more disparity between D_i and S_k , the less preferable it is to a voter $_i$ (Davis et al. 1970). The F factor is *inflated* by the inverse of the vote share because the issue position of an agent with a smaller weight will be counted as being counteracted by other larger agents.

The second component of the B term, denoted as H , is defined as:

$$(2-2) \quad H_{ij} = \nu_k (D_i - S_l)^2$$

where S_l is the issue position of her least favorite political agent. The H factor is *deflated* by the vote share since the severity of the threat perceived by voters depends on the weight

of a political agent. A smaller weight decreases the possibility to be influential on the policy outcome.

Voters are more likely to vote when both the F and H factors are larger. Voters like to raise their voice for their favorite party to give them greater weight in policy implementation (Fowler and Smirnov 2005; Franklin 2004). Under SMD, if voters believe that their favorite candidate has a chance to win, they turn out to vote to ensure her win and to grant a firm mandate. Under PR, voters support their favorite parties to let them have more chips in the negotiation process if no single party acquires a majority.

The H factor relates negatively to the degree of centripetal forces in an electoral system. If there are more centripetal forces, political agents will tend to move toward the median voter. The locations of political agents will be close and the H factor is smaller, reducing the incentive to vote. If there are more centrifugal forces, political agents will tend to spread out widely over the issue space. The positions of political agents will be more diverse; thus, the H factor is larger, increasing the propensity of voting.

In short, relying on the type of electoral system and power-sharing institutional design, a voter will assess and identify which party is likely to be influential in the next government or parliament. Under SMD, her least favorite political agent who has some leverage to move a policy outcome would be located in the farthest position away from her ideal point. On the other hand, under PR, a voter's least favorite agent with a seat-acquiring ability and the potential to participate in a coalition government should be counted as a potential menace in PR.

Based on the discussion above, I derive three hypotheses as follows:

Hypothesis 1: Voters are more likely to vote when the F factor increases.

Hypothesis 2: Voters are more likely to vote when the H factor increases.

Hypothesis 3: On average, the F and H factors are both larger under PR than SMD.

All in all, when P is controlled across countries, $B = F + H$ can be used as an approximation of how electoral systems impact the propensity of voting. By breaking down the B term we are able to theoretically articulate and empirically test the effects of different mechanisms on turnout under different electoral systems. Importantly, this method provides an explicit linkage between individual characteristics and contextual variables.

3. Empirical Analysis

3.1 Selection of Cases and Data

To substantiate the hypotheses, I analyze survey data from Comparative Study of Electoral Systems. CSES fits our purpose since its research design collects individual-level data reflecting macro-level variations of political systems. Both round 1 and round 2 of CSES surveys from 1996 to 2006 are included. However, I did not include all available elections for several reasons. First, the study focuses on free elections; thus, any country with a negative Polity IV score is excluded.¹⁵ Second, any elections held in non-sovereign regions are dropped.¹⁶ Third, the dependent variable is whether respondents voted in the most recent election and any pre-election surveys are not used.¹⁷ Fourth, any surveys

¹⁵ This excludes the Belarus 2001 presidential election.

¹⁶ This excludes the Hong Kong 1998, 2000, 2004 legislative elections.

¹⁷ This omits the Russia 2000 presidential and Kyrgyzstan 2005 presidential elections.

missing questions that I use as independent variables are excluded.¹⁸

There are 64 elections left for analysis. Please see the appendix for more detail about these elections. They constitute a representative sample of voting behavior from a variety of electoral systems across the world. Not only does it allow us to compare the effects of electoral institutions on individual behavior but it provides enough cases from both established and non-established democracies to explore the difference between both types of political systems.

3.2 Measurement

3.2.1 Binary Dependent Variable

The dependent variable is defined as whether or not a voter casts a ballot in elections reported in the “Survey Turnout” of Table A.1 in the appendix. By comparing aggregate turnout and self-reported turnout in the survey, we see a serious overreporting problem, as found in Silver, Anderson and Abramson (1986) and Karp and Brockington (2005). However, the tendency of overreporting is not confounded with our definition of the *B* term (see below) and the degree of centripetal forces.¹⁹ Thus, the use of self-reported

¹⁸ This omits the Japan 1996, 2004 and Thailand 2001 because there is no self-positioning question on a left-right scale. The Chile 1999 and USA 1996 elections are discarded because respondents’ perceptions of the parties’ positions are unavailable. This also drops Belgium 2003 due to no income variable being available and the Netherlands 2002 because the question asking whether a vote can make a difference was not included in the survey.

¹⁹ This argument is supported by a regression analysis at the election level (not shown here). The dependent variable is the discrepancies between aggregate and survey turnouts in elections. The independent variables are the aggregate turnout, *F*, *H*, compulsory voting, and the other controlled variables used in the final model. No independent variables had strong enough effects to influence over-reporting biases in 64 elections.

turnout does not cause systematic biases in the estimations of effects of the main independent variables of interest.

3.2.2 Main Independent Variable

The B term is operationalized with the following two items: “In politics people sometimes talk of left and right. Where would you place yourself on a scale from 0 to 10 where 0 means the left and 10 means the right? Now, using the same scale, where would you place a particular political party?” Two approaches are used to denote the party position: subject and average party placements. The self-judgment of party positions is potentially biased in favor of voters’ projection. Rabinowitz and Macdonald (1989) argue that the party positions should be measured by the average of respondent perceived positions by balancing the subjective biases. Yet, given the individualism emphasized in this paper for the voting benefit calculation, the individual perceptions of party positions are not constant and ‘the best source for both types of information is therefore the individual voter’ (Westholm 1997, 870). Besides, the biases introduced by voters’ projections can be reduced by the inclusion of socio-demographic and party identification variables in the model (Blais et al. 2001; Kedar 2009). Furthermore, Merrill et al. (2001) demonstrate that the biases do not have systematic effects introduced by electoral systems. Hence, this paper adopts the first approach as the primary method and the second approach is to provide supplementary evidence.

To incorporate the viability of a political party, the two components of the B term (F and H) are computed through separate processes with an emphasis on how voters evaluate the proximate and opposite distances distinctly. The first step is to estimate that the

squared distances between voters' ideal points and the locations of party platforms. To incorporate the party weights into policy outcomes, the distance of the F factor is inflated by the inverse of vote shares in the election. This represents the information voters perceived from pre-election polls, and they utilize this information when judging the likely importance of political parties after the election. Specifically, if a political party or candidate is expected to receive strong support, its weighted distance, F , is inflated less, meaning that its impact increases. For those agents with smaller expected vote shares, their F factor is enlarged more to reflect a smaller influence. On the other hand, citizens discount the H factor when considering a political party with weak support because they expect it will have less of an effect in determining the government policy.

The calculation of the F factor can be written as:

$$(2-3) \quad F_{ij} = -\min[1/\nu_k * (D_i - S_k)^2]$$

where ν_k is the vote share for party k in country j . The records of vote shares for main political parties chosen by professionals in each CSES country team are collected in these elections and applied to three electoral scenarios: the chief executive election, concurrent presidential and parliamentary elections, and parliament only elections.²⁰

The second component, the H factor, is also weighted by the percentage of vote shares. When citizens measure the gravity of counter-effects from less favorable parties, they analyze the probability of winning the election and the power that these parties might have in the bargaining process. The H factor is defined as:

²⁰ Sources are IFES Election Guide (<http://www.electionguide.org/>) and Election Results Archive (<http://cdp.binghamton.edu/era/>).

$$(2-4) \quad H_{ij} = \max[\nu_k^*(D_i - S_f)^2].$$

I use ν_k because it indicates how far a specific political party is able to pull the policy outcome away from a voter's most preferred issue position.

In accordance with the principle of item equivalence, which is to ensure each component of the B term is comparable across countries, each term is divided by the standard deviation of the distribution of voters' ideal points because the shape and spread of that distribution varies over countries. This procedure removes specific measurement units pertaining to countries even if they are originally measured by the same scale.²¹

3.2.3 Classification of Electoral Systems

In classifying electoral systems, the three major features are electoral formula (E), ballot structure (V), and district magnitude (M). In 64 elections there are four electoral formulae: SMD, combined-independent, combined-dependent, and PR. In majoritarian systems including first-past-the-post or two-round 2nd ballot systems, the ballot structure is per person per vote and the district magnitude is 1. These factors usually induce a Duvergerian equilibrium in which two agents obtain substantial votes and other ranked-below-three agents acquire very few ballots. Hence majoritarian systems should have stronger centripetal forces than other types.

In non-compensatory mixed PR-SMD electoral systems, there are two separate

²¹ Davis et al. (1970) specify a voter's utility function as $U_{ij} = -a_{ij}(D_i - P_k)^2$ where a_{ij} is an individual-specific weight to the issue. In my example, the assumption is that the weight a_j is country-specific. The standardization procedure intends to get rid of a_j to fit the principle of equivalence.

electoral rules to distribute seats. These systems can be represented by $E = \text{plurality}$ and PR , $V = 2$ and noncumulative, and $M > 1$ (i.e., the congressional elections in Russia and Ukraine). Total seats are allocated independently, which show the feature “combined-independent.” Voters have two ballots to vote for candidates in the district and for closed PR list. For the first ballot, the convergent incentives are similar as in a majoritarian system. However, the second ballot for PR with district magnitudes larger than 1 provides some incentives for political parties to deviate from the median voter position. So the centripetal forces in combined-independent systems are weaker than those in majoritarian systems.

In compensatory mixed electoral systems, their ballot structure and district magnitude are similar to combined-independent systems (i.e., Germany). They have features similar to the previous type except that the proportions of seats allocated to political parties are entirely determined by the second ballot for closed PR list. Political parties’ shares of seats are compensated by vote shares in the second ballot. These systems provide more driving forces to deviate from the median voter. Hence we conclude that the centripetal forces in compensatory mixed systems are weaker than those in combined-independent systems.

PR systems can be represented by $E = PR$, $V = 1$ and noncumulative, and $M > 1$. Voters cast one ballot for candidates in an open PR list or for political parties in a closed PR list. In the latter, seat allocation is based on vote shares among political parties. In the former, a voter can select her favorite candidate and votes for candidates in the same political parties are aggregated. The ranking of candidates of the same party is determined by the votes that they acquire. Seats are allotted according to the ranking of candidates and vote shares created by individual votes. Thus, the centripetal forces in PR are at least as

weak as those in compensatory mixed systems.

Next, I discuss the centripetal forces in concurrent elections with two levels, chief-executive and congressional, held at the same time. If two levels adopt the same formula as SMD, we classify it as the most centripetal. If they use different formulae, we count the formula for presidential election as primary because these presidential elections usually determine who will have the final say in a policy outcome under a presidential system. Thus, we consider these elections to contain as strong of centripetal forces as majoritarian systems. These include the following elections: Brazil 2002, Chile 2005, Mexico 2000, Peru 2000, 2001, 2006, and Philippines 2004. However, this standard cannot be extended to semi-presidential systems in which executive functions are shared between the president and the prime minister. The presidential election is usually majoritarian and the parliamentary election is PR (i.e., Romania 1996 and 2004). I treat them as mixed electoral systems like a non-compensatory mixed system.

The special case is Australia. Its electoral system is the Alternative Vote (AV) with $E = AV$, $V > 1$ and cumulative, and $M = 1$. Voters can cast preferential votes to rank candidates in their district in order. The minimum threshold for being elected is 50%+1 in the district for one seat. It can be classified as a majoritarian system (Norris 2004). Therefore, it produces the most centripetal forces.

Thus, I divide the degree of centripetal forces of electoral systems into three categories from the strongest to the weakest based on the degree of centripetal forces: the strongest is majoritarian, concurrent SMD, and AV; the medium is non-compensatory mixed and concurrent SMD and PR; the weakest is either compensatory mixed or proportional. This categorization illustrates how electoral institutions shape party competitions.

3.3 The Institutional Effects on the *B* Term

We are ready to inspect hypothesis 3. Table 2.1 provides summary statistics of the *F* and *H* factors by types of electoral systems. The unweighted figures are quadratic distance on a scale of 0 to 10 and the weighted ones are computed with vote shares as described above. First, the unweighted *F* factor is the largest due to weak centripetal forces induced by the electoral systems. Examining the standard errors shows that the width is tightest. As centripetal forces increase, the *F* factor gets smaller which means it is further from voters' ideal points. The opposite trend is found in the *H* factor.

Second, the conclusion for the weighted *F* factor still holds with the confirmation of a similar pattern. Although the pattern does not hold for the mean of the *H* factor, the standard error of *H* in the least centripetal cases is smaller than the other two. A possible explanation is that the vote shares in the third type are usually smaller because of multipartyism. However, the weighted *H* factor is consistent at a similar strength. Therefore, I consider the results in Table 2.1 as evidence supporting hypothesis 3.

Table 2.1 Two Components of the *B* Term by Types of Electoral Systems

<i>Distance</i>	<i>Centripetal</i>	<i>F</i>	(<i>SD</i>)	<i>H</i>	(<i>SD</i>)	<i>Cases</i>
Unweighted	Most	-1.07	2.95	14.32	14.66	21676
	Medium	-0.78	2.60	14.26	11.36	12574
	Least	-0.52	2.03	14.67	10.55	49766
Weighted	Most	-4.67	14.98	3.95	4.53	21676
	Medium	-2.95	8.68	4.08	3.97	12574
	Least	-2.51	10.39	3.23	3.25	49766

3.4 A Voter Turnout Model

Now that the influence of electoral systems on the B term is confirmed, I explore how the motivation for voting is affected by individual perceptions of the B term. A more sophisticated model explaining the individual decision to vote is necessary to control for confounding factors in assessing the cost-benefit calculation. Controlling for variables related to voting propensity is necessary or the impact of the calculus of voting cannot be accurately assessed. Insights from previous research on electoral participation should be included as intervening variables in the voting utility function.

3.4.1 Individual-level Control Variables

Each individual has her own socioeconomic status in a society, which affect how she perceives the benefits of voting. Individuals have different endowments of resources determined by socio-demographic variables such as sex, age, income, and education. Those with more resources are presumed to care more about electoral outcomes because they would like to influence government policy in the future. Moreover, since the voting act bears costs of time and information, the wealthy are able to absorb the inevitable costs more easily.

In addition, political attitudes should not be ignored. Those who have greater political interest and stronger party identification are more likely to vote because they are more concerned that the candidate or political party they support wins the election. Voters with stronger party identifications are more easily mobilized. The effect is captured by a dummy variable for party identification.

People with higher political efficacy are more likely to vote than others. This is

measured by two variables measuring a respondent's political views: do people think who is in power can make a difference (*Inpower* in Table 2.2); do people think who they vote for makes a difference (*makediff* in Table 2.2). The above two variables are all ordinal variables with 5 levels from "Strongly disagree" to "Strongly agree."

3.4.2 Aggregate-level Control Variables

The P and B terms are endogenous to an election because they are determined by the interplay between political agents and voters; however, the P and C terms are exogenously fixed to the context of a political system since the decisive probability depends on pre-existing demographic variables like population size. Moreover, the cost of voting is subject to electoral laws, like the registration procedure and compulsory voting. Next, voters adjust their perceptions of P and assess B through pre-election competition. This is two-stage information acquisition. Hence, aggregate variables related to the P and C terms contribute partially to variation of voting rates and should be controlled in the model specification.

One socio-demographic variable is average district size related to the P term. Individuals will feel their vote is more decisive if a representative is elected by a smaller set of citizens. The larger the average district size, the smaller the P . Blais and Dobrzynska (1998) and Geys (2006) find a negative association between voter turnout and the logarithm of population size.

How political fragmentation measured by the effective number of political parties changes voter turnout is inconclusive. Political fragmentation has positive effects because there are more choices offered to voters, and more parties also mean more competitiveness.

Meanwhile, political fragmentation also has negative effects because more political parties increase the need for coalition formation. The other reason comes from information theory: more parties mean more complexity and higher information cost in the act of voting (Long and Shively 2005). Brockington (2004) shows that the size of coalition government does matter when it exceeds the rule of a minimum winning coalition. Conversely, after the effects of coalition government are controlled for, the higher number of political parties increases voter turnout. The main reason for the puzzling results is the lack of a standardized cross-national measure of the information cost to individual voters.

I use three aggregate measures of political fragmentation: effective number of parties, district magnitude, and the degree of political competition. I expect that the three variables are all positively correlated with the propensity to vote.

Compulsory voting is an important factor in the voting cost calculation. In countries with compulsory voting and high punishment of nonvoting, the voter turnout should be larger than those without such procedures. Thus the coefficient for compulsory voting is expected to be positive. The variable is measured at five levels from “No,” “Yes; without sanction for violation,” “Yes; limited enforcement,” “Yes; weakly enforced sanctions,” and “Yes; strictly-enforced sanctions.” To account for the nonlinearity of these five categorizations, they are collapsed into 3 dummies: “Yes; without sanction”, “Yes; limited or weak sanctions”, and “Yes; strict sanctions”.²²

Acquiring information occupies a significant portion of the voting cost. Concurrent elections reduce the information cost through the media coverage of at least one election and the spending of more campaign funding (Cox and Munger 1989). The voting

²² I am indebted to an anonymous reviewer who clarified this point.

probability is empirically proven to be higher in systems with concurrent elections than without (Long and Shively 2005). Following Geys (2006), I hypothesize that the dummy variable of concurrent elections is positively correlated with voter turnout.

I also consider the individual perceived P term. Each voter's observation of the P term varies depending on information from pre-election competition. The individual assessment of the P term is an adjustment of P at the aggregate level after voters form beliefs about the expected vote shares of competing political agents. Therefore, the degree of competitiveness also is controlled to partial out the effects of the B term.

One dimension of the individual judgment of the P term is decisiveness possibly measured by the closeness of the election. Electoral closeness is the marginal victory of the largest political party over the second largest party in terms of votes received. If political parties are in a tight race, political elites will make a great effort to mobilize voters and voters will also perceive a higher P term. The ex post vote shares are considered a reasonable measure of how close voters perceive the race.

Another contextual variable is the frequency of elections. If there are more national elections, citizens may feel that electoral contests are less decisive or citizens may develop "burn out" from repeated voting. This variable is included as a control variable and the sign is expected to be negative.

Finally, the socioeconomic environment is an important indicator for the measure of individual resources. The economic development is usually hypothesized to facilitate voter participation through higher education, the easy access to more information, and more leisure time (Blais and Dobrzynska 1998). GDP per capita is included as a control variable. However, there are arguments that the change in per capita GDP does not have the same

effects on turnout in the developing countries as in industrialized countries. A downturn in the economy reduces the citizens' willingness to vote in the advanced industrial countries while the effects stimulate voter turnout in the developing democracies (Aguilar and Pacek 2000; Fornos et al. 2004; Radcliff 1992). Thus, the lagged change in per capita GDP before the election year and its interaction term with the indicator of developing countries are included.²³

The socioeconomic claim illustrates the importance of the distinction between developed and developing countries. But I expect that the micro-mechanism of the *F* and *H* factors will work efficiently across the two groups of countries because their influences are introduced by electoral institutions framing the same individual rational expectations that penetrate country borders.

3.4.3 Multilevel Methods

The multitude of methods used in exploring the variations in voter turnout across countries should be unified. Some studies focus on the aggregate level while others concentrate on the individual level only. Moreover, some scholars integrate individual characteristics and contextual effects to exploit joint their effects on voting rates across political systems (Egmond et al. 1998; Perea 2002; Franklin 2002; Brockington 2004; Norris 2004). The underlying assumption is that the propensity to vote is directly influenced by aggregate-level variables. These methods still lack an important linkage demonstrating to how institutional variables influence individual decisions. Matsusaka

²³ The GDP per capita is the variable RGDPCH from the Penn World Table (PWT6.3) in the election year. The change in per capita GDP is the variable GRGDPCH from the same source.

and Palda (1999) argue that macro analysis suffers from an ecological fallacy so that conclusions drawn from aggregate-level examination may be incompatible with micro-level behavior.

The essence of voting is purely individualistic regardless of whether it is examined from the aggregate perspective or not. Instrumental motivations have two sources of variation: from individual characteristics that distinguish people from each other and from the circumstance that they are situated in. Since electoral institutions influence how political parties campaign, elites' strategies should shape voters' beliefs about the available choices, which in turn affect their motives for voting. Individual perception of the institutional impact of electoral systems is the second source of variation that needs to be captured in the model. Thus, not only should the direct impacts of individual characteristics on voting be included, but the repercussions of institutional variables on individual perceptions as well.

3.4.4 Multilevel Model Results

To evaluate to what extent the *B* term explains individual voting decisions, independent variables are divided into three groups: aggregate-level, individual-level, and the two components of the *B* term. Aggregate variables include random effects of countries and institutional properties. Individual variables are socio-demographic and attitudinal variables. The *B* term is classified as its own category to test for its effects on voting behavior. The level-1 model is as follows:

$$(2-5) \quad Prob(Vote_{ij}) = \text{logit}(\beta_0 + \beta_1 * Female_{ij} + \beta_2 * Education_{ij} + \beta_3 * Income_{ij} + \beta_4 * Inpower_{ij} \\ + \beta_5 * Makediff_{ij} + \beta_6 * Partyid_{ij} + \beta_7 * Age26_35_{ij} + \beta_8 * Age36_45_{ij})$$

$$+\beta_9 * Age_{ij} + \beta_{10j} * F_{ij} + \beta_{11j} * H_{ij} + e_{ij}).$$

The fixed effects of β_1 to β_9 are assumed the same at country-level j because we expect these variables work homogeneously regardless of country borders. Other β_{0j} , β_{10j} , and β_{11j} can be further specified:

$$(2-6) \quad \begin{aligned} \beta_{0j} = & \gamma_{0(0)} + \gamma_{0(1)} * Compulsory1_j + \gamma_{0(2)} * Compulsory2_j + \gamma_{0(3)} * Compulsory3_j \\ & + \gamma_{0(4)} * Closeness_j + \gamma_{0(5)} * ENP_j + \gamma_{0(6)} * (District\ Magnitude)_j + \gamma_{0(7)} * Frequency_j \\ & + \gamma_{0(8)} * Concurrent_j + \gamma_{0(9)} * (Log\ District\ Size)_j + \gamma_{0(10)} * (Political\ Competition)_j \\ & + \gamma_{0(11)} * GDP_j + \gamma_{0(12)} * (Developing)_j + \gamma_{0(13)} * (L_GDP_Change)_j \\ & + \gamma_{0(14)} * (L_GDPC_Developing)_j + \gamma_{0(15)} * PR_j + \gamma_{0(16)} * MIX_j + u_0 \end{aligned}$$

where *ENP* is effective number of political parties; *District Magnitude* is the average seats elected in each district; *Frequency* is the average of electoral frequency in the 1990s including presidential and congressional elections; *Concurrent* is a 0, 1 indicator of if there is another election running at the same time; *Log District Size* is logarithm of average population size that the elected candidate represents in an election, and *Political Competition* is the average of political competitiveness defined as the average margin of the largest political party over the second largest in parliament in the 1990s; gross domestic product (*GDP*) is introduced to account for the economic impacts on voter participation at the country level.

To tackle the interaction effects between GDP growth and the group indicator of being in the industrialized or developing world, I include three terms: the dummy of

developing countries not in the OECD, the lagged annual change in GDP per capita, and the product of the previous two terms. To correctly estimate the effects of the interaction term, the constitutive term, which is the dummy of developing countries, needs to be included in the equation (Brambor et al. 2006).

The final group of variables is two indicators of electoral institutions: *PR* and *MIX*. They are put into the equation for capturing any remaining effects not explained by the individual institutional evaluations, *F* and *H*.

The random coefficients of two components of the *B* term can be written as:

$$(2-7) \quad \beta_{10j} = \gamma_{10(0)} + \gamma_{10(1)} * PR_j + \gamma_{10(2)} * Developing_j + u_{10};$$

$$(2-8) \quad \beta_{11j} = \gamma_{11(0)} + \gamma_{11(1)} * PR_j + \gamma_{11(2)} * Developing_j + u_{11}.$$

The constrained model imposes the assumption that the slopes of *F* and *H* do not vary across developed and developing countries. The model fit shows whether the generalization of the two factors holds across the two groups of democracies.

The advantage of a multilevel model is the random coefficient. The random intercept shows the effect of holding different institutional contexts constant and allowing the coefficients of the *F* and *H* factors to vary across electoral systems and democracies. In order to separate between- and within-country effects, I use a random effect hierarchical generalized linear model to estimate the systemic relationship between the two components of the *B* term and individual voting decisions. I use a generalized linear model with a logistic link function due to the dichotomous property of the voting decision.

Table 2.2 shows the results of the multilevel model with two model specifications.²⁴

²⁴ To check the robustness of Table 2.2 from individual projection biases toward party

Notice that the random-effect estimation of country-specific differences is statistically significant. Although the significant variance of the country effect is about 17% by conditional intraclass correlation, we account for the fact that the institutional setting is peculiar to a country. For aggregate institutional variables, four variables are significant at the 5% level and are all in the expected direction. On average, without-sanction and strictly-enforced compulsory voting, and close elections increase voter turnout. Frequency of elections decreases average willingness to vote. Nevertheless, the two dummy variables of electoral systems are not significant at the usual statistical level. Compared to SMD, the level of voter turnout in PR and Mixed systems has no difference when other macro and micro variables are controlled for.

The impacts of macro-economic development on micro-voting decisions as found in previous aggregate research are verified (Blais and Dobrzynska 1998; Fornos et al. 2004). Higher GDP per capita does increase the willingness to vote, albeit this finding is statistically insignificant. Furthermore, the effects of lagged change in GDP per capita are negative for both the industrialized and developing countries. The coefficients of lagged GDP change (in the constrained model) are estimated at $-0.0269 + 0.0008 * \text{Developing}$, where Developing is the indicator variable. More specifically, the coefficient of lagged GDP change in the industrialized countries is -0.0269 with 0.537 p-value and that in the

issue positions, the individual respondents' perceptions are also replaced with the averages of respondents' evaluations (Rabinowitz and Macdonald 1989) because the experts' judgments of party issue positions are not available for all countries included in the study or are inconsistent with all individual perceived party positions in a country. After these changes, the results remain and are, therefore, robust. See Table A.2 in the appendix for details.

developing counterparts is -0.0261 with 0.492 p-value.²⁵ A decrease of GDP per capita fosters a voter's motivation in both the industrialized and developing world, though not statistically significant. This finding of economic voting is in line with the arguments of the developing countries in previous research, but inconsistent with those of the industrialized ones.

To explore the mechanism's efficiency across non-established and established democracies,²⁶ the indicator variable dividing elections into two groups is included in the intercept, and the slopes of the F and H factors. The dummy variable in the intercept is to control for all remaining noninstitutional factors that fundamentally exist in the difference between two groups of nations. The coefficient of the intercept indicator shows that individual voting propensity is initially higher in the non-established nations with other variables held constant. However, the binary indicators in the random coefficients of F and H are not statistically significant at the 5% level. The two coefficient indicators demonstrate that the relationship between the two components and voting propensity is not substantially different in non-established versus established democracies. More specifically, the institutional voting mechanism prevails in all of these elections. The implication of the magnitude similarity is that electoral institutions create the same voting incentives in the two worlds.

²⁵ The standard error of the coefficient for lagged GDP change in the developing countries is calculated by the formula, $\sqrt{\text{var}(\hat{r}_{0(13)}) + \text{var}(\hat{r}_{0(14)}) + \text{cov}(\hat{r}_{0(13)}, \hat{r}_{0(14)})}$, which is 0.0380 in this case. So the T-ratio is -0.6876 and the p-value is 0.4917.

²⁶ I use the terms of industrialized and developing countries and those of established and non-established democracies interchangeably.

Table 2.2 Multilevel Model of Calculus of Voting in 64 Elections (N: 66592) (Part 1)

	Full Model			Constrained Model		
<i>Fixed Part</i>	Coefficient	Robust SD	P-value	Coefficient	Robust SD	P-value
<i>Intercept of β_0, $\gamma_{0(0)}$</i>	-2.275	1.743	0.198	-2.318	1.741	0.190
<i>Compulsory1, $\gamma_{0(1)}$</i>	0.797	0.302	0.012	0.794	0.301	0.012
<i>Compulsory2, $\gamma_{0(2)}$</i>	0.139	0.236	0.560	0.141	0.229	0.541
<i>Compulsory3, $\gamma_{0(3)}$</i>	1.284	0.211	0.000	1.306	0.209	0.000
<i>Closeness, $\gamma_{0(4)}$</i>	-1.458	0.387	0.000	-1.452	0.386	0.001
<i>ENP, $\gamma_{0(5)}$</i>	-0.072	0.047	0.132	-0.072	0.046	0.130
<i>District magnitude, $\gamma_{0(6)}$</i>	-0.002	0.002	0.261	-0.002	0.002	0.298
<i>Frequency, $\gamma_{0(7)}$</i>	-2.247	0.440	0.000	-2.483	0.440	0.000
<i>Concurrent, $\gamma_{0(8)}$</i>	0.373	0.221	0.098	0.358	0.219	0.109
<i>Log District size, $\gamma_{0(9)}$</i>	0.043	0.034	0.207	0.045	0.034	0.187
<i>Politi Competition, $\gamma_{0(10)}$</i>	-0.002	0.007	0.739	-0.002	0.007	0.746
<i>GDP per capita, $\gamma_{0(11)}$</i>	0.165	0.147	0.268	0.168	0.146	0.256
<i>Developing, $\gamma_{0(12)}$</i>	0.970	0.243	0.001	0.989	0.244	0.000
<i>L_GDP Chang, $\gamma_{0(13)}$</i>	-0.028	0.029	0.339	-0.027	0.029	0.357
<i>L_GC_Developing, $\gamma_{0(14)}$</i>	0.002	0.039	0.962	0.001	0.040	0.983
<i>PR, $\gamma_{0(15)}$</i>	0.086	0.187	0.648	0.079	0.188	0.674
<i>MIX, $\gamma_{0(16)}$</i>	-0.283	0.280	0.318	-0.293	0.278	0.299
<i>Female, β_1</i>	0.022	0.025	0.381	0.022	0.025	0.378
<i>Education, β_2</i>	0.096	0.010	0.000	0.095	0.010	0.000
<i>Income, β_3</i>	0.086	0.010	0.000	0.086	0.010	0.000
<i>Inpower, β_4</i>	0.106	0.011	0.000	0.106	0.011	0.000
<i>Makediff, β_5</i>	0.176	0.017	0.000	0.176	0.017	0.000
<i>Partyid, β_6</i>	0.716	0.040	0.000	0.716	0.039	0.000
<i>Age26_35, β_7</i>	0.274	0.036	0.000	0.274	0.036	0.000
<i>Age36_45, β_8</i>	0.614	0.046	0.000	0.614	0.046	0.000
<i>Age46 and above, β_9</i>	0.967	0.054	0.000	0.967	0.055	0.000

Table 2.2 Multilevel Model of Calculus of Voting in 64 Elections (N: 66592)
(Part 2, cont'd)

	Full Model			Constrained Model		
<i>Fixed Part</i>	Coefficient	Robust SD	P-value	Coefficient	Robust SD	P-value
<i>F slope, β_{10}</i>						
<i>Intercept $\gamma_{10(0)}$</i>	0.004	0.001	0.000	0.003	0.001	0.000
<i>PR, $\gamma_{10(1)}$</i>	0.001	0.001	0.974	0.001	0.001	0.600
<i>Developing, $\gamma_{10(2)}$</i>	-0.001	0.001	0.228			
<i>H slope, β_{11}</i>						
<i>Intercept $\gamma_{11(0)}$</i>	0.007	0.002	0.007	0.008	0.002	0.001
<i>PR, $\gamma_{11(1)}$</i>	0.011	0.004	0.007	0.010	0.004	0.019
<i>Developing, $\gamma_{11(2)}$</i>	0.003	0.004	0.428			
<i>Random Part</i>	Std. Dev.	χ^2	P-value	Std. Dev.	χ^2	P-value
σ_e (scale factor)	1.81	3.29				
σ_{u0}	0.699	2342.21	0.000	0.699	2336.68	0.000
σ_{u10}	0.003	102.30	0.001	0.003	104.69	0.001
σ_{u11}	0.016	158.41	0.000	0.016	160.37	0.000

The likelihood ratio test between the full model versus the constrained model with eliminating the 2 dummies of developing countries in the slopes of the F and H factors is 3.45, which is smaller than the threshold of .05 p -value statistics, 10.6, under χ^2 distribution with two degree of freedom. Besides, the Bayesian information criterion of the full model against the constrained model is 20.3, which shows the strong support of the constrained model. This justifies the usage of the constrained model and that the strength of the two components of the B term does not vary across non-established and established countries.

The estimated results in Table 2.2 are a population-average model with robust

standard errors for making general inference toward the comparison of electoral institutions. First, hypothesis 1 and 2 are confirmed after individual and contextual variables are controlled for. The higher the individual components of the B term are, (i.e., the F and H factors), the more likely an individual decides to vote. This estimate offers us promising evidence about the micro-foundations of the individual voting process. The voting mechanism of benefit calculation considerations depends on institutional factors. The linkage between the micro voting decision and electoral institutions is through how electors evaluate the policy positions of political parties and their expected vote shares.

What is the connection between the micro-level voting mechanisms and electoral systems? The PR dummy variable is not significant at the slope of the F factor. Regardless of whether the voting decision is made under PR or non-PR systems, individuals use the F factor in the same, positive way. Nonetheless, the PR dummy variable is significant at the slope of the H factor. The relationship between the H factor and individual voting decisions are stronger under PR systems. Thus, the H factor provides more incentives for individuals to vote under PR and this is why PR fosters voter turnout.

4. Conclusion

This paper tackles the micro-foundations of voting and addresses why PR systems are associated with higher turnout than SMD systems. The micro-foundations are built upon the calculus of voting and spatial theory. The central claim is that individual evaluations of the B term in the calculus of voting are affected by spatial party competition framed by electoral institutions. While SMD constrains the number of political parties and creates large centripetal forces for party competition, it reduces individual perceptions of the two

components of the B term. In contrast, PR allows more political parties to survive and does not generate many centripetal forces; thus, it helps voters acquire higher estimates of the two counterparts of the B term.

This thesis is operationalized and tested using CSES data. The method employed is multilevel modeling because individual voting decisions are influenced by both aggregate-level contextual variables and personal characteristics at the same time. The empirical findings confirm that the voting mechanism holds under both SMD and PR while PR has a stronger tendency of voting due to the H factor. Moreover, the mechanism holds across established and non-established democracies.

The calculus of voting helps us understand why voting rates differ across countries. The cost-benefit approach under a synthesized spatial theory facilitates explaining citizens' voting behavior driven by electoral institutions. Since every election is specific based on the constraints of political institutions, and country-level contextual factors, *interactions* between political agents and electorates are centrally important in explaining individual voting behavior. Unless such an interplay among agents is accounted for, aggregate-level interpretations miss the basic point that a decision whether to vote or not is fundamentally individualistic. However, for future research, the data used in this paper do not control for all relevant aggregate-level variables. More macro-level data should be collected. Moreover, only cross-sectional data are used in Table 2.2. This dimension of the study is obviously not sufficient because this model cannot clarify why voter turnout across countries declines over time. As a result, panel data needs to be analyzed to investigate the universal trend of sliding voter turnout.

Finally, the discrepancy between the effects of economic development on voter

turnout between macro- and micro-levels of research deserves more investigation. The aggregate research may commit an ecological fallacy without a direct linkage between individual behavior and economic change. Although the direction of the impacts of GDP in the both worlds and of GDP change in the developing nations work as described in previous research, the effects are not strong enough to be statistically significant. Individual reactions to the changes in the economic environment are not explicitly measured or captured in the model. Moreover, in the developed world, voters do not reward success. This phenomenon is in contradictory with the findings of previous research. It is likely that the economics works differently among distinct groups of voters, and citizens also hold different views toward economic voting based on either a sociotropic or pocketbook perspective. In addition, no consensus exists on what economic indicators should be used in evaluating this question. Thus, future research needs to integrate possible mechanisms to sort out the effects of economic voting.

CHAPTER 3

HOW IS POLITICAL REPRESENTATION AFFECTED BY ELECTORAL SYSTEMS?

Political representation starts from political participation. The represented express their preferences mainly through the act of voting in elections. As Dahl asserts: ‘citizen[s] ought to have an adequate opportunity, and an equal opportunity, for expressing their preferences as to the final outcome’ (Dahl 1989, 109); thus, effective participation is a basic requirement of a democratic process. Equal opportunity implies that each citizen’s preference has an identical weight, or as Verba puts it, ‘political equality refers to the extent to which citizens have an equal voice in governmental decisions’ (Verba 2003, 663). However, in the real world, not everyone turns out to vote and voter turnout rates vary across countries with differing electoral systems. As the institutions of elections aggregate individual preferences and influence how elected representatives act in the interest for the represented (Powell 2000, 2005), it is thus essential to investigate whether the electoral-system-caused bias between the preferences of the whole citizens and those of who vote exists.

Procedural representation concentrates on the relationship between votes and seats without considering citizens’ preferences. It investigates the mechanics of how electoral institutions transform vote counts into seats (Rae 1967). The concept of proportionality refers to the degree to which vote shares correspond to seat shares allocated to political parties (Lijphart 1994; Taagepera and Shugart 1989).²⁷ However, despite the merits of understanding how electoral systems induce different proportionalities between seats and

²⁷ Proportionality can be measured by the least-square index—calculated by taking the square root of the half of the sum of squared difference between partisan vote and seat percentages (Gallagher 1991).

votes under the principle of ‘one man, one vote,’ procedural representation does not care about citizens’ needs (Powell 2004). Since the object to be represented in political representation is citizens’ preferences, it is necessary to bring the citizens’ preferences back into consideration.

From the perspective of substantive representation (Powell 2004), the quality of political representation hinges on the congruence between citizens’ preferences and policy outcomes. In contrast to the view of procedural representation which focuses on the disproportionality between votes and seats, substantive representation emphasizes the link between citizens’ preferences and their representatives (Miller and Stokes 1963). Only when the consistency of the link is ensured does successful political representation prevail. More specifically, democratic responsiveness occurs when the government makes public policies in accordance with what the citizens want (Powell 2005, 62-63).

Operationally, the research of substantive representation explores the congruence between the citizen median and policy outcomes as defined either by the legislative median or by government policies, and this perspective addresses how political representation is affected by electoral systems. In the proportional vision associated with proportional representation (PR) election rules, the government is usually formed in a coalition and the policy outcome is generated from bargaining compromises (Powell 2000). The legislative median accentuates its power in determining final policy (McDonald et al. 2004; Powell and Vanberg 2000), while the role of government is emphasized in implementing the policy outcomes (Huber and Powell 1994; Powell 2006). Both traditions of research conclude that PR is advantageous over single member district (SMD) election rules.

Notwithstanding the effects of electoral systems on congruence, the literature has paid

little attention to how the effects of electoral institutions on voter turnout influence political representation. The will of the people are realized mainly through political participation in elections. Participation in elections is the essential quality of democracy for reflection of responsiveness. Voting in elections reveals the citizens' preferences, which is one of the necessary conditions to ensure 'government responsiveness to the expectations, interests, needs, and demands of citizens' (Diamond and Morlino 2005, xxix).

The primacy of political participation in elections depends upon the citizens' decision to vote or not. If voters evaluate the cost of showing up at the polling station as not outweighing the benefit of expressing their preferences, they would abstain. Those who do not show up to vote give up the right to make their voice heard. Assume that a certain portion of eligible voters constantly do not vote and political parties also take this fact into account while campaigning and making policies. Then the government is no longer responsive to those abstaining from voting. This situation violates the basic principle of political representation from the view that the government should be responsive to all citizens. However, if voter abstention comes proportionally from different parts of the society, the preference profile of voter turnout resulted from aggregation of electoral systems may not be so dissimilar to that of the whole society. Thus, the understanding of whether the discrepancy between the preferences of voter turnout and those of the whole society exists is an important research agenda.

Moreover, voter turnout varies across countries with diverse electoral systems around the world. Electoral systems have been identified by many studies to be an important factor in explaining cross-national variation of voter turnout (Blais 2006); brutally summarized, PR systems are associated with higher turnout (Blais and Carty 1990;

Franklin et al. 1996; Jackman and Miller 1995; Powell 1986; Radcliff and Davis 2000), whereas the high disproportionality of SMD usually reduces voter turnout.

Nonetheless, as demonstrated in Chapter 2, the micro-foundations of voter turnout are rooted in citizens' evaluations of party issue positions (which are themselves structured by electoral institutions), and citizens' own policy locations in the voter distribution affect the willingness to vote. The critical point is that if electoral institutions raise or lower the voting propensities of different portions of the voter distribution, the resulting preference distribution of those who actually cast the ballot may or may not be consistent with the same distribution as the whole population eligible to vote.

Extending the emphasis on micro-foundations from the previous chapter, this chapter will examine political representation within the context of electoral systems. The main objective of this chapter is to explore whether political representation is biased by electoral systems through comparison between the profiles of voter turnout and those of the country as a whole.²⁸ The key finding is that contrast to the conventional wisdom, this paper shows that SMD systems induce a more representative government in the sense that those who turnout possesses features similar to the whole population.

In section two, I will clarify the meaning of political representation and the focus of this study. Next, I will demonstrate the mechanisms of how electoral systems influence the degree of political representation through three steps in the third section: first, I briefly review the past research on voter turnout; second, I show how voter turnout varies by electoral systems; third, reinterpretation of the impacts of electoral systems on newly

²⁸ In light of spatial theory, the distribution of voter turnout's ideal points on an issue dimension should be identical to the whole society by excluding those who do not vote in the election.

defined political representation. To support and verify the theoretical arguments, I will perform empirical analyses from aggregate and individual perspectives. It is important to develop appropriate measurements and to operationalize the conceptualizations in the theory to allow for hypothesis testing. In the country-level analysis, I will present a preliminary examination of summary statistics by types of electoral systems and adopt a more sophisticated regression model to explore the effects of electoral institutions. In the mean time, in the individual-level investigation, I inspect the micro-foundations of data analysis to complement and confirm the macro-level assertions. Finally, I shall conclude and make some future research suggestions.

1. Voting in Elections and Political Representation

The citizens' preferences are the objects made manifest through the complex, responsive democratic process. To induce the government to do what citizens desire, the latter vote in elections, the results of which are filtered through electoral systems. More specifically, electoral systems not only define how citizens' preferences are counted for electing representatives, but also structure what kinds of choices are available to them. To facilitate responsiveness, election outcomes are the bridge between the citizens' preferences, and government formation and policy outcomes. Famously, Schumpeter defines democracy as 'that institutional arrangement for arriving at political decisions, in which individuals acquire the power to decide by means of a competitive struggle for the people's vote' (Schumpeter 1976, 269).

Specifically, the two purposes of voting in elections are preference expression and delegate selection. Theories of substantive representation state that democratic

responsiveness works when the representatives are aware of citizens' preferences and are able to fulfill those preferences in forming policies under democratic institutions. The other conception is that the agents (the elected) respond to the principals' (the voters) needs. Pitkin observes that democratic responsiveness comes from two angles: (a) authorization of a representative and (b) accountability of the representative. The function of voting in elections is to articulate the object, the citizens' preferences, represented by the agents, which constitutes how the people's will is defined at the election time (Pitkin 1967, 225-226).

The two theories specify that the citizens wield elections to select representatives using complementary prospective and retrospective visions: mandate and accountability (Manin et al. 1999a; Powell 2000). In the forward-looking version, the citizens look at whether representatives will act in accordance with the expressed desires of the represented. The citizens select agents who are competent enough to accomplish their campaign promises. The principal wants to prevent the selection of agents who are unable to perform their tasks—a process known as adverse selection. In other words, voters want to have a mandate government.²⁹

This chapter adopts the standard of authorization to evaluate the quality of political representation. The selection mechanisms mean that the voters at the current time period authorize representatives the legitimacy to rule at the next time period. This notion refers

²⁹ In addition, in the backward-looking vision, citizens examine whether incumbent agents have fulfilled their duty during the previous electoral term. Voting empowers citizens to get rid of bad politicians who shirk their responsibility and to hold them accountable for their past performance. The citizens' ability to punish or reward agents' past behavior creates accountability. Accountability shows that the incumbents do not ignore their constituents and do not just pursue their own goals out of self-interest. This dimension is important, but not the major concern of this chapter.

to promissory representation in which the agents campaign to keep their promises for winning the principal's support (Mansbridge 2003). Only those who exert their right to vote do participate in the authorization process. For those who abstain in elections, their preferences may be ignored by agents. Thus, the preference differences caused by not all citizens' votes being counted in elections can increase the probability that representatives deviate from the distribution of whole citizens' preferences.

Political participation's centrality in elections is further enhanced by another perspective on political representation called gyroscopic representation. Mansbridge defines it as the following: 'Voters select representatives who can be expected to act in ways the voter approves without external incentives' (Mansbridge 2003, 520). Due to information deficiencies and the extreme cost of monitoring after elections, citizens tend to focus more on selection of good types of politicians (adverse selection) than on sanctioning bad performance of the incumbent (moral hazard) (Fearon 1999).

This paper proposes a previously unexplored notion of political representation. The method is to compare the distribution of the citizens' preferences expressed by voter turnout and that of the whole society. The more consistent the two distributions are, the higher the degree of political representation is. This notion of representation is built upon the electoral participation – the focus of the previous chapter –, as voting provides an important form of preference communication that helps or hinders the selection of like-minded representatives and requires that the representatives be held accountable (Bartels 1998; Miller and Stokes 1963). Lijphart argues that, 'who votes, and who doesn't has important consequences for who gets elected and for the content of public policies' (Lijphart 1997, 4). Moreover, representatives are more responsive or more likely to reward

voters than nonvoters in the policy-making process (Griffin and Newman 2005; Martin 2003). Therefore, voting in elections is an essential step in the representation of the citizens' preferences, and participation in elections can make a difference in who will be in power.

The notion of representation proposed in this paper also takes the root in Downs' (1957) spatial theory. In this framework, the citizens' preferences can be measured from the distribution of their issue positions. While the conventional wisdom equates democratic responsiveness to congruence between the median of the citizens' most preferred issue positions and the outcomes of public policies, the initial determinant of responsiveness is the consistency between the distribution of the voter preferences of those who voted in elections and the counterpart of all eligible citizens' preferences. If the distribution of preferences represented through elections is distorted, the chance of accurate responsiveness in policy outcomes will be lower.

Figure 3.1 displays examples of higher and less distortion in preference distributions. The preference distribution of the whole society is plotted in red. The distribution of voter turnout in the upper graph has less distortion compared to that in the bottom because the green-dashed distribution of voter turnout has more area outside the population distribution.

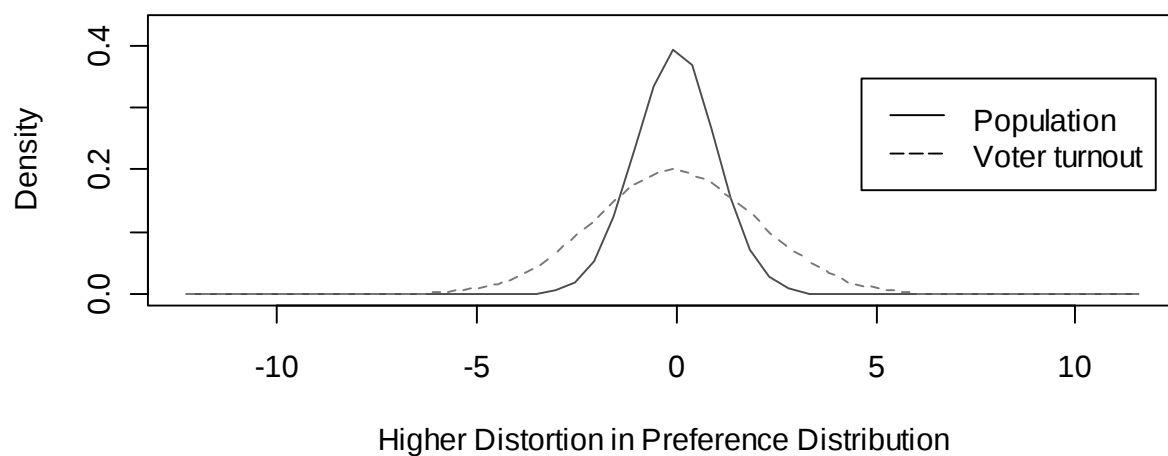
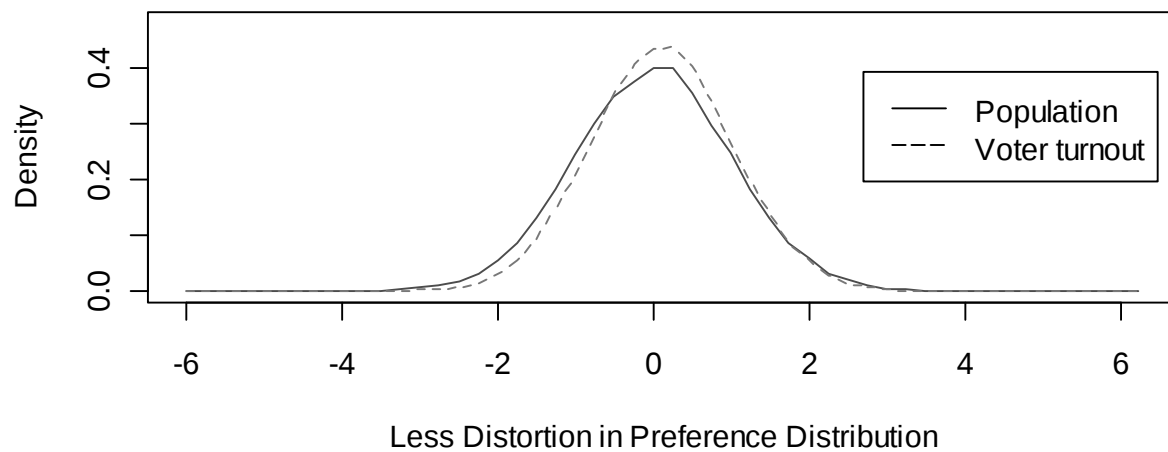


Figure 3.1 Examples of Distortion in Preference Distribution

Indeed, one of the fundamental principles of democratic government is fairness and equal representation (Dahl 1956). All individual preferences should be counted as equivalent. As Mill argues, proportional representation ‘secures a representation, in proportion to numbers, of every division of the electoral body: not two great parties alone’ (Mill 1862, 156). When this principle is applied to our case, it requires the consistency between the preference distribution of voter turnout and that of all eligible citizens with

the right to vote. Verba argues that, ‘one of the bedrock principles in a democracy is the equal consideration of the preferences and interests of all citizens’ (Verba 2003, 663). Because all citizens do not vote, the more homogeneous the two distributions are, the less misrepresentation occurs as a result of the partial voter turnout.

To sum up, this paper evaluates the degree of political representation in a polity by comparing the preference distribution of voter turnout against the analogue derived from all eligible voters.³⁰ Dalton depicts ‘the basic goal of representative government’ as ‘political decision makers enter[ing] the policy process with the same policy preferences as the public’ (Dalton 1985, 275). Thus, the correspondence between the elites’ attitudes and the overall citizens’ preferences in substantive representation hinges on an unbiased voter distribution created by higher voter turnout.

Although voting in elections is based on geographical constituency voters belong to, the discrimination among constituencies should be less distinctive on issues across different locations, such as gender, environment, global trade and so on (Rehfeld 2005; Urbinati and Warren 2008). Weissberg argues that the degree of representation measured collectively is always no worse than that metered district by district (Weissberg, 1978). Following this tradition, I calculate the degree of political representation by using a probabilistically illustrative sample in a democratic country. Assuming that a quintessential issue dimension of the citizens’ preferences is determined, this method requires the distribution be congruent between two groups of voters along that issue dimension. This requirement

³⁰ Although Miller and Stokes (1963) adopt the same viewpoint to examine preference consistency in the dyadic representative-constituent relationship, this method may be misleading due to randomness in the binominal matching process at the district level (Achen 1977, 1978).

means that the distribution of voter turnout should be a mirror of all eligible voters because it is voter turnout that selects and authorizes representatives to rule. This can be viewed as a preliminary step to reach Pitkin's descriptive representation which asks that the 'legislature be a mirror of the nation or of public opinion' (Pitkin 1967, 61).

2. The Influence of Electoral Institutions on Political Representation

The central focus of substantive representation is the reflection of citizens' preferences in final policy outcomes. The mandate theory of democracy requires that political representatives, such as political parties, are a smaller set of delegates whose authority comes from the aggregation of diverse citizens' preferences expressed through voting in elections (Converse and Pierce 1986).³¹ This defines the linkage between the citizens' preferences and the government policy with the initial step of political representation is to know the former.

With the emphasis on mandate theory, the means to reveal citizens' preferences is voting in elections. McDonald and Budge write vividly that the role of elections is 'to communicate where the median voter stands' and that 'voting is an expressive act with a guaranteed value: every vote counts not in deciding the winner but in identifying the median' (McDonald and Budge 2005, 12). The policy-making process depends on the plurality's preferences of the policymakers, and their preferences should correspond to the

³¹ This definition does not exclude Edmund Burke's view of the relationship between voters and representatives as a trusteeship. According to the famous Diamond diagram in Miller and Stokes (1963, 52), constituents' sentiments have an impact on politicians' opinions. Furthermore, the relationship between voters and their agents should not be dichotomized; rather, it should be a combination of both types. (Converse and Pierce 1986).

preferences of the citizens. This congruence demonstrates the importance of the position of the median voter. However, the position of the median voter is not fixed and relies on those voters who do go to the polling station to cast their ballots. Voter turnout decides what political views are representational by the vehicle of political parties.

Meanwhile, Downs' spatial theory provides a succinct model in which voters select among political parties with alternative policy packages (Downs 1957). Political parties are the devices offering various policy programs to represent the citizens' preferences and enact the policy position with a mandate in government policy (Converse and Pierce 1986; Dalton 1985; Kitschelt et al. 1999; Schmitt and Thomassen 1999).³²

Importantly, the position-taking strategies of political parties are not created out of a vacuum but are chosen in response to the context provided by electoral systems. On the one hand, the available range of policy packages varies across countries that have adopted differing electoral institutions (Cox 1990a; Katz 1997). On the other hand, the effective number of political parties is higher under PR compared to SMD because the effective threshold of representation is usually lower under PR (Lijphart 1994; Taagepera 2007). The two factors summarize the effects of electoral systems on the campaign strategies of political parties.

Finally, instead of asking whether the congruence between the citizens' preferences and the final policy outcome, we need to take one more step back from the party's policy package to investigate the source of the mandate. Despite examining the coherence

³² At the electoral stage, different political agents propose contrasting policy programs to allow voters to express their preferences. The linkage between the will of the citizens and the government policy hinges on political agents' carrying out their campaign promises (Klingemann et al. 1994).

between the two ends of the linkage process, the input of the fidelity of the citizens' preferences is crucial. As explained in the previous chapter that electoral institutions have impacts on individual voters' decision-making on casting a ballot, so the essential question to query is whether citizens' preferences are expressed faithfully across various turnout rates under electoral systems. The more consistent the preference distributions between voters who turn out and the whole eligible electorate are, the more representative an electoral system is. In other words, when the input of the citizens' preferences is unbiased, there is a higher chance that they can be integrated into the final policy outcomes.

2.1 Background Research

The studies of substantive representation shift the focus from dyadic representation to collective representation. The tradition of substantive representation begins with Miller and Stokes' (1963) dyadic congruence between representatives and their constituents. Converse and Pierce (1986) extend the theoretical underpinnings of dyadic representation in their book on French electoral politics. Yet dyadic representation suffers the failure of correlation coefficient to show the truthful relationship between the policy positions of the representatives and those of their districts (Achen 1978; Weissberg 1978). While investigating substantive representation dynamically or comparatively, scholars choose to explore collective congruence between elites' policy preferences and public opinion in a political system (Fowler and Smirnov 2007; Holmberg 1999; Kitschelt et al. 1999; Stimson et al. 1995; Thomassen and Schmitt 1999; Holmberg 2000; Thomassen and Schmitt 1997). Moreover, Esaiasson finds that the extent of agreement between voters of a particular constituency and the collective of party representatives is at least the same as between the

constituents and their own specific representative. His findings were valid in Sweden, West Germany, France, and the USA (Esaiasson 1999). The main assumption that facilitates such an observation is that the amount of geographical variation within a polity is smaller compared to the variance within a district. The collective perspective also makes plausible the examination of how characteristics of a political system influence political representation.

Electoral systems are an important factor in explaining the correspondence between popular preferences and government policy. The two stages in the linkage process that produces substantive representation are: (1) citizens' preferences select some agents and (2) agents participate in the legislature or the government to make policies. The units of analysis for comparison usually are two-fold: the issue position of political parties and the policy position of the government. Under the concept of responsible party government, parties carry the preferences of those who vote for them into the policy-making process. Congruence is measured by the degree of correspondence between the collective of party elites and its supporters' preferences in a political system (Dalton 1985; Golder and Stramski 2010; Luna and Zechmeister 2005; Wessels 1999). The assumption is that political parties, as the device for preference aggregation, would represent their supporters faithfully in the second stage.

On the other hand, the second type of units of analysis is institutions like government. The government position is approximated by the weighted position of government parties according to seat share in parliament (Blais and Bodet 2006; Huber and Powell 1994; Powell 2000), or by the position of the median legislative party (Budge and McDonald 2007; McDonald et al. 2004; Powell and Vanberg 2000; Powell 2006). This model

connects the citizens' preferences directly to the government without paying attention to how the final policy is created. Thus, the model treats the two separate stages as one single process.

Most congruence analyses reach the conclusion that PR systems produce better representation than non-PR ones. With PR providing more diverse party choices and more closely proportional vote-to-seat transformations, it is able to create a government that better reflects the median voter. However, two recent studies find that PR does not outperform SMD on the criterion of the congruence between citizens' preferences and the government policy (Blais and Bodet 2006; Golder and Stramski 2010). Although Powell accounts for the anomaly as a difference in the data sources and the time periods covered (Powell 2009), it is still puzzling why the effects of PR are not consistent across studies.

The proposed study argues that previous research does not take into account the effects of electoral institutions on the citizens' preferences at stage one. While the congruence of the citizens' preferences is compared with either political parties or the government, the selection of these agents is determined partially by voter turnout, which in the real world varies across countries. The mechanisms of PR and SMD work differently to represent the citizens' preferences. Under SMD, the government is delegated to a single party determined by electoral competition whereas under PR, the government is formed through postelection negotiation (Lijphart 1999; Powell 2000). In other words, the effect of electoral institutions on the degree of congruence depends on the coordination of political parties at both stages. While the representation of citizens' preferences under SMD needs more stringent coordination at the first stage, the counterpart under PR happens mostly during the second stage. As Cox explains, "if coordination is more likely to

fail at the electoral stage, then majoritarian systems will be more erratic. If coordination is more likely to fail at the government formation stage, then PR systems will be more erratic” (Cox 1997, 237).

In short, political representation is a product of the interactions between voters and political parties through the process of electoral competition. Previous research concentrates only on the effects of electoral institutions on political parties but not on the voters. The acting agents under either PR or SMD are based on the preferences expressed by the total number of voters who turnout during the election. Since electoral systems also influence higher or lower turnout in a polity, the bias introduced by electoral systems affect not only how political agents represent the citizens’ preferences, but also which citizens express their preferences by turning out to vote in elections. Therefore, electoral systems’ effects on political parties and political representation should not be the only target of research. I propose to incorporate the effect of voter turnout via electoral systems on the expression of citizens’ preferences and thus, policy responsiveness.

2.2 Electoral Systems and Voter Turnout through Spatial Theory

The representation of the electoral process can be broken down into three connected elements: the individual decision to vote, the preference distribution of those who vote, and how party competition seeks the support of those who turnout. The first component is the focus of this study.

Suppose that the citizens’ preferences are distributed in one dimension policy space³³

³³ The assumption of unidimensionality is reasonable if the most salient issue exists within a country and it coincides with the left-right scale. The most usual dimension can be

(see the next section). The structure of the dimension is to set up a common frame for communication between voters and political parties. In the literature, the left-right dimension has become the focus of the analysis since it is most applicable (McDonald and Budge 2005; Powell 2000).³⁴

The forces of electoral system on political representation through voter turnout are contingent on the collective congruence between the preference distribution of voter turnout and that of the citizens as a whole. If nonvoters includes some certain groups of disadvantaged citizens such as low income, or ethnic minority, the elected agents may not be responsive to include their needs in the government policy. Thus, the initial inquiry of the degree of political representation is to ask the question whether or not the distribution of those regular voters in elections is biased against the whole range of the distribution of the whole society.

First, the incentives of participation are different across electoral systems. Individual decisions of voting or not depend not only on many contextual-specific factors but also on the effects of electoral institutions. The decision to participate or abstain in elections shows whether eligible citizens can appropriate deputies to represent their preferences. The central claim of Chapter Three is that individual evaluations of the B term in the calculus of voting are affected by spatial party competition framed by electoral institutions. While SMD constrains the number of political parties and creates large centripetal forces for party competition, it reduces individual perceptions of the B term. In contrast, PR allows more political parties to survive and does not generate many centripetal forces and helps

assumed the left-right dimension. It may change depending on the context.

³⁴ Scholars also prove that voters do have an understanding of where their self-position and the stands of political on the left-right space (Converse and Pierce 1986; Pierce 1999).

voters acquire higher estimates of the B term. Building upon insights from spatial voting theories, Chapter Two argues that a voter's turnout propensity increases as the distance between her position and the policy position of her most favored party decreases. Conversely, a voter is more likely to turn out if the policy distance between her and her least favored party increases. Taken together, a voter's turnout propensity should be increased more by PR than by SMD, *ceteris paribus*.

However, not all eligible voters exercise political participation, and it is those who do go to the polling station that select representatives and hold them accountable. Do those types of voters who show up for elections faithfully cover the full range of the policy space? We must know whether voting turnout leaves some parts of the distribution unrepresented. If representatives know that a certain portion of their constituents relinquishes their rights, they may not take into consideration their interest in the policy-making process. Thus, the resulting policy outcomes may be biased against those who abstain in elections. Based on aforementioned mechanisms of voter turnout, the relationship between electoral systems and substantive representation measured by preference distribution consistency contrasting voter turnout versus all eligible voters, needs to be explored.

2.3 Electoral Systems and the Degree of Political Representation

The focus of this section is to discuss how electoral systems influence different portions of the electorate's voting propensity in a unidimensional policy space. We ask the question whether the rates of participation and abstention spread evenly or disproportionately among all electors under electoral systems. Put it briefly, this amounts to comparing the relative positions of voters and nonvoters in the issue space. If the rates of participation

and abstention are pretty close across the whole range of the distribution, the resulting preference distribution of voter turnout will be similar to that of electorate.

The main argument acts on the following assumptions: (1) Electoral systems and the number of political parties are fixed before each election and are treated as exogenous; (2) Political parties or candidates campaign by choosing issue positions in the issue space; (3) Voters respond to information and messages sent by political agents and decide whether or not to cast their ballot. Then, the key question is: what portions or segments of the preference distribution of voters on the main issue are more likely to vote or abstain?

Next, political parties choose their issue positions to solicit voters' support. Cox (1990a) classifies electoral systems into centripetal and centrifugal types based on how electoral laws lead political agents to take converging or dispersed positions in a one-dimensional issue space. Cox finds that SMD is the most centripetal electoral system, whereas PR is the most centrifugal one. Obviously, the more centripetal an electoral system is, the more convergent are the issue positions political agents will choose. Moreover, political parties decide their issue positions in response to rival parties' policy shifts and to public opinion. In the former, political parties are more likely to diverge from the median if other parties do so, especially those in the same ideological families (Adams and Somer-Topcu 2009). In the latter, the centrist and rightist parties react to public opinion more quickly than the leftist ones (Adams et al. 2009). These patterns of the parties' positioning strategies confirm the institutional effects of electoral systems.³⁵

³⁵ The positioning strategies under SMD and PR can also be explained from the angle of entry problem. In equilibrium, the strategy under SMD is convergent toward the median while that under PR is candidate dispersion over the policy space. This is the best response under both types of electoral institutions because the threat of entry from new candidates

Voters react to political parties' campaign promises by two classes of electoral models: the moral hazard model and the adverse selection model. Voters make their decision to participation based either on the former with available information about candidates like incumbent government performance and campaign promises, or on the latter with anticipation about how they would behave in office (Ferejohn 1993). In particular, the citizens derived their voting utility from the combination of both sources of information. Hence, the issue positions taken by candidates under SMD or PR provide useful hints to voters' decision of political participation.³⁶

Thus, the citizens use their right to vote as the means for controlling politicians by responding to campaigning strategies structured by electoral systems. The *B* term of voting in elections largely includes two parts: the *F* factor, how closely a voter's ideal point will see implementation in government policy; the *H* factor, how far the distance is between a voter's ideal point and her least preferred party. More specifically, in an electoral system with more median-convergent stimuli, the utility derived from the first component of the *B* term tends to become smaller and decreases the propensity of voting. On the contrary, in a more centrifugal electoral system, the induced utility of the second component of the *B* term is likely to become larger and increases the incentive of voting. In conclusion, on average, SMD tends to induce a smaller *F* factor and a smaller *H* factor than PR does in a

does not exist (Greenberg and Weber 1985; Palfrey 1989).

³⁶ The classes of electoral models both have equilibriums under unidimensional issue space. The politicians are uncontrollable in a multidimensional issue space (Ferejohn 1986, 1993). Usually the dimensionality can be reduced to one because the single dimension can explain an essential part of variance of many issues. In other words, many issue positions can be mapped into the most salient issue space. This argument has been confirmed in empirical research of roll call data in American (Jackman 2001; Poole and Rosenthal 1985). In the comparative research of substantive representation, the single issue space is the left-right dimension (Huber and Powell 1994; McDonald et al. 2004; Powell 2006).

unidimensional space.

Using Powell's language, the vision of two-candidate elections, mostly in SMD systems, is majoritarian, and that of multiple-candidate elections, usually in PR, is proportional (Powell 2000). The former vision sees elections as instruments to control the concentrated policy-making power and the latter consider elections as an indirect role to influence factions in the dispersed counterpart. In voters' minds, they need to take into account both components of the B terms in both types of elections. In the majoritarian view, citizens only need to worry how distant their less preferable candidate is since the policy-making power is delegated to either her favorable or unfavorable candidate. In the proportional view, voters have to think about the policy positions of all representative agents, who will enter the bargaining process. Although their votes in the multiple-candidate competition only exert indirect influence on the final policy outcome, a voter must consider how her least preferable agent will weigh in after elections. More specifically, the minimization of the issue proximity is the same across all types of elections, but how voters perceive the seriousness of threats from their least preferable candidates under SMD and PR relies on the second component.

Classifying voters based on the relative location along the distribution of their ideal points helps analyze the question about which segment of voters are more likely to turn out. The distribution of voter preferences can be divided into three segments: the leftist, the moderate, and the rightist from minimum to maximum. The classification of left and right does not matter because the same categorization can be obtained by reversing the direction. I define three types by voters' relative locations on the issue spectrum: the leftist toward the left end, the moderate, and the rightist toward the right end. The categorization is to define

three types of voters and their actual locations are not the main concerns here.

The effects of electoral systems on three types of voters vary through different evaluations of two components of the B term. Under SMD, the moderate type has a satisfactory F factor and a low H factor because two agents converge toward the median. In the mean time, the other two types have an unsatisfactory F factor and low H factor because two agents are not only far from their ideal points but also cluster together. Hence, all three types of voters have low incentives to go to the polling station. Furthermore, under PR, the moderate type has a similar incentive scheme to their counterpart under SMD because they can find a political agent to represent and also because the extreme types of agents are not so threatening to them. The story of the leftist and rightist is different under PR because they would not only have a satisfactory F factor but also have a high H factor. The F factor is satisfactory because there are extreme types of agents staying at out of interquartile range. The H factor is high because they sense the threat from the other extreme of the distribution. Thus, the incentives of turnout for different types of voters are universally low under SMD. However, they are low only for the moderate type under PR but are high for two extreme types of voters.

Based on discussion above, the degree of political representation defined by the distortion of the distribution of voter preferences induced by turnout variation across electoral systems is higher under SMD than under PR. The preference distribution is more biased because more extreme types are more likely to vote while they locate at the lower density area of the distribution. Therefore, the main research hypothesis is as follows:

The degree of political representation is higher under SMD than under PR because the

resulting distribution of voter preferences is more consistent against that of the citizens' under SMD than under PR.

3. The Institutional Effects of Electoral Systems on Representation

3.1 Selection of Cases and Data

To explore the institutional effects of electoral systems on substantive representation from a collective perspective, it is necessary to compare the preference distributions country by country. The unit of analysis is a polity. The advantage to compare the degree of political representation at the country level is that the institutional impacts on citizens' decision to vote in elections are the same to everyone in a political system. Moreover, to make the distribution comparatively equivalent, the issue space needs to be measured on an identical scale. The citizen preference distribution should be a quintessential sample within a polity. Survey data across countries can approximate reasonably the preference distribution. Thus the data sets of comparative study of electoral systems (CSES) meet our requirements of empirical analyses.

Following the case selection criteria in Chapter Two for the round 1 and round 2 of CSES project from 1996 to 2006, there are 64 elections included. The same 64 elections are used to calculate of the F and H factors for multilevel analysis. However, for the collective representation at the country level, those elections with the measure of the citizens' preference distribution can enter the congruence analysis without any concerns because the analysis only require voters to identify their policy stands on the issue spectrum and their decision to vote in an election. These elections are Chile 1999, Belgium 2003, Netherlands 2002, and the USA 1996. Thus, there are 68 elections for collective

congruence analysis. Please see appendix for more detail about these elections.

3.2 Measurement

3.2.1 The Dependent Variable

In order to measure the degree of representation of voter turnout vs. the whole eligible voters, two steps should be taken. First, pick an essential dimension of the citizens' preferences to compare across two groups. Second, decide how to measure the discrepancy between the distributions of voter turnout and the whole population.

The dimension picked for analysis is the left-right issue space. The battery question is "In politics people sometimes talk of left and right. Where would you place yourself on a scale from 0 to 10 where 0 means the left and 10 means the right?" The question measures the citizens' preferences over the left-right and provides us with a distribution for comparison across voters against all eligible voters. While the issue dimension is determined, the next step is to discriminate two groups of respondents. The group indicator is the binary variable: whether the respondent voted or not in the previous election.

In order to calculate the discrepancy between two distributions and take the consideration of variable equivalence across countries into account, the frequency of probabilistic samples within one country from 0 to 10 is computed to be proportions. Another reason for calculating proportions is so that sample sizes across countries and sample numbers will not affect the discrepancy between distributions. These proportions are summed up to 1 according to Kolmogorov axioms of probability because they represent the discrete mass at each point from 0 to 10. The same method can be applied to

two groups of samples.

The congruence between the distribution of voter turnout and that of all eligible voters display how the effects of electoral institutions on voter turnout transform the citizens' preferences. If the preference distribution communicated by voter turnout is identical with that of all citizens, it means that there is no bias introduced by electoral systems. This approach is similar to previous research that it checks the relationship between the citizens' preferences and their representatives from a collective perspective, but it is dissimilar in that it examines the effects of electoral institutions on the voter side. The reason for the focus on voters is because their preferences are the object to be represented and the fidelity of preference communication through the electoral competition should be the guarantee of the quality of the democratic process.

The measure of the congruence of two preference distributions is the distance between two distributions. The idea of comparing two distributions for the degree of political representation is fairly new, except in Golder and Stramski (2010), in which they called it a 'Many to Many' relationship and focus on the congruence between the distributions of citizen and representative preferences. The concept is to compute the difference between two distributions. Golder and Stramski adopt the method of calculating the difference in area of the cumulative distribution functions of the two distributions (Golder and Stramski 2010, 96). The shortcoming of this method is that the distribution needs to be transformed first and the left-right ideological measure in the survey is usually from 0 to 10, which is discrete, not continuous. Therefore, the transformation may be problematic.

I utilize a more intuitive approach to evaluate the difference between the two distributions, the Kullback-Leibler distance (KLD henceforth) is a good choice to measure

the closeness of two distributions (Gill 2008). KLD can be computed directly using probability distribution functions and no transformation is needed. Suppose that the distribution function of all eligible citizens' preferences is normal. If the resulting distribution of voter turnout is also normal but with another mean and a different standard deviation, the KLDs of the two indicate how far apart the two distributions are. Another example is the distribution of turnout is uniform. KLD between normal and uniform distributions is greater compared to that of the former example.

KLD is used to measure the degree of political representation between voter turnout against all eligible voters. The formula is defined by:

$$(3-1) \quad I(f, g) = \int \log \left[\frac{f(x)}{g(x)} \right] f(x) dx$$

for two candidate distributions (Robert and Casella 1999, 222). The Kullback-Leibler distance is computed by using the distribution of voter turnout, $f(x)$, compared to the distribution of all electorate, $g(x)$. So the distance indicates the degree of deviation of the distribution of voter turnout preferences from the whole electorate. This is a measure of disproportionality at the country level. The total number of observations is 68.

Examples of KLD are shown in Figure 3.2. From top to bottom, the degree of similarity is from the greatest to the least and KLD ranges from small to large. Smaller KLD, which the distance between two distributions is close, means that they look alike. The measure of larger KLD indicates that two preference distributions are different in their locations and shapes.

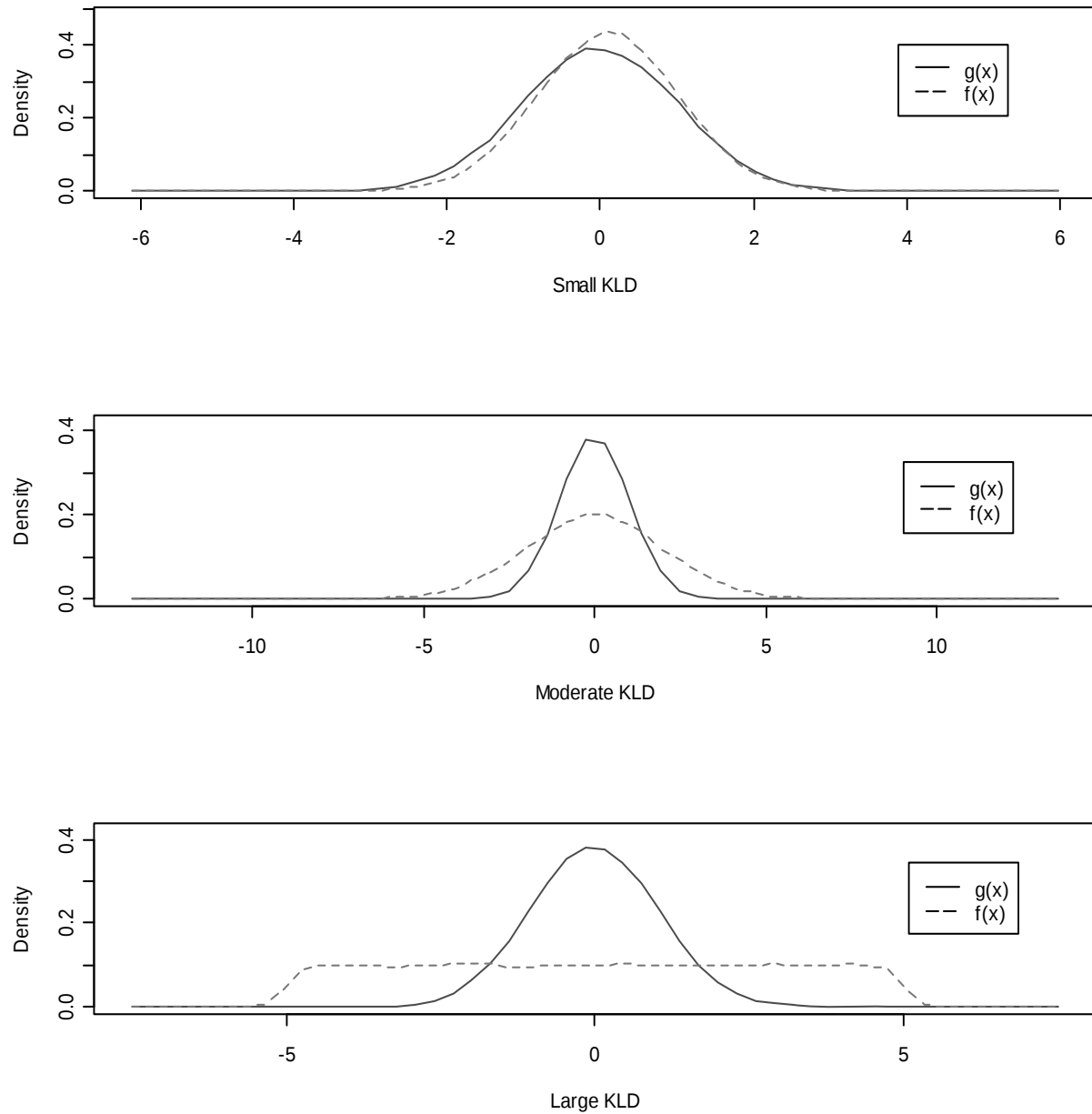


Figure 3.2 Examples of KLD Computation

3.2.2 The Classifications of Electoral Systems

The classifications of electoral systems follow the standards specified in Chapter Two into four categories: majoritarian, combined-independent, combined-dependent, and proportional representation. Majoritarian systems include the first-past-the-post or the

two-round 2nd ballot systems. Second, combined-independent systems contain two tiers of districts using SMD and PR formulae to allocate seats separately. Third, compensatory mixed electoral systems have the same features as the previous type except that the seat allocation is according to the vote shares in the PR tier. Forth, PR systems cover those countries with larger district magnitude and a variety of PR formulae to distribute seats to political parties. Furthermore, for presidential and parliamentary elections held concurrently, if the formulae are not the same in both levels, the centripetal effects of SMD will be contradicted by those of PR.

I further arrange the electoral systems by the degree of centripetal forces into three categories from the strongest to the weakest: the strongest is majoritarian, concurrent SMD, and AV; the medium is non-compensatory mixed and concurrent SMD and PR; the weakest is either compensatory mixed or proportional. This categorization illustrates how electoral institutions will shape party competitions. Thus, these definitions give us three types as SMD1, Mixed1, and PR1 (see Appendix Table A.3 for detail).

In order to test the robustness of the categorization, compensatory mixed electoral systems are not combined with PR according to Shugart and Wattenberg (2001). Thus we have four categories: SMD2, MMM, MMP, and PR2, where MMM stands for mixed-member majoritarian and MMP stands for mixed-member proportional.

3.2.3 Aggregate-level Control Variables

Three aggregate measures of political fragmentation are used, which are effective number of parties, district magnitude, and the degree of political competition. These three variables should be negatively related with the KLD because these are all beneficial to

proportionality.

Compulsory voting is considered as an important factor in the voting cost calculation. In those countries with compulsory voting and high punishment of nonvoting, the voter turnout should be larger than those without compulsory voting or those with lower punishment of nonvoting. Thus the coefficient for compulsory voting is expected to be negative. The compulsory voting is measured at five levels from ‘No,’ ‘Yes, without sanction for violation,’ ‘Limited enforcement,’ ‘Yes, weakly enforced sanctions,’ and ‘Yes, strictly enforced sanctions.’ If more voters are forced to go to the polls, KLD will be smaller.

Another contextual variable is the frequency of elections. If there are more national elections, citizens may feel that electoral contests are less decisive or citizen may develop “burn out” from repeated voting. This variable is put in as a control variable and the sign is expected to be positive. The same logic of compulsory voting appears again here. Since voters are more likely to abstain their rights due to too many elections, the possibility that the difference of two distributions of turnout versus all eligible voters will be higher. More frequent the elections, the larger the KLD.

Developing is a dummy variable of developing countries which includes all countries not in the OECD. This dummy variable can let us compare whether the degree of disproportionality varies across established and non-established democracies.

3.3 Descriptive Statistics of KLD by Electoral Systems

The summary statistics by different types of electoral systems are shown in Table 3.1. As expected, the mean level of the degree of disproportionality is ranked by PR, Mixed, and

SMD from the highest to the lowest. The degree of disproportionality in PR is twice the number of SMD by our measure. This preliminary result confirms our main hypothesis that though PR induces higher voter turnout, it generates more discrepancy between the preference distribution of voter turnout and that of the electorate. The main reason for this phenomenon is that those voters at the interquartile range of the preference distribution have lower incentives to cast their ballot.

To verify the robustness of the previous finding, mixed electoral systems are reclassified by Shugart & Wattenberg's typology. The summary statistics are displayed at the bottom of Table 3.1. Basically we make the same conclusion as the original classification. Surprisingly, compensatory mixed PR-SMD electoral systems have the lowest degree of disproportionality. Maybe this is the consequence of the combination of both kinds of electoral systems, but the conclusion is tentative due to there only being 5 cases in this category.

Table 3.1 Summary Statistics of KLD by Types of Electoral Systems

<i>Category</i>	<i>Types</i>	<i>Mean</i>	<i>(SD)</i>	<i>Cases</i>
Centripetal	SMD1	0.154	0.183	21
	Mixed1	0.261	0.233	12
	PR1	0.365	0.562	35
Shugart & Wattenberg	SMD2	0.154	0.183	21
	MMM	0.261	0.233	12
	MMP	0.127	0.136	5
	PR2	0.405	0.597	30

3.4 Random Intercept Regression Model

In order to explore whether the disproportionality of PR is higher than SMD, a more sophisticated method is necessary to eliminate the impacts of other confounding variables. Since KLD is a measure on a continuous scale, a linear regression model fits the need. To

control for unobservable country-specific characteristics, random intercepts assumption is reasonable. Each intercept can be interpreted as anything belonging with a country and not generalizable across borders. There are 37 countries with 68 elections. A common intercept is estimated for one country with several elections and a particular one is estimated for those countries with just one election in the data set. This method amounts to putting a dummy variable into the right hand side and will not cause the identification issue. Since the goal of the model is to control for those country-specific effects, we should not focus on explaining these coefficients. Bayesian methods are used in model estimation because this avoids the problem of degrees of freedom that would otherwise result from the small number of cases. The main assumption of Bayesian method is that all estimated coefficients are assumed to have a non-informative prior.

The estimation results of the first categorization of electoral systems are shown in Table 3.2. The statistics presented in the table are the means and various quantiles of the posterior distribution. The mean indicates the centrality of distribution while the quantiles contain information about how the posterior distribution spreads among its range because not all posterior distribution is symmetric. Several observations can be made:

- (1) The coefficient mean of the PR variable is 0.152. This is consistent with our conjecture in Hypothesis 1 that compared with SMD PR does have a higher disproportionality through higher voter turnout mechanisms. The positive range of the PR posterior distribution is around 80%. This means that we have a reasonable, though not strong evidence to support Hypothesis 1.
- (2) The average coefficient of Frequency is 1.299. The more frequent the elections, the higher probable the disproportionality. This shows that voters will be tired of

elections and less likely to turn out if elections are too many. More frequent elections will cause larger disproportionality. The evidence of this argument is strong because the 95% range of the posterior is positive.

- (3) Political competition reduces disproportion, though the mean effect is -0.06, which is smaller when compared with the previous two variables. Around the 90% range of the posterior is negative.
- (4) The developing countries have a lower disproportionality than the developed countries. The mean coefficient is -0.286 and the 95% range of the posterior locate in the negative area. The possible explanation is that there are fewer voters who customarily abstain and voters are less inclined to relinquish their right to vote across the whole range of the distribution. So the resulting distribution of voter preferences is less distorted.
- (5) The results of the second categorization of electoral systems are shown in Table 3.3. Similar conclusions can be derived from these coefficients. For electoral institution variables, PR has a stronger positive effect on disproportionality with the mean coefficient at 0.205 and with the 90% positive range. At the same time, MMP also has a moderate negative effect on disproportionality with 80% negative range.

Table 3.2 Random-Intercept Regression Model of KLD in 68 Elections with 3 Types of Electoral Systems

<i>Variable</i>	<i>Mean</i>	<i>5%</i>	<i>10%</i>	<i>15%</i>	<i>20%</i>	<i>80%</i>	<i>85%</i>	<i>90%</i>	<i>95%</i>
<i>Frequency</i>	1.299	0.618	0.776	0.881	0.958	1.641	1.722	1.821	1.971
<i>Politic competition</i>	-0.006	-0.013	-0.011	-0.010	-0.009	-0.002	-0.002	-0.001	0.001
<i>Developing</i>	-0.286	-0.541	-0.483	-0.444	-0.414	-0.286	-0.157	-0.090	-0.034
<i>PR</i>	0.152	-0.096	-0.039	-0.004	0.025	0.278	0.307	0.344	0.401
<i>Mixed</i>	0.053	-0.219	-0.158	-0.117	-0.085	0.053	0.192	0.266	0.326
<i>ENP</i>	0.006	-0.057	-0.042	-0.033	-0.025	0.038	0.046	0.055	0.069
<i>District magnitude</i>	-0.001	-0.002	-0.002	-0.001	-0.001	0.001	0.001	0.001	0.002
<i>Compulsory</i>	-0.036	-0.112	-0.095	-0.083	-0.074	-0.035	0.002	0.023	0.040
<i>Variance Part</i>									
$\sigma_{Intercept}$	0.175	0.017	0.047	0.072	0.092	0.179	0.252	0.288	0.319
$\sigma_{Residual}$	0.375	0.305	0.319	0.328	0.336	0.412	0.422	0.434	0.452
<i>Deviance</i>	57.766	38.619	42.52	45.36	47.63	67.94	69.63	71.66	74.74

The main point of the collective congruence analysis at the country level is that PR has a higher probability to induce biases into the distribution of citizen preference because more extreme voters are more likely to find a viable political party to support. The previous research which focuses on the congruence between the citizen preferences and the median party in the legislature or the government policy outcome, basically concludes that PR has advantages at creating congruence and thus, producing a better political representation (Huber and Powell 1994; McDonald et al. 2004; Powell and Vanberg 2000; Powell 2006). The mechanisms proposed in these studies mainly explain the different degrees of congruence in political representation through the actions of political parties. SMD requires the majority party to move toward the position of the median voter. While this requirement is more stringent, political parties may often fail to fulfill it. On the other hand, under PR, the reduction of the distance between the median parliamentary party or the government policy hinges on the postelection bargaining process, but not on the party coordination at the electoral stage (Powell 2006). From the time dynamic aspect, the

adjustment to get closer to the median voter is higher under SMD than PR because political parties are able to propose a policy platform with more freedom. However, in the long run, the congruence between citizen preferences and the government policy is closer under PR than SMD (Budge and McDonald 2007).

These preceding studies do not take into account the effects of electoral institutions on the voter side. By bringing the consideration of the influence of electoral systems on voter participation back, I find that PR has a higher chance to generate disproportionality into voter preference distribution. The argument is in line with Blais and Bodet (2006) and Golder and Stramski (2010). Although Powell (2009) concludes that the different conclusions are due to the data in a later time period, this study provides another explanation: the effects of PR in the congruence between the citizen preferences and the government policy are balanced by the biases it introduces in the voter turnout.

Table 3.3 Random-Intercept Regression Model of KLD in 68 Elections with 4 Types of Electoral Systems

<i>Variable</i>	<i>Mean</i>	<i>5%</i>	<i>10%</i>	<i>15%</i>	<i>20%</i>	<i>80%</i>	<i>85%</i>	<i>90%</i>	<i>95%</i>
<i>Frequency</i>	1.273	0.590	0.747	0.847	0.930	1.617	1.697	1.798	1.949
<i>Politic competition</i>	-0.005	-0.012	-0.011	-0.010	-0.009	-0.002	-0.001	-0.001	0.001
<i>Developing</i>	-0.282	-0.537	-0.479	-0.442	-0.412	-0.152	-0.123	-0.085	-0.028
<i>PR</i>	0.205	-0.060	0.001	0.040	0.072	0.339	0.370	0.409	0.466
<i>MMP</i>	-0.222	-0.598	-0.515	-0.459	-0.415	-0.031	0.014	0.073	0.161
<i>MMM</i>	0.068	-0.205	-0.143	-0.102	-0.069	0.208	0.240	0.281	0.344
<i>ENP</i>	-0.002	-0.067	-0.052	-0.042	-0.035	0.030	0.038	0.048	0.063
<i>District magnitude</i>	-0.001	-0.002	-0.002	-0.001	-0.001	0.001	0.001	0.001	0.002
<i>Compulsory</i>	-0.028	-0.106	-0.089	-0.077	-0.067	0.011	0.020	0.032	0.049
<i>Variance Part</i>									
$\sigma_{Intercept}$	0.174	0.027	0.051	0.070	0.090	0.251	0.268	0.288	0.321
$\sigma_{Residual}$	0.376	0.306	0.320	0.330	0.337	0.413	0.423	0.435	0.453
<i>Deviance</i>	58.109	39.12	43.189	46.00	48.25	67.82	69.55	71.65	74.80

4. The Micro-foundations of Disproportionality of PR on Representation

To understand the source of why the biases of voter turnout toward the distribution of citizen preference are higher under PR, we need to investigate the individual decision to vote more thoroughly. The mechanism of higher disproportionality in PR is that voters with a more extreme location in the preference distribution are more likely to go to the polls than their counterparts in SMD. While extreme voter preferences have a higher possibility to be expressed under PR than under SMD, the preference distribution of voter turnout is more likely to have more biases under PR as compared to the preference distribution of all citizens.

The operationalization of the relative location of voters in the preference distribution is the transformation of the cumulative distribution function. Since the preference distribution of the left-right is discrete from 0 to 10, there are many voters positioning themselves at the same point. The voters with the same location should be ranked the same in the indicator. Furthermore, for the purpose of comparison across countries, the different shapes and spreads of preference distributions need to be standardized. The first step is to transform each distribution into a cumulative distribution function ($F(x)$). Each voter then has her own relative location in the distribution within a country. The range of $F(x)$ is from 0 to 1 with extreme voters locating on the both ends close either to 0 or to 1. A second transformation is necessary to capture the voters' extremeness in the preference distribution. The variable is defined as:

$$(3-2) \quad X = \text{abs}[F(x) - 0.5]$$

The second transformation is to take the absolute value of subtracting 0.5 from the location in the cumulative distribution function. The X variable measures the extremeness of voters' location compared to other voters in the same country. We expect that X has positive impacts on citizens' decision to vote because when voters' location is further from the center of the distribution, they are more likely to have higher benefits in the calculus of voting. Yet the institutional effects work differently under PR and under SMD. As PR has more effective political parties and more extreme political parties, the extreme voters have more incentives to support their favorite agents under PR than under SMD. In other words, the effects of the X variable are hypothesized to be larger under PR.

Following the multilevel modeling method in Chapter Two, assume that the coefficients of the X variable vary across elections. Using the model specification in Chapter Two, I use all variables as control variables now. The model is written:

$$(3-3) \quad \text{Prob}(\text{Vote}_{ij}) = \text{logit}(\beta_0j + \beta_1 * \text{Female}_{ij} + \beta_2 * \text{Education}_{ij} + \beta_3 * \text{Income}_{ij} + \beta_4 * \text{Inpower}_{ij} \\ + \beta_5 * \text{Makediff}_{ij} + \beta_6 * \text{Partyid}_{ij} + \beta_7 * \text{Age26_35}_{ij} + \beta_8 * \text{Age36_45}_{ij} \\ + \beta_9 * \text{Age46}_{ij} + \beta_{10j} * F_{ij} + \beta_{11j} * H_{ij} + \beta_{12j} * X_{ij} + e_{ij}).$$

The intercept includes all control variables at the country level, which is:

$$(3-4) \quad \beta_0j = \gamma_{0(0)} + \gamma_{0(1)} * \text{Compulsory1}_j + \gamma_{0(2)} * \text{Compulsory2}_j + \gamma_{0(3)} * \text{Compulsory3}_j \\ + \gamma_{0(4)} * \text{Closeness}_j + \gamma_{0(5)} * \text{ENP}_j + \gamma_{0(6)} * (\text{District Magnitude})_j + \gamma_{0(7)} * \text{Frequency}_j$$

$$\begin{aligned}
& +\gamma_{0(8)} * \textit{Concurrent}_j + \gamma_{0(9)} * (\textit{LogDistrict Size})_j + \gamma_{0(10)} * (\textit{Political Competition})_j \\
& + \gamma_{0(11)} * \textit{GDP}_j + \gamma_{0(12)} * (\textit{L_GDPC_Developing})_j + \gamma_{0(13)} * (\textit{L_GDPC_Industrial})_j \\
& + \gamma_{0(14)} * \textit{PR}_j + \gamma_{0(15)} * \textit{MIX}_j + u_0.
\end{aligned}$$

For the random coefficient specification, I continue to assume that the F and H factors differ across elections. The same assumption applies to the X variable as well. In order to test for the institutional effects of PR versus non-PR, I put a dummy variable of PR as the group predictor for the effects of the X variable. The formulae are as follows:

$$(3-5) \quad \beta_{10j} = \gamma_{10(0)} + u_{10};$$

$$(3-6) \quad \beta_{11j} = \gamma_{11(0)} + u_{11};$$

$$(3-7) \quad \beta_{11j} = \gamma_{12(0)} + \gamma_{12(1)} * \textit{PR}_j + u_{11}.$$

I utilize the hierarchical modeling method to estimate the calculus of voting under electoral systems. Table 3.4 displays the maximum likelihood estimation results and Table 3.5 shows the results by Bayesian methods. Both tables tell a similar story about the effects of the extreme variable. The micro-foundations of the effects of electoral systems on political representation lie in the influence of X . The random coefficients of X , which is the relative location of a voter in the preference distribution, demonstrate the individual propensity to vote, controlling for relevant variables at both micro- and macro-levels. The average coefficient estimate of X is positive and also significant at the 95% confidence

level. This shows that no matter what electoral institutions voters are situated in, on average, they have a higher probability to decide to express their preferences by the act of voting as their issue positions are more extreme in the distribution. Moreover, the indicator variable of PR versus non-PR exhibits a positive coefficient which is statistically significant as well. The meaning of the greater influence of PR in X is that those extreme citizens are more likely to vote compared to those under SMD, despite of positive coefficients in both circumstances. Thus, the consequences of X demonstrate the micro-foundation mechanisms of PR.

5. Conclusion

The purpose of this paper is to explore the question of how electoral institutions affect the degree of political representation through the perspective of comparing the distribution of voter preferences versus that of all electorate. The effects of electoral systems on political representation are based upon voters' response to party competition under spatial theory. The main argument is that different types of electorate, according to their relative locations in the distribution of voter preferences, have various incentives to vote. The moderate type of electors with location in the middle range has lower benefit evaluations for voting across PR and SMD. However, the extreme type of electors with locations in smaller or larger quantile has dissimilar profit schemes under PR and SMD. The profit calculation for the extreme type is lower under SMD than PR because of indifference and alienation for political parties' policy position convergence toward the median voter. Thus, due to inconsistent benefit evaluations among different types of electorate, PR has a higher probability to induce disproportionality defined above.

Table 3.4 Multilevel Model of Calculus of Voting in 64 Elections (Part 1)

<i>Fixed Part</i>	<i>Coefficient</i>	<i>Robust SD</i>	<i>T-ratio</i>	<i>D.F.</i>	<i>P-value</i>
<i>Intercept of β_0, $\gamma_{0(0)}$</i>	-0.656	1.816	-0.362	48	0.719
<i>Compulsory1, $\gamma_{0(1)}$</i>	0.247	0.268	0.921	48	0.362
<i>Compulsory2, $\gamma_{0(2)}$</i>	0.263	0.217	1.207	48	0.234
<i>Compulsory3, $\gamma_{0(3)}$</i>	1.132	0.227	4.978	48	0.000
<i>Closeness, $\gamma_{0(4)}$</i>	-1.443	0.447	-3.227	48	0.003
<i>ENP, $\gamma_{0(5)}$</i>	-0.009	0.045	-0.205	48	0.838
<i>District magnitude, $\gamma_{0(6)}$</i>	0.002	0.001	1.552	48	0.127
<i>Frequency, $\gamma_{0(7)}$</i>	-1.880	0.396	-4.748	48	0.000
<i>Concurrent, $\gamma_{0(8)}$</i>	0.376	0.225	1.673	48	0.100
<i>Log District size, $\gamma_{0(9)}$</i>	0.045	0.034	1.313	48	0.196
<i>Political Competition, $\gamma_{0(10)}$</i>	-0.002	0.007	-0.300	48	0.765
<i>GDP, $\gamma_{0(11)}$</i>	-0.007	0.146	-0.052	48	0.959
<i>L_GDPC_D, $\gamma_{0(12)}$</i>	0.036	0.018	2.011	48	0.050
<i>L_GDPC_I, $\gamma_{0(13)}$</i>	-0.062	0.025	-2.422	48	0.019
<i>PR, $\gamma_{0(14)}$</i>	-0.081	0.182	-0.444	48	0.658
<i>MIX, $\gamma_{0(15)}$</i>	-0.257	0.251	-1.024	48	0.312
<i>Female, β_1</i>	0.024	0.022	0.708	66632	0.280
<i>Education, β_2</i>	0.090	0.009	9.268	66632	0.000
<i>Income, β_3</i>	0.082	0.009	8.588	66632	0.000
<i>Inpower, β_4</i>	0.098	0.010	9.526	66632	0.000
<i>Makediff, β_5</i>	0.167	0.015	10.689	66632	0.000
<i>Partyid, β_6</i>	0.657	0.036	18.200	66632	0.000
<i>Age26_35, β_7</i>	0.266	0.034	7.787	66632	0.000
<i>Age36_45, β_8</i>	0.590	0.043	13.495	66632	0.000
<i>Age46 and above, β_9</i>	0.922	0.052	17.560	66632	0.000
<i>F slope, β_{10}, Intercept, $\gamma_{10(0)}$</i>	0.007	0.001	6.714	63	0.000
<i>H slope, β_{11}, Intercept, $\gamma_{11(0)}$</i>	0.011	0.005	2.042	63	0.045
<i>X slope, β_{12}, Intercept $\gamma_{12(0)}$</i>	0.035	0.011	3.095	62	0.003
<i>PR, $\gamma_{12(1)}$</i>	0.059	0.017	3.437	62	0.001

Table 3.4 Multilevel Model of Calculus of Voting in 64 Elections (Part 2, cont'd)

<i>Random Part</i>	<i>Std. Dev.</i>	<i>Variance</i>	<i>D.F.</i>	χ^2	<i>P-value</i>
σ_e (scale factor)	1.81	3.29			
σ_{u0}	0.722	0.522	48	2708.7	0.000
σ_{u10}	0.006	0.00004	63	98.06	0.003
σ_{u11}	0.039	0.001	63	133.31	0.000
σ_{u12}	0.085	0.007	62	126.74	0.000

Table 3.5 Bayesian Hierarchical Model of Calculus of Voting in 64 Elections (Part 1)

Fixed Part	Posterior	Bayesian Confident Interval		
	mean	Low(2.5%)	Median(50%)	High(97.5%)
<i>Intercept of β_0, $\gamma_{0(0)}$</i>	<i>They are 64 random parameters and not reported here.</i>			
<i>Compulsory1, $\gamma_{0(1)}$</i>	1.398	-3.928	1.412	5.558
<i>Compulsory2, $\gamma_{0(2)}$</i>	0.406	-0.339	0.401	1.149
<i>Compulsory3, $\gamma_{0(3)}$</i>	0.678	-0.032	0.667	1.374
<i>Closeness, $\gamma_{0(4)}$</i>	1.478	0.767	1.478	2.184
<i>ENP, $\gamma_{0(5)}$</i>	-1.672	-3.350	-1.660	-0.034
<i>District magnitude, $\gamma_{0(6)}$</i>	-0.005	-0.178	-0.016	0.224
<i>Frequency, $\gamma_{0(7)}$</i>	0.003	-0.004	0.002	0.009
<i>Concurrent, $\gamma_{0(8)}$</i>	0.376	-0.015	0.375	0.551
<i>Log District size, $\gamma_{0(9)}$</i>	-0.006	-0.038	-0.005	0.024
<i>Political Competition, $\gamma_{0(10)}$</i>	-0.399	-1.156	-0.393	0.359
<i>GDP, $\gamma_{0(11)}$</i>	-0.132	-0.518	-0.146	0.364
<i>L_GDPC_D, $\gamma_{0(12)}$</i>	0.035	-0.038	0.035	0.107
<i>L_GDPC_I, $\gamma_{0(13)}$</i>	-0.073	-0.154	-0.072	0.007
<i>PR, $\gamma_{0(14)}$</i>	-1.524	-2.734	-1.514	-0.346
<i>MIX, $\gamma_{0(15)}$</i>	-0.158	-0.731	-0.164	0.404
<i>Female, β_1</i>	0.025	-0.022	0.025	0.073
<i>Education, β_2</i>	0.104	0.088	0.104	0.119
<i>Income, β_3</i>	0.094	0.075	0.094	0.115
<i>Inpower, β_4</i>	0.113	0.094	0.113	0.133
<i>Makediff, β_5</i>	0.191	0.171	0.192	0.210
<i>Partyid, β_6</i>	0.765	0.711	0.766	0.818
<i>Age26_35, β_7</i>	0.300	0.222	0.301	0.376
<i>Age36_45, β_8</i>	0.676	0.598	0.677	0.756
<i>Age46 and above, β_9</i>	1.063	0.987	1.063	1.138
<i>F slope, β_{10}, Intercept, $\gamma_{10(0)}$</i>	0.006	0.003	0.005	0.009
<i>H slope, β_{11}, Intercept, $\gamma_{11(0)}$</i>	0.002	-0.011	0.001	0.017
<i>X slope, β_{12}, Intercept $\gamma_{12(0)}$</i>	0.043	0.005	0.042	0.083
<i>PR, $\gamma_{12(1)}$</i>	0.062	0.013	0.061	0.110

Table 3.5 Bayesian Hierarchical Model of Calculus of Voting in 64 Elections (Part 2, cont'd)

<i>Random Part</i>	<i>Variance</i>			
σ_{u0}	0.746	0.604	0.739	0.935
σ_{u10}	0.073	0.034	0.073	0.111
σ_{u11}	0.004	0.001	0.004	0.009
σ_{u12}	0.035	0.021	0.035	0.051

This thesis is operationalized and tested by survey data from CSES in the macro level of 68 elections and across the multi-levels of 64 elections. Summary statistics and a random intercept regression model are utilized to examine the argument. Evidence is found that PR has higher chance to produce disproportionality than SMD. Furthermore, a multilevel model of the calculus of voting elucidates the micro-foundations of PR. The reason that PR causes a higher disproportionality through the decision to vote is because more extreme voters under PR have a higher voting propensity as compared to their counterparts under SMD.

The future research agenda will need to include more elections with more diversity. The 68 elections in this dataset are still close to a small N case, and their information will not be sufficient to implement a more complex model. Furthermore, related to the data issue, race, ethnicity, language, and religion variables are not available in all countries included in CSES studies. This difficulty makes comparison of these properties across voter turnout and all electorate impossible. If the data problem can be solved, a more thorough examination can be executed toward different dimensions of voter turnout preferences.

CHAPTER 4

A COMPARISON OF ISSUE VOTING ACROSS ELECTORAL SYSTEMS

Electoral competition means that political parties seek the citizens' support in a representative democracy, which is the process of selecting policy makers as an intermediate step linking voters' preferences to policy outcomes. Political parties connect voters to the government with two requirements: voter participation and elected officials' responsiveness (Powell 2005). Political agents are responsive to citizens' policy preferences, which are expressed through voter participation. To represent the people, political parties campaign with announced platforms to gain votes, which are subsequently transformed by the electoral system into seats. The intermediate steps linking citizens' preferences to policy outcomes are from the electoral campaign to government policy-making. The current research on political representation investigates the relationship between voters' preferences and the policy positions of political parties; research on the latter uses either announced platforms in elections (Adams 2001; Adams et al. 2005; Kedar 2005; Schofield and Sened 2006) or the compromise of party positions in the government decision-making process resulting policy outcomes (McDonald and Budge 2005; Powell 2006). The first approach emphasizes the importance of party positioning strategies for being elected while ignoring the policy-making process. On the other hand, the second approach correctly focuses on the government process but fails to pay attention to how political agents are chosen in elections in the first place. Although there is research that discusses the consistency between election pledges and subsequent government policy actions (Thomson 2001), these studies fail to take account of how voter choices in elections are affected by the government policy-making process.

The positioning strategy of political parties in elections is for the purpose of being elected. When voters decide which parties to select for, they have expectations of how the platforms of elected parties will be changed due to types of government (i.e., majority or coalition). The process of political representation is to delegate agents to express principals' preferences. This definition has two properties: authorization and the truthful transformation of the citizens' preferences. The first determines who has the mandate to voice for the people's desires and the second means that representatives should support policies that fit the people's need. From the voters' point of view, they would like the policy outcome as closer to their own issue positions as possible. Therefore, when the citizens cast their ballots for political parties, they take account of the change of their positioning strategy in elections after parties enter the government.

The party strategies in election campaigns and in the government policy-making process are heavily influenced by electoral institutions. District magnitude is an important variable that shapes electoral competition in different electoral systems. The defining feature of a single-member district system is that only one candidate can be elected, while that of a proportional representation system is that multiple posts are filled. Under the assumption of the single issue dimension in spatial theory, political parties and candidates have electoral incentives to converge toward the center under SMD and to diverge under PR (Cox 1990a). Furthermore, electoral systems are associated with contrasting government policy-making processes. The government in SMD is delegated to a single party, while the counterpart in PR is a coalition government comprising several political parties as the result of bargaining. The former electoral system is majoritarian, and the latter is called proportional (Huber and Powell 1994; Powell 2000). In other words, the

policy position of political parties to be fulfilled in the government is picked by the electorate at the election stage under SMD but the policy position of the government under PR is adjusted by the negotiations among elites without any control by the electorate. As a consequence, electoral institutions influence how political parties choose their positioning strategies in campaigns and the consideration of how the policy positions of all winning political parties will be executed in the government. Conditional on the policy positions of political parties structured by electoral institutions in elections and in the government, citizens make their choice of which political party to support. Thus, issue voting under various types of electoral systems includes the possible trajectory of the formation of postelection policy because the information related to how the policy is made is politicized.

Institutions matter. Spatial party competition describes how political parties pick their issue positions with vote-maximizing motivations under different institutional settings.³⁷ The most famous argument of spatial theory is the median voter theorem with political party convergence to the center of the distribution of voters' preferences (Downs 1957). When extended to multiple competitors, candidates deviate from the centrist location in equilibrium (Eaton and Lipsey 1975). These position-taking strategies are based on the plurality rule with one seat elected. Where multiple seats are at stake, political parties locate themselves across the issue space and top-vote getters' victory is not guaranteed (Greenberg and Shepsle 1987). The rule of how many seats are elected in one district can change the positioning strategy. Electoral laws define the rules of the game which

³⁷ The goal of vote-maximizing for political parties is common under two-agent competition. Adams et al. (2005) and Schofield and Sened (2006) adopt the assumption under multiple-agent competition. For the model of political parties with policy motivations, the results are similar (Adams and Merrill 2009).

influences political parties' positioning strategies.³⁸ In modern democracies, electoral systems specify basic rules such as the electoral formula, the district magnitude, the ballot structure, and the electoral threshold (Lijphart 1994; Taagepera 2007).

Electoral systems produce centripetal and centrifugal incentives to political parties' position-taking strategies (Cox 1990a). The former situation is linked with single-member district systems which are also called first-past-the-post and the latter happens under proportional representation systems. Under PR, a political party or candidate needs to obtain a quota of votes defined by the electoral formula for winning a seat. Spatial theory states that political parties spread across the issue dimensions with roughly equal vote shares (Greenberg and Weber 1985; Sugden 1984). Hence, depending on the number of agents entering the election race, convergence or dispersion campaign strategy will occur. Under the plurality rule with two agents competing, a convergent equilibrium exists. However, when the number of candidates is more than two under the plurality rule, there are multiple dispersion equilibriums. Moreover, with multiple candidates contending for seats under the plurality rule or under PR, party issue positions diverge (Cox 1990b).

The aforementioned spatial models assume that voters respond to party issue positions deterministically, meaning that voters cast their ballots for political parties whose policy positions are the closest to their own. Since this vision of deterministic voting may not fit the real world properly, a model of probabilistic voting is developed to present a voter's utility as the summation of parts derived from issue distance, individual social demographic properties, and error terms. Using the probabilistic voting model, the equilibrium of multi-candidate competition under the plurality rule is that all candidates

³⁸ See, e.g., Cox (1987).

converge to the mean of voter distribution (Lin et al. 1999). Recent research also shows that the model of probabilistic voting is an appropriate tool to investigate multiparty competition under different electoral systems (Adams et al. 2005; Schofield and Sened 2006). I take the assumption that citizens decide how to vote based on the utility they derive from each political party. This is one version of probabilistic voting, which is also called the random utility model.

This chapter aims to explain the patterns of the degree of policy dependence among political parties' issue positions across electoral systems. The policy dependence means whether the policy positions of political parties are correlated with each other during the policy-making process. The main argument is that the degree of policy dependence is higher under PR than SMD due to two reasons: the types of government and voter turnout rates. When political parties think about their campaign strategies and how to position themselves on the ideological spectrum, they need to take the postelection government structure and how to acquire voter support into account. First, SMD usually creates a single majority government while PR encourages a coalition government. The distinction comes from majoritarian and proportional visions of democracy (Powell 2000). This means that the policy outcomes of a majority government are determined by a political party without compromise among political parties represented in the parliament. Second, seeking to maximize voters, a political party selects an issue position where it can capture enough votes to win seats under the electoral system. The electoral threshold is higher under SMD while PR usually needs a quota to guarantee a seat. Political parties think about their electoral market defined as potential supporters. They may move to a more extreme position since extreme voters are more willing to vote and feel more threatened

from the political parties locating at the opposite end of the issue space (Kedar 2009). In other words, when political parties recognize the facts that turnout rates are higher under PR and that voters are willing to vote for more extreme political parties, they respond with placing themselves at a more extreme position. When a coalition government needs to be formed with majority, moderate political parties have to bargain with those minority parties. Therefore, the policy dependence is higher under PR than under SMD.

The vote choice under SMD and PR is affected by the policy dependence from various degrees. The citizens view vote choice as substitutable or independently under SMD, since the policy dependence is low from the fact that a single political party can execute their policy position without bargaining. Conversely, the citizens treat vote choice as correlated under PR because the policy dependence is high since the policy outcome results from the negotiation among several political parties to form a majority coalition. If the degree of policy dependence is measurable, it can be used as an independent variable in the voter's utility function. Under such a circumstance, the residual terms in the voter's utility toward each political party are stochastic. However, contemporary scholars of electoral competition do not conduct surveys to measure policy dependence. The current survey data of voter choice cannot control for the effects of policy dependence by using it as a random variable in the systematic component of the voter's utility function. Given the constraints of the current survey data, the effects of policy dependence must be relegated into the residuals. More specifically, the error terms of the voter's utility functions toward political parties are prone to be independent under SMD but correlated under PR after the relevant variables that influence voter decision-making are taken into account.

The subsequent sections of the paper go as follows. The second section discusses

how electoral systems influence political competition. To elucidate the effects of electoral systems on the issue positions of political parties in a campaign, I discuss how various types of government formation produce the final policy outcome. Next, I show how citizens decide their vote choice. The linkage between party positioning strategies and voter choice functions through the two perspectives of electoral institutions: the types of government and voter turnout rates. Following theoretical expectations, the hypotheses are based on the implications of statistical models, (i.e., multinomial logit and multinomial probit models). The index for comparison of the model fit between multinomial probit and multinomial logit of voter choice under SMD and PR is Bayes factor. Moreover, to investigate the difference in the substitution pattern of voter choice predicted by multinomial probit and multinomial logit, the Taiwan 2004 legislative election is used as a case study. The final section ends with concluding remarks and suggestions for future research

1. Theoretical Consequences of Electoral Systems on Party Competition

An electoral system produces convergent or non-convergent position-taking incentives for political parties. This argument is derived from the mechanical effects of electoral institutions regarding how votes are transformed into seats (Duverger 1954). Electoral systems tend to defractionalize the allocated seats in the parliament but the intensity of this process depends on the electoral formula (Rae 1967, chapter 4). The disproportionality between votes and seats is the product of electoral rules, with PR usually having a lower degree of disproportionality than SMD. The main features which characterize PR and SMD are the electoral formula and the district magnitude, which jointly produce the

electoral threshold. Thus PR can support more political parties and provide incentives for them to locate at the periphery of the policy space.

The proportionality between votes and seats is higher under PR than SMD (Taagepera and Shugart 1989; Taagepera 2007). The electoral formula decides the quota of votes required to award a seat in a district. The quota to secure a seat is Droop quota calculated as $100\% / (M+1) + 1$ where M is the district magnitude. The plurality rule associated with SMD is sometimes termed first-past-the-post. The district magnitude under SMD is 1 required Droop quota of 50% of votes + 1 to win a seat. As the district magnitude increases (which is the case under PR), the quota decreases. With different PR formulae like d'Hondt, Sainte-Languë, or Hare-LR, the threshold would be slightly different. This most stringent condition is the upper bound of the threshold. As the number of political parties or candidates competing in a district goes up, the quota will decrease. This most favorable condition is the lower bound of the threshold. Thus, the effective electoral threshold is between the former two criteria (Taagepera 2007) and the lower effective electoral threshold has a strong influence on multipartyism (Lijphart 1994, 83-86).

The argument that multipartyism is highly correlated with PR has been proven empirically. The effective number of political parties is measured either by the inverse of the sum of square of voter share percentages or by the same definition of seat shares. PR allows more parties to gain seats in the parliament conditional on the effects of social cleavages (Cox 1997; Ordeshook and Shvetsova 1994). Since the rise of the third-wave democracies in the 1990s, there is a new trend of combining PR and SMD formulae called mixed electoral systems (Massicotte and Blais 1999; Shugart and Wattenberg 2001). The institutional effects of mixed electoral systems have been shown to lie between PR and

SMD (Ferrara et al. 2005, chapter 8).

The electoral threshold is influenced directly by the district magnitude, which produces convergent or divergent electoral incentives (Cox 1990a). When the district magnitude is one, the electoral threshold becomes high. When the district magnitude is multi-member, the electoral threshold gets lower. As Colomer states, ‘the large prefer the small and the small prefer the large’ (Colomer 2004, 3). When the district magnitude is set at one, it reduces the viable number of political parties or candidates down to two (Cox 1997; Palfrey 1989). The large parties move to the center location of the policy space because of the high electoral threshold imposed by having only one seat at stake. In PR with a large district magnitude $M > 1$, the number of viable parties or candidates is restricted to $M + 1$ (Cox 1994; Cox and Shugart 1996). The small parties can acquire seats even when advocating a more extreme issue position, conditional on a larger district magnitude. These convergent and non-convergent electoral incentives across electoral systems are provided with evidence in early research (Cox 1997; Dow 2001). Therefore, electoral institutions are an important factor influencing how political parties choose their campaign strategies.

1.1 Party Positioning Incentives and Government Type

Political parties represent the voter policy preferences expressed in elections in the policy-making process. As just discussed, the selection of policy makers is determined by electoral systems, which produce convergent and divergent electoral incentives. However, the position-taking strategy for being elected does not work in isolation. Position-taking strategies in elections for being elected are related to how voters make their decisions and

the policy making process. The first component regards how voters choose a political party to support and the second is how the policy positions of parties are incorporated into final policy outcomes. Since citizens' voting considerations concerns the product of policy execution, how the types of governments influence party campaign strategies will be examined first using backward induction (Austen-Smith and Banks 1988; Shepsle 1991, chapter 8).

Following Powell (2000), the democratic political systems in the world can be mapped onto the dimension of majoritarian vs. proportional visions depending on the constitutional design and the electoral system.³⁹ The majoritarian vision means that a single political party dominates policy-making while all authorized political parties are allowed to influence the policy outcome under the proportional vision. The constitutional design regards the separation of power whether the president is elected by popular votes with a fixed term, not dependent on the parliament confidence vote, and whether the president is granted lawmaking authority (Shugart and Carey 1992). On the other hand, electoral systems induce either two-party or multiple-party seat getters in the parliament. Three typologies follow. First, a combination of parliamentarism and SMD is majoritarian because the ruling party has the authority to implement its policy position. The other example of the majoritarian vision is that the president and the congress are controlled by the same party under the mixture of presidentialism and SMD. Second, the composite of parliamentarism and PR is proportional in the sense that the coalition

³⁹ Lijphart (1999) adopt a similar method to classify democracies into the criterion of Westminster and consensus models. Nohlen (1984) also argue that the categorizations of the electoral systems such as SMD and PR should not be mutually exclusive and they are rather on a continuous scale like the degree of proportionality.

government often takes place with compromises among the issue positions of parties in it. Third, other situations that do not fit into the previous two categories are regarded as a mixed type located within two extremes. The combination of presidentialism and PR under the situation of a unified government is mixed because more political parties are represented in the congress and the coalition building is needed to support the president's policy. On the other hand, if two political parties hold the power in the executive and legislative branches, the issue position of the party in the executive branch is checked by the other holding the majority in the legislative branch. Thus, in the third type of mixed systems, the policy position of the presidency must accommodate that of the congress. The combination of PR and presidentialism with a unified government happens very seldom because it is difficult for a single political party to acquire the majority of seats in the congress.

Table 4.1 Types of Governments by Separation of Power and Electoral Systems

	Unified Power	Separated Power with a unified government	Separated Power with a divided government
SMD	Majoritarian	Majoritarian	Mixed
PR	Proportional	-	Mixed

The degree of centripetal electoral incentives hinges on the government formation process structured by electoral systems. The convergent electoral incentives are the strongest under the majoritarian vision of democracy associated with a majority government created by SMD. Conversely, the non-convergent electoral incentives produced by PR from the coalition government are the weakest. However, the divergent incentives produced by PR are modified by the combination of presidentialism and a

coalition government. The final policy outcome under such a political system is an accommodation between the convergent electoral incentives driving the president and the divergent ones permeating in the congress. Specifically, the ranking of centripetal force generated by electoral systems from the strongest to the weakest is from the majoritarian, mixed, and proportional visions of democracy.

The generalization of the aforementioned argument is based on the assumption of the policy space being unidimensional. The politics of the real world works within the multiple dimensions of many issues, and it is argued that at least two dimensions are needed to better display the issue positions of political parties across countries (Dow 2001). Although the two-dimension model has the advantage of showing more information regarding diversified party issue positions, evidence from the US Congress roll call and comparative issue voting analyses shows that the one-dimension model can capture most of variance of party issue positions (Jackman 2001; Schofield and Sened 2006). Thus, unidimensionality is a reasonable assumption.

1.2 How Citizens Decide to Vote

Citizens decide which party to support according to the proximity between their ideal points and the party issue positions framed by electoral institutions and the government formation process. The deterministic voting model with its emphasis on policy distance is insufficient to explain the vote choices made by all voters. The advantage of the probabilistic voting model is that its inclusion of a random term helps explicate individual voting behavior. Social demographic variables and partisanship should also be incorporated into the model for a more thorough understanding (Adams et al. 2005;

Schofield and Sened 2006).

The random utility model (henceforth RUM) specifies that an individual, labeled n , obtains a utility by facing a set of J alternatives and that an individual selects an alternative with the highest utility. These choice-specific utilities U_{nj} , $j = 1, \dots, J$, are unobservable variables and only the indicator of final choice can be observed by the researcher. The observed choice made by the decision maker is a manifestation of the underlying utilities. Accordingly the behavioral assumption is that one chooses alternative i if and only if $U_{ni} > U_{nj} \forall j = i$. Since only one final choice made by each individual is observed and each individual's utility functions of choices are latent, the utility of alternative j is divided into two components: representative utility V_{nj} and a stochastic term (Train 2003; Walker and Ben-Akiva 2002):

$$(4-1) \quad U_{nj} = V_{nj} + \varepsilon_{nj}.$$

This formulation of the utility function is consistent with the definition of a probabilistic voting model. The probability that the n^{th} individual selects the i^{th} alternative is the probability that the utility for the i^{th} alternative exceeds the utilities of all other alternatives in the choice set:

$$\begin{aligned} (4-2) \quad P_{ni} &= Pr(U_{ni} > U_{nj} \forall j = i) \\ &= Pr(V_{ni} + \varepsilon_{ni} > V_{nj} + \varepsilon_{nj} \forall j = i) \\ &= Pr(\varepsilon_{nj} - \varepsilon_{ni} < V_{ni} - V_{nj} \forall j = i). \end{aligned}$$

By this formulation, only the differences between utilities matter for which one to

choose and the scale of utilities is irrelevant (Train 2003, 23-33). Another feature is that the distribution of $\varepsilon_{nj} - \varepsilon_{ni}$ determines how P_{ni} is computed.

The first component of utilities toward political parties is assumed to be a function of a set of observable independent variables. The researcher observe the representative utility composed of the attributes related to alternatives $x_{nj} \forall j$ and those related to the decision maker s_n . In other words, $V_{nj} = V(x_{nj}, s_n) \forall j$ contains two parts: alternative-specific and individual-specific preferences. The alternative-specific preferences are related to how an individual evaluates the properties of each choice, i.e., assessments attached to each option derived from how an individual appraises them by how far the policy locations of candidates are from his own ideal point. The first element corresponds to issue voting which is how political position-taking strategies influence the voter's choice. The second individual-specific element is measured by social demographic variables and partisanship.

All factors that cannot be explained by the representative utility are included in the error term ε_{nj} . According to Train, 'The characteristics of ε_{nj} , such as its distribution, depend critically on the researcher's specification of V_{nj} . This distribution becomes relevant when evaluating the appropriateness of various specific discrete choice models' (Train 2003, 19). To state it another way, how the researcher can observe or specify representative utility determines what factors are relegated into the error term. If the researcher believes that the function of the representative utility is thorough and that no omitted variables are excluded, then the error terms across utilities are assumed to be

independent. Conditional on the specification of the representative utility, the distribution assumptions on ε_{nj} induce different behavioral patterns. Thus whether the assumption of independence among error terms holds relies on measurement. When some variables of theoretical importance cannot be collected, they cannot be captured in the representative utility, which causes correlated error terms.

The proximity voting model is simple and intuitive but has some limitations. The proximity model has been criticized by directional and discounting voting models (Grofman 1985; Lacy and Paolino 1998; Rabinowitz and Macdonald 1989). Although the effects of added complexity to the proximity model may not be substantial (Lewis and King 2000; Westholm 1997), I assume that the other types of issue voting not captured by the proximity voting model are not correlated with the systematic component. Thus these unmeasured properties of issue voting are relegated into the error term.

1.3 Linkage between Party Strategies and Voter Choice

Party position-taking strategies under electoral systems are influenced by voter choice from two perspectives: the type of government formed and the voter turnout rate. The first component reinforces the non-convergent electoral incentives through the bargaining process in the coalition government. The second component affects political competition as a result of citizens' voting decision since the degree of diversified issue positions is modified by which part of the voter distribution will actually cast the ballot. The argument is that higher voter turnout under PR also gives political parties electoral incentives to take a more extreme position. These two patterns will be discussed in order.

1.3.1 The Effects of Government Formation

The voting behavior of electorates in periodical elections in democracy determines which political party holds power and which one is to step down. Voters use elections as tools to express their preferences in future policy and their satisfaction with status quo policy. Citizens utilize elections as instruments to hold politicians accountable and to prevent the government from infringing on their own civil rights (Powell 2000). At the same time, how voting decisions are made is framed by electoral institutions. More specifically, the decision-making process of voting behavior is contingent on electoral institutions from two aspects: the choice set available to voters and the methods of how votes are translated into seats.

The first aspect concerns about entry problem, which is how many candidates compete in an election. The higher portion of votes in a district that are needed to be collected by candidates to ensure a seat, the fewer candidates that will enter the election. For example, in SMD, only the leading candidate with the most votes is awarded the seat. The number of serious candidates with substantial vote support usually converges to two because of mechanical and psychological effects (Duverger 1954; Myatt and Fisher 2002; Palfrey 1989). Moreover, in a single nontransferable vote system (henceforth SNTV), the district magnitude (M) is larger than 1 and electorates cast one vote for each candidate. Depending on the size of district magnitude which is the number of candidates elected out of the district, the number of candidates with positive vote shares tends to be close to the size of district magnitude plus one. When under PR, there are usually $M + 1$ viable candidates in an M -seat district (Cox 1997; Cox and Shugart 1996). Therefore, how many candidates are available in the choice set is constrained by the types of electoral

systems.

The second aspect is related to how voters' preferences are transformed into policy outcomes. There are different degrees of disproportionality across electoral systems. The disproportionality of SMD is higher than its counterpart of PR. Since one candidate is elected in SMD, the delegate represents opinions from those who vote for him. Voters in SMD know that the winning candidate will be the only one expressing their policy preference in the government. However, when more than one delegate is chosen in SNTV and PR, different segments of voters are voiced in the government. The final policy outcomes must be compromises among these representatives. For instance, in a one-dimension issue space of Downsian spatial theory, the median voter position is the policy outcome generated by SMD. While there are several agents standing for different weights of preferences over the whole issue space, the policy outcome is a negotiation process. The preference aggregation procedures are also influenced by the types of electoral systems and hence, the impacts of votes on policy results are not the same across electoral systems.⁴⁰

How do electoral institutions influence voter choice models? The classifications of electoral systems depend on two features. First, the number of alternatives in the choice set is dichotomized into two categories: two viable candidates and more than two. The former happens usually in SMD and the latter can appear sometimes in SMD and usually in SNTV and in PR. According to sizes of districts in electoral systems, these choice sets

⁴⁰ In SMD, voters usually use proximity voting to judge how closer a political party is. But in a multi-member system like SNTV and PR, voters may prefer to support more extreme political parties because the final policy outcome depends on compromise among political parties in the parliament. This is called compensational voting (Kedar 2005).

can be arranged from the fewest to the most as two alternatives in SMD, more than two in SMD, more than two in SNTV, and more than two in PR.

Second, conditional on the vote preference transformation process, voting utilities of alternatives depend on the linkage of voter preference and prevailing postelection policy. In SMD, electorates evaluate voting utilities of candidates by knowing that the candidate whom they support will implement their preferred policy. In other words, the voting utility of one candidate cannot be replaced by picking up the other candidate. However, this is not the case under SNTV and PR. The delegates all play roles in setting government policy and the voting benefits of candidates rest on the policy locations of other candidates too. The interdependency of candidates' policy positions in resulting policy outcomes in SNTV and PR indicates that electorates have to take not only their favorite candidate into consideration but also other candidates. Similarly, the degree of vote choice substitutability is the second dimension to categorize electoral systems. The degree of vote choice dependence in SMD is lower than that in SNTV and PR. Hence, there are four types of choices sets with two related to SMD and with the other two related to SNTV and PR. These choice sets are combined with a lower degree of choice dependence in SMD and a higher degree of choice dependence in SNTV and PR. In conclusion, this order also shows the degree of convergent incentives ranked from the strongest to the weakest in four scenarios.

1.3.2 The Effects of Voter Turnout

The convergent and non-convergent party strategies are influenced by varied turnout rates across electoral systems. The fact that PR is linked with higher voter turnout is

well-documented (Blais and Carty 1990; Jackman 1987; Jackman and Miller 1995; Powell 1986). The utility of a voter's decision to choose a political party is based on the cost-benefit calculation with benefits derived from party policy differentials. Political parties' goal of maximizing vote support is constrained by voter abstention. The configurations of party policy issues induced by electoral institutions are adjusted by voter abstention to be less convergent under SMD and to be more divergent under PR for small political parties.

Under SMD, the electoral force that political parties converge toward the median voter position is mitigated by voter abstention. If political parties all occupy the same position at the median voter, the voting benefits of the policy difference to voters will be zero. Voters will have no incentives to cast their ballots either due to alienation or due to indifference (Adams and Merrill 2003). The former reason is that voters think the political parties are too far from their own ideal points and the latter reason is because the policy outcome implemented by the two parties will be alike. Moreover, when two main political parties are too close to the median voter position and look too similar in their policy positions, they are vulnerable to the emergence of a third political party (Palfrey 1984).⁴¹ Therefore, the convergent electoral incentives of SMD are reduced but still significant.

Under PR, political parties have incentives to take extreme positions in elections when voters consider the larger voting benefits of supporting more extreme, small political parties. Voters located at the two extreme ends of the electoral space have motivations to vote because the policy outcome can be pulled toward their favored direction if small parties gain enough vote shares to exert influence in the coalition government. Voters have

⁴¹ See, e.g., Lacy and Burden (1999).

this sort of calculation because they would like the final policy outcome created by the coalition government to be as close as possible to their ideal positions (Kedar 2009). On the other hand, small parties also acknowledge this kind of voting intention and have electoral incentives to move to a more extreme position to extort the government (Schofield and Sened 2006). The reciprocal calculations between voters and smaller parties under PR generate more divergent electoral incentives. Furthermore, political parties have their loyal or activist supporters located more diversely along the electoral space under PR. Political parties usually move toward the mean or the median of these groups in order to attract more votes in elections (Adams et al. 2005).

In sum, convergent and divergent incentives by electoral institutions are affected by voter turnout by various degrees depending on the context. The general pattern of electoral institutions which move political parties stay similar, but with caution regarding how to stimulate more voters to go to the polls.

1.3.3 Hypotheses and Statistical Models

Party positions are perceived by voters differently. The average positions of all voters are argued to be a better estimate of where political parties locate themselves because in theory, political positions should be unique (Rabinowitz and Macdonald 1989). However, in fact, citizens have their own judgments of party positions due to voter heterogeneity. The approach of different party positions perceived by voters is not inferior (Blais et al. 2001; Westholm 1997). The measurement of party position is:

$$(4-3) \quad Z_{nj} = Z_j + \Delta_{nj},$$

where Z_j is the average party position for party j and Δ_{nj} is drawn from a random

distribution.

Policy dependence between political parties can be viewed as how voter choice is correlated with each other at the final policy stage. Conditional on the representative utility of voter choice, the degree of the correlation between alternatives tells how much citizens view the dependence between political parties' issue positions. Remember that the policy dependence between parties is induced by electoral institutions. The policy dependence is higher under PR than under SMD.

The controversy between applications of multinomial logit (henceforth MNL)⁴² or multinomial probit (henceforth MNP) persists. Some scholars advocate that MNP is a better model in explaining voting behavior than MNL because the former relaxes the independence from irrelevant alternatives (henceforth IIA) assumption which is implicitly adopted by the latter (Alvarez and Nagler 1998; Alvarez et al. 2000). Other scholars argue that MNL is a better model than MNP since the estimation results of MNL are not so different from those of MNP and MNL is easier to estimate and more efficient than MNP (Dow and Endersby 2004). In addition, some scholars also argue that the implementation of MNL or MNP depends crucially on the data available (Quinn et al. 1999). The essential factor that underlies voting behavior is the electoral institution. The electoral institution structures the choice set of how many candidates compete in an election and the calculation process of voting behavior.

According to the effects of electoral institutions on voter choice, what statistical methods should be used to analyze voting behavior in different scenarios? The focus of this

⁴² Depending on model specifications, multinomial logit includes another version called conditional logit. We do not discriminate between the two types of multinomial logit models.

paper is on multiparty competition which means that there should be at least three alternatives in the choice set. This excludes the first condition in the four classifications with only two candidates in the race. MNL with the IIA assumption should be used to analyze voting behavior with a lower degree of choice dependence in SMD. MNP without the IIA assumption is more appropriate in investigating voting patterns with some degree of choice interdependence under SNTV and PR. The IIA assumption imposes restrictions on the random term of voting utility and implies that the choice between MNL and MNP amounts to what the degree of policy dependence that researchers select to explain voting behavior. Explaining the patterns of voting behavior under various electoral circumstances relies on assumptions of statistical models imposed by researchers. The target of investigation is the underlying process generating observed data. The understanding of a primary mechanism behind voting behavior is necessary for selecting correct statistical methods since the latter should approximate the former as closely as possible but not the other way around. In other words, when an inappropriate statistical model is applied, some needless assumptions are added on the voting behavior of interest. Unwanted assumptions either distort the explanation researchers intend to uncover or conceal the real patterns of voting behavior. Choosing correct voting choice models derived from electoral institutions is thus essential in understanding of the perceived party positions by voters.⁴³

Hypothesis 1: MNP is more appropriate for voter choice under PR than MNL.

⁴³ See more discussion about how voters make decisions when facing the uncertainty of a large population in Myerson (1999), Myerson (2000), and Martinelli (2002).

The substitution patterns of voter choice between MNL and MNP differ. Remember that the utility function contains two components: the systemic components, V_{nj} , developed by the researcher with the observed variables and the error components defined as the difference between the utilities that the individual in fact acquires, U_{nj} , from different political parties. If the researcher could specify the best systemic utility, the error components left are essentially “white noise”. In multinomial logit, only individual-specific characteristics are utilized in the specification of systemic utility, but not alternative-specific variables. As a result, in multinomial logit, the IIA property is not avoidable. A feasible way to get rid of the IIA property is to improve the specification of the systemic component. However, when some variables are immeasurable, the IIA assumption becomes an unnecessary restriction on the statistical model. For example, the policy dependence between political parties is not measured directly by survey questions, but the perceptions exist in voters’ minds and the policy dependence is taken into account in party position-taking strategies. To evaluate tradeoffs between logit and probit models, the restrictions of substitution patterns under the IIA assumption should be explored.

Two ways to investigate the substitutions pattern of RUM are how a new choice entering a choice set changes the existing probability distribution among choices and how the increase of representative utility of a choice decreases the proportions of other choices. The first scenario is how a new candidate entering an election influences the support of preexisting candidates. For example, suppose that there are two political parties, L and R , occupying the left and the right position along a left-right issue dimension. Their vote shares are $P_L = 0.5$ and $P_R = 0.5$ with the ration $P_L/P_R = 1$ where P_L and P_R are

probabilities of voting for the left and right parties. Suppose another right political party R_2 emerges. We can expect that voters have no particular preferences over the two right parties: $P_R/P_{R_2} = 1$. The IIA assumption imposed by MNL says that $P_L/P_R = 1$ does not change even though there is a new right party. It follows that $P_L = P_R = P_{R_2} = 1$. However, we should expect that the two right political parties split the same political segment. It is more reasonable to reach a distribution of vote shares like $P_L = 0.5$ and $P_R = P_{R_2} = 0.25$.

Although this exercise can help investigate counterfactual scenarios about how the votes of one candidate can be distributed to other candidates, this situation does not usually happen in a real election because the number of candidates is exogenous to an election. The decision of whether to enter a campaign takes place before the beginning of an election. More importantly, it is required for citizens to register in order to qualify for being a candidate. The registration requirement implies that the number of alternatives in a choice set is fixed. The number of candidates can only decrease as the election goes on and it cannot increase in an opposition direction. But giving up in a campaign seldom happens. In other words, the number of alternatives can be viewed as unchanging. Hence, the first interpretation of substitution patterns cannot tell us how voters make their decisions when facing a fixed number of candidates.

The second way to interpret the IIA assumption is proportional substitution about altering the probability distribution when the probability of one choice varies. The elasticity of P_{ni} related to a derivative that influences the representative utility of alternative j (Train 2003, 51-64):

$$(4-4) \quad E_{iz_{nj}} = \frac{\partial P_{ni}}{\partial z_{nj}} \frac{z_{nj}}{P_{ni}} = - \frac{\partial V_{nj}}{\partial z_{nj}} z_{nj} P_{nj},$$

where z_{nj} is the characteristic of alternative j assessed by person n .

This cross-elasticity is the same for all i choices since there is no quantities related to i in $E_{iz_{nj}}$. This shows that the decreasing proportion is the same for all other i choices while there is an increase of representative utility j . Suppose that there are three political parties, labeled L , C , and R , positioning themselves along the left-right single dimension from left to right under the condition that the distance between positions of C and R is smaller than its counterpart of L and C . Their initial vote shares are $P_L = 0.4$, $P_C = 0.4$, and $P_R = 0.2$.⁴⁴ This implies that $P_L/P_R = 2$. If the vote share of the central party C increases to 0.46 by 10%, proportional substitution stipulates that $P_L = 0.36$ and $P_R = 0.18$. Since the ratio of P_L and P_R must not change by the IIA assumption, the decreasing percentage must also be the same as 10% and the decreasing percentage of P_L must be larger than that of P_R . However, this pattern of substitution imposed by the IIA assumption is possibly incorrect because we expect the increasing vote share of C comes more from R than L by spatial theory. Facing a fixed set of alternatives, the voting behavior is restricted by the IIA assumption even though electorates see that some candidates are more similar than others. This unrealistic IIA assumption of the error terms

⁴⁴ Myerson and Weber (1993) claim that the voter's choice depends not only on his own preference but also on the winning probability of each candidate obtained by pairwise comparison. The winning probability is induced by types of electoral institutions.

in voting utilities has serious consequences by using a misspecified model. Under the condition that error terms are interdependent imposed under MNL, MNP must be used to discover a correct substitution pattern while the policy dependence exists.

Hypothesis 2: The substitution pattern among political parties predicted by MNP is better than that by MNL because of the degree of policy dependence is higher under PR than under SMD.

2. The Effects of Electoral Institutions on Voter Choice

To investigate how electoral institutions affect voter choice, I use survey data from the Comparative Study of Electoral Systems (CSES) project. The project contains survey data across varied electoral systems which allow having a valid comparison across different types of electoral systems. Furthermore, the issue dimension common in the survey data is the left-right scale and it enables us to estimate and compare issue voting across countries.

2.1 The Voter's Utility Function

The voter's utility function is the expected utility that the voter will receive by voting for a particular political party. The utility function includes two components: the systematic term and the disturbance. The former represents those factors which are measurable by other questions included in the survey. The latter is the error term including all factors which can not be controlled for. Within a political system, a voter i 's utility

function to political party j is written as⁴⁵:

$$(4-5) \quad U_{ij} = \text{Intercept} + \beta_1 * \text{Issue}_{ij} + \beta_2 * \text{Female}_{ij} + \beta_3 * \text{Education}_{ij} + \beta_4 * \text{Income}_{ij} \\ + \beta_5 * \text{Age26_35}_{ij} + \beta_6 * \text{Age36_45}_{ij} + \beta_7 * \text{Age46}_{ij} + \beta_8 * \text{Partyid}_{ij} + \beta_9 * \text{Inpower}_{ij} \\ + \beta_{10} * \text{Makediff}_{ij} + e_{ij}.$$

The systematic component has eleven variables classified into 5 categories: valence, issue, socio-demographic, party identification, and political efficacy. The valence is the electorate's average judgment of the component or the integrity of a political leader (Stokes 1963, 1992). The valence is usually independent of the issue evaluation and it is appropriate to use an intercept to capture it (Schofield 2008). Second, the issue variable is the quadratic distance between a voter's ideal point and the policy platform of a political party. This independent variable is alternative-specific, meaning that its measure has information about a voter's distance to every political party. Third, a voter's socio-demographic characteristics determine how he or she derives the utility from each vote choice. This group of variables contains sex, age, education, and income. Forth, the core supporters of a political party can influence their party's positioning strategies. Political parties may move toward the policy location preferred by their party activists (Adams et al. 2005). Therefore, it is necessary to control for the effects of party identification. Fifth, the final group of variables concerns whether a voter thinks that his or her one vote impacts the electoral or policy results. The variable of interest is the issue

⁴⁵ I exclude those political parties receiving less than 5% of the vote share from the choice set because they have a smaller chance to influence the policy outcome even if they win seats.

variable. The sign of the coefficient is hypothesized to be negative because a voter is less likely to choose a political party whose policy position is further from the voter's ideal point.

2.2 Case Selection Criterion

To insure a valid comparison between MNP and MNL, some elections are excluded because of the constraints of the choice set or because of the political reality in a polity. First, the choice set must have more than two options, and at least three for multinomial model estimation, which excludes the Russia 2004, Taiwan 2004 and the USA 2004 presidential elections. Second, in a political system with too many candidates running as independents or fluid party systems, the issue position estimates of political parties are not stable. This standard excludes the Lithuania 1997 presidential and the Ukraine 1998 parliamentary elections.

2.3 Bayes Factor Calculations

The Bayes factor of two models, M_1 versus M_2 , is defined as ratio of the marginal likelihoods $f(y|M_1)$ and $f(y|M_2)$ where y is the observed data. The marginal likelihood $f(y|M)$ for $M \in \{M_1, M_2\}$ is calculated by integrating out the model parameters as (Gill 2008):

$$(4-5) \quad f(y | M) = \int f(y | \theta_M, M) f(\theta_M | M) d\theta_M .$$

I approximate the marginal likelihood of the posterior distributions of the MNP

and MNL models by Newton and Raftery's (1994) harmonic mean method. To avoid the instability of the harmonic mean estimator, I further adopt the iterative algorithm to reach a more accurate estimation of the marginal likelihood (Congdon 2006; Kass and Raftery 1995). The posterior distribution of MNP is a truncated multivariate normal distribution. To evaluate the marginal likelihood, I follow Rossi, Allenby, and McCulloch's (2005) GHK simulator⁴⁶ to estimate the marginal likelihood of MNP.

2.4 Results

Table 4.2 displays the Bayes factor of MNP over MNL across 59 elections. This is the step to verify whether the patterns of voter choice vary across electoral systems. For each country, two statistical models of voter choice are estimated by Bayesian methods. The advantages of Bayesian methods are two-folds: First, the posterior distribution of parameters of interest can show more information about the estimated coefficients. We can make more valid inferences, not like traditional methods relying on hypothesis testing; second, since we have posterior distributions of all parameters, we are able to calculate marginal likelihood more precisely.

There are two points worth making in details. First, the coefficients of issue voting shown in Table 4.2 are almost significant in 95% of Bayesian confident interval. Except the Chile 2005 and South Korea 2000 elections, the effects of issue voting are essential in determining the voter choice in other 57 elections. At the same time, the importance of issue voting holds across various electoral institutions. Therefore, issue voting does

⁴⁶ The GHK simulator is developed by John Geweke, Vassilis Hajivassiliou, and Michael Keane.

influence the voter choice. Second, the magnitudes in Bayes factor of MNP over MNL within three types of electoral systems shows a pattern from positive to negative as the institutions change from PR to SMD. The average of Bayes factor in PR is 7.591, that of mixed systems is -2.000, and that of SMD is -6.5. This shows that the MNP model is more suitable for voter choice under PR while the MNL model is for SMD. Hence, this provides some evidence to substantiate the hypothesis 1.

Table 4.2 The Comparison of Vote Choice Models across 59 Electoral Systems by Bayes Factor (Part 1)

Country	Year	Type	# Model	Mean	2.5%	97.5%	Log Mag Likelihood	Bayes Factor Average
Belgium	1999	PR	6 MNL	-0.0673	-0.0760	-0.0590	-1720.8010	
			6 MNP	-0.0130	-0.0167	-0.0105	-1718.6240	2.1770
Bulgaria	2001	PR	5 MNL	-0.0840	-0.0950	-0.0750	-587.9487	
			5 MNP	-0.0190	-0.0260	-0.0140	-584.4877	3.4610
Czech Rep	1996	PR	6 MNL	-0.1227	-0.1404	-0.1060	-746.1125	
			6 MNP	-0.0146	-0.0177	-0.0121	-744.1069	2.0056
Czech Rep	2002	PR	4 MNL	-0.1707	-0.2020	-0.1440	-318.2120	
			4 MNP	-0.0280	-0.0420	-0.0200	-316.0631	2.1489
Denmark	1998	PR	5 MNL	-0.2076	-0.2300	-0.1870	-1084.0110	
			5 MNP	-0.0543	-0.0647	-0.0440	-1079.6750	4.3360
Denmark	2001	PR	5 MNL	-0.1520	-0.1687	-0.1368	-1285.4540	
			5 MNP	-0.0620	-0.0773	-0.0482	-1283.5540	1.9000
Germany	1998	PR	5 MNL	-0.0796	-0.0913	-0.0690	-1268.6200	
			5 MNP	-0.0150	-0.0210	-0.0120	-1261.7840	6.8360
Germany	2002	PR	5 MNL	-0.0662	-0.0759	-0.0570	-1512.9170	
			5 MNP	-0.0189	-0.0235	-0.0150	-1509.6470	3.2700
Iceland	1999	PR	4 MNL	-0.1220	-0.1380	-0.1067	-684.8749	
			4 MNP	-0.0430	-0.0580	-0.0330	-684.0060	0.8689
Iceland	2003	PR	5 MNL	-0.1520	-0.1753	-0.1308	-697.5130	
			5 MNP	-0.0398	-0.0487	-0.0320	-695.2284	2.2846
Israel	1996	PR	5 MNL	-0.0780	-0.0960	-0.0604	-347.0964	
			5 MNP	-0.0329	-0.0710	-0.0170	-338.6494	8.4470
Israel	2003	PR	6 MNL	-0.1000	-0.1180	-0.0818	-382.6424	
			6 MNP	-0.0202	-0.0270	-0.0130	-373.3548	9.2876
Finland	2003	PR	6 MNL	-0.1220	-0.1410	-0.1040	-887.1411	
			6 MNP	-0.0250	-0.0322	-0.0190	-883.7840	3.3571
Ireland	2002	PR	4 MNL	-0.0660	-0.0800	-0.0530	-780.9008	
			4 MNP	-0.0192	-0.0299	-0.0130	-779.9333	0.9675
Italy	2006	PR	4 MNL	-0.0580	-0.0894	-0.0330	-189.6867	
			4 MNP	-0.0048	-0.0083	-0.0016	-189.5646	0.1221
Netherlands	1998	PR	5 MNL	-0.1878	-0.2090	-0.1670	-1335.4800	
			5 MNP	-0.0330	-0.0520	-0.0220	-1334.3900	1.0900
New Zealand	1996	PR	5 MNL	-0.1260	-0.1370	-0.1152	-2045.4371	
			5 MNP	-0.0355	-0.0411	-0.0298	-2044.6580	0.7791
New Zealand	2002	PR	5 MNL	-0.1060	-0.1225	-0.0880	-479.5482	
			5 MNP	-0.0193	-0.0247	-0.0124	-478.2426	1.3056
Norway	1997	PR	6 MNL	-0.1358	-0.1490	-0.1221	-1722.6670	
			6 MNP	-0.0265	-0.0308	-0.0223	-1720.3360	2.3310

Table 4.2 The Comparison of Vote Choice Models across 59 Electoral Systems by Bayes Factor (Part 2, cont'd)

Country	Year	Type	# Model	Mean	2.5%	97.5%	Log Mag Likelihood	Bayes Factor	Average
Norway	2001	PR	6 MNL	-0.1364	-0.1510	-0.1230	-1663.5621		
			6 MNP	-0.0478	-0.0580	-0.0396	-1662.4490	1.1131	
Poland	1997	PR	4 MNL	-0.0750	-0.0880	-0.0630	-553.3134		
			4 MNP	-0.0191	-0.0240	-0.0140	-551.3992	1.9142	
Poland	2001	PR	6 MNL	-0.0670	-0.0792	-0.0550	-535.6088		
			6 MNP	-0.0211	-0.0288	-0.0153	-533.1723	2.4365	
Portugal	2002	PR	4 MNL	-0.1280	-0.1500	-0.1100	-382.2072		
			4 MNP	-0.0445	-0.0570	-0.0340	-378.6974	3.5098	
Portugal	2005	PR	5 MNL	-0.0611	-0.0692	-0.0530	-1256.9630		
			5 MNP	-0.0108	-0.0134	-0.0087	-1255.1183	1.8447	
Sweden	1998	PR	5 MNL	-0.1310	-0.1490	-0.1130	-636.6120		
			5 MNP	-0.0291	-0.0408	-0.0221	-635.4533	1.1587	
Sweden	2002	PR	6 MNL	-0.1731	-0.1980	-0.1500	-814.5072		
			6 MNP	-0.0221	-0.0290	-0.0163	-810.6247	3.8825	
Slovenia	1996	PR	6 MNL	-0.0510	-0.0628	-0.0390	-552.9481		
			6 MNP	-0.0226	-0.0337	-0.0150	-548.8174	4.1307	
Slovenia	2004	PR	6 MNL	-0.0550	-0.0640	-0.0380	-241.3974		
			6 MNP	-0.0129	-0.0230	-0.0045	-224.7552	16.6421	
Spain	1996	PR	4 MNL	-0.0470	-0.0590	-0.0360	-441.5405		
			4 MNP	-0.0218	-0.0330	-0.0140	-433.3279	8.2126	
Spain	2000	PR	4 MNL	-0.1459	-0.1770	-0.1200	-327.6002		
			4 MNP	-0.0225	-0.0360	-0.0160	-323.9329	3.6673	
Spain	2004	PR	3 MNL	-0.1400	-0.1700	-0.1160	-234.6854		
			3 MNP	-0.0236	-0.0278	-0.0190	-233.6746	1.0108	
Switzerland	1999	PR	4 MNL	-0.1206	-0.1375	-0.1050	-783.3624		
			4 MNP	-0.0437	-0.0515	-0.0320	-782.5713	0.7911	
Switzerland	2003	PR	5 MNL	-0.1110	-0.1270	-0.0953	-718.6000		
			5 MNP	-0.0398	-0.0550	-0.0256	-716.3860	2.2140	3.4876
Albania	2005	Mixed	5 MNL	-0.0409	-0.0484	-0.0350	-369.8226		
			5 MNP	-0.0173	-0.0240	-0.0130	-393.6514	-23.8288	
Brazil	2002	Mixed	3 MNL	-0.0125	-0.0160	-0.0090	-825.9670		
			3 MNP	-0.0040	-0.0053	-0.0027	-824.1888	1.7782	
Chile	2005	Mixed	4 MNL	-0.0048	-0.0100	0.0009	-854.1580		
			4 MNP	-0.0023	-0.0060	0.0024	-855.8812	-1.7232	
Hungary	1998	Mixed	5 MNL	-0.1020	-0.1190	-0.0850	-618.4877		
			5 MNP	-0.0240	-0.0290	-0.0188	-616.5464	1.9413	
Hungary	2002	Mixed	4 MNL	-0.0622	-0.0840	-0.0430	-200.9694		
			4 MNP	-0.0180	-0.0300	-0.0085	-195.4531	5.5163	
Mexico	1997	Mixed	6 MNL	-0.0230	-0.0261	-0.0207	-730.5618		
			6 MNP	-0.0120	-0.0160	-0.0081	-753.9203	-23.3585	

Table 4.2 The Comparison of Vote Choice Models across 59 Electoral Systems by Bayes Factor (Part 3, cont'd)

Country	Year	Type	# Model	Mean	2.5%	97.5%	Log Mag Likelihood	Bayes Factor	Average
Mexico	2000	Mixed	3 MNL	-0.0258	-0.0310	-0.0209	-596.4166		
			3 MNP	-0.0091	-0.0127	-0.0057	-595.4128	1.0038	
Mexico	2003	Mixed	4 MNL	-0.0240	-0.0290	-0.0190	-529.7419		
			4 MNP	-0.0076	-0.0108	-0.0048	-534.2830	-4.5411	
Peru	2000	Mixed	5 MNL	-0.0310	-0.0390	-0.0240	-604.1493		
			5 MNP	-0.0130	-0.0240	-0.0068	-601.5447	2.6046	
Peru	2001	Mixed	4 MNL	-0.0377	-0.0446	-0.0310	-910.9695		
			4 MNP	-0.0133	-0.0163	-0.0100	-916.9777	-6.0081	
Peru	2006	Mixed	6 MNL	-0.0195	-0.0240	-0.0150	-1124.3140		
			6 MNP	-0.0048	-0.0063	-0.0034	-1132.1340	-7.8200	
Philippines	2004	Mixed	5 MNL	-0.0095	-0.0160	-0.0025	-645.6324		
			5 MNP	-0.0033	-0.0061	-0.0012	-641.8285	3.8039	
Romania	1996	Mixed	4 MNL	-0.0208	-0.0300	-0.0120	-341.1735		
			4 MNP	-0.0098	-0.0150	-0.0044	-340.6212	0.5523	
Romania	2004	Mixed	5 MNL	-0.0371	-0.0470	-0.0280	-432.6715		
			5 MNP	-0.0235	-0.0357	-0.0150	-426.9113	5.7602	
Russia	1999	Mixed	6 MNL	-0.0551	-0.0650	-0.0460	-702.4708		
			6 MNP	-0.0168	-0.0234	-0.0113	-700.2422	2.2287	
S. Korea	2000	Mixed	4 MNL	-0.0120	-0.0210	-0.0076	-325.4625		
			4 MNP	-0.0013	-0.0044	0.0007	-327.1485	-1.6860	
S. Korea	2004	Mixed	4 MNL	-0.0240	-0.0290	-0.0190	-526.2679		
			4 MNP	-0.0076	-0.0108	-0.0048	-529.7419	-3.4740	
Taiwan	2001	Mixed	5 MNL	-0.0600	-0.0717	-0.0410	-529.0898		
			5 MNP	-0.0251	-0.0350	-0.0130	-514.3441	14.7457	-2.2308
Australia	1996	SMD	5 MNL	-0.0960	-0.1100	-0.0820	-963.2401		
			5 MNP	-0.0314	-0.0380	-0.0260	-964.7504	-1.5103	
Australia	2004	SMD	4 MNL	-0.1250	-0.1430	-0.1072	-998.6099		
			4 MNP	-0.0914	-0.1350	-0.0580	-996.3808	2.2291	
Canada	1997	SMD	5 MNL	-0.1070	-0.1224	-0.0920	-902.8433		
			5 MNP	-0.0344	-0.0464	-0.0233	-910.8321	-7.9888	
Canada	2004	SMD	4 MNL	-0.1238	-0.1404	-0.1100	-811.5547		
			4 MNP	-0.0570	-0.0704	-0.0460	-837.1024	-25.5477	
France	2002	SMD	6 MNL	-0.0588	-0.0720	-0.0460	-457.7811		
			6 MNP	-0.0153	-0.0240	-0.0110	-463.1364	-5.3553	
UK	1997	SMD	3 MNL	-0.0960	-0.1080	-0.0846	-1039.2630		
			3 MNP	-0.0230	-0.0313	-0.0165	-1048.4950	-9.2320	
UK	2005	SMD	3 MNL	-0.1305	-0.1630	-0.1030	-271.5710		
			3 MNP	-0.0280	-0.0550	-0.0150	-272.7975	-1.2265	
Taiwan	1996	SMD	3 MNL	-0.0430	-0.0651	-0.0227	-239.3537		
			3 MNP	-0.0193	-0.0280	-0.0122	-236.4446	2.9091	-6.9474

3. Case Study: the 2004 Taiwanese Legislative Election

3.1 Background

In 2000, Taiwan experienced the control of a new political party for the first time. The Kuomintang (KMT) that was in government from 1949 stepped down and Chen Shui-bian from the Democratic Progressive Party (DPP) was elected as president of Taiwan. After the 2000 presidential election, KMT split into three parts. In addition to the old one, the two new parties are the People First Party (PFP) and the Taiwan Solidarity Union (TSU).⁴⁷ This means that Taiwan has a multi-party system. One important factor attributed to this is the electoral institution of the legislature, which is a SNTV.

The plurality rule system promotes a two-party system and the PR system does not prevent a multi-party system from emerging. The plurality rule system has a higher elected threshold than does the PR system and there is only one candidate elected from one district under SMD. The parties or candidates must form a coalition to compete the position. Under this mechanism, in the long run, the party system is prone to a two-party system unless there are serious social cleavages. Under the PR system, there is no such mechanism. So the PR system does not have any incentives to make such a coalition because the party or candidate does not need to be the first pass the post. The SNTV system is similar to the PR system if the party nominates its candidates in each district efficiently based on the expected vote shares the party will receive. The multiparty system that forms under the SNTV system is an equilibrium outcome.

⁴⁷ The other political party in 2000 was the New Party (NP), but it did not amass a large vote after the 2001 legislative election. There are other independent candidates too. The former is excluded because of its small vote share and the latter are not included because of a data restriction in the lack of issue positions.

The policy positions of political parties will not converge to the median voter position under the SNTV system because they only need to get the support of enough specific electorates in order to win. The threshold to win a seat is not fixed in each district. There are two parameters that influence the threshold to win a seat in a district. The first parameter is the size of a district which is how many seats will be elected in this district. We use M to represent the size of a district. When M increases, the threshold to win a seat will decrease. The second parameter is the number of candidates in a district. The vote share distribution of each candidate in a district will have higher variance when there are more candidates entering the election. If there are more candidates entering the SNTV system in a district, the threshold to win a seat will be lower. Because of this mechanism under the SNTV system, we can expect that there will be different kinds of parties or candidates who represent different parts of the electorate. The policy positions of parties will spread over the entire issue space. The parties or candidates who can occupy the positions that can get enough support to win a seat in a district will survive. The distributions of electorate ideal points in different issue dimensions will be the basic issue space. Then different parties or candidates will emerge to represent different voices in various issue positions. In equilibrium, only the $M + 1$ vote getters within the district are viable under the SNTV system. The implication of this kind of equilibria means that the proximity between the candidate's position and the voter's ideal point decides voter behavior. The voter will choose the candidate or party whose position is closest to his own.

According to the Taiwanese constitution, the highest chief executive is not president. The appointment of the chief executive is nominated by the president, who does not need the consent of legislature; the president can nominate any politician who can conduct his

policy. The Taiwanese electoral system is close to a mixed regime. After the DPP was in government from 2000, they formed a minority government because the DPP did not have a majority in the legislature. Moreover, the major parties in Taiwan are divided into two pan-green and pan-blue coalitions to fight each other in the legislature. Consequently, the central government did not operate efficiently since 2000. Therefore, voters know that the official government policy must be generated through a negotiation process in the Legislative Yuan.

3.2 Model Specification

There was a legislative election in 2004. The data source is the Taiwan's Election and Democratization Study (TEDS2004LB), which conducted postelection face-to-face interviews. The total sample size is 600 after excluding any missing case values. In the 600 sample size, 34% of voters reported casting a ballot for the KMT, 45.33% for the DPP, 15.85% for the PFP, and 4.83 % for the TSU. The utility function of individual n toward a political party j is as following:

$$(4-6) \quad U_{nj} = TD_{nj} + Like_{nj} + Sex_n + Age_n + Educ_n + TW_n + Chenscore_n + \varepsilon_{nj},$$

where TD_{nj} is the total issue distance from a political party j , $Like_{nj}$ is the affection toward a political party j , TW_n is Taiwanese identity, and $Chenscore_n$ is satisfaction with Chen Shui-Bian's government.

In the top of Table 4.3, the survey respondents perceive two groups of political parties that the KMT and the PFP are more similar while the DPP and the TSU are closer in the three issue dimensions of independence versus union with the Chinese mainland,

environmental protection versus economic growth, and reform versus stability. In the dimension of non-welfare state versus welfare state, the DPP supports a welfare state more than the other three parties. Hence, the DPP and the TSU belong to the pan-green camp and the KMT and the PFP can be classified into the pan-blue camp according to their positions in the four-dimension issue space.

Table 4.3 Summary Statistics of Alternative-Specific Variables

Issues	TSU	DPP	KMT	PFP
Independence v.s. union	1.61(1.99)	2.18(1.96)	7.43(1.92)	7.50(1.95)
Environment v.s. economy	5.29(2.51)	5.58(2.55)	7.09(1.98)	6.48(2.12)
Non-welfare v.s. welfare state	5.29(2.65)	6.05(2.66)	5.63(2.68)	5.52(2.52)
Reform v.s. stability	3.63(2.55)	3.79(2.67)	7.01(2.54)	6.31(2.45)
Total Euclidean distance between voters and parties	2.22(0.73)	2.10(0.71)	1.93(0.77)	1.93(0.74)
Party affection	3.77(2.63)	5.20(2.62)	5.04(2.48)	4.19(2.49)

Source: TEDS2004LB.

Standard errors are in parentheses.

In order to capture the issue distance between voters and political parties in the four-dimension issue space, the total issue distance is included as an alternative-specific variable in the utility function. The total issue distance is computed by the square root of the square distance between voters' ideal points and the positions of political parties. According to Downsian spatial theory, a voter will acquire lower benefits when a political party is farther from his ideal point. Therefore, the sign of coefficient estimate of total issue distance expects to be negative.

The other alternative-specific variable is party affection. It is choice-specific because this question was asked four times toward each political parties measured by a 0 to 10 scale. This variable indicates voters' political orientation about party identification. Since

party affection measures the same concept as “which political party do you identify with?”, the question battery about party identification is excluded in the utility function to avoid the collinearity problem. When two variables catch almost the same variance in the sample, the variance will be inflated to make estimates of standard errors less efficient. This problem can be solved either by collecting more samples or by demeaning related variables. Under the condition that the limited sample size contains restrict information and the second method of centering variables is not feasible, the traditional dummy measure of party identification does not enter the model.

To assess other dimensions of political orientation, Taiwanese identity is used to capture the heterogeneity of ideology among voters. Although there are many factors influencing the ideology, whether a voter identifies himself as a Taiwanese would be the most important in the case. No matter what a voter’s ethnicity is, he would think that pan-green parties are closer to his own ideology once he considers himself as more Taiwanese than Chinese. The attitude about whether Taiwan should go for independence or union with Mainland China should be also important too. But this factor is already contained in the issue dimension related to “independence versus union.” Therefore, only Taiwanese identity is utilized in the systematic component of the utility function.

To explore whether the IIA assumption holds in voting for four political parties in the 2004 Taiwanese legislative election, the multinomial logit model with alternative-specific variables treated separately in all party contrasts is performed.⁴⁸ Then the null hypotheses that any two political parties can be combined are all rejected at the 0.05 significant level. As one kind of the test of the IIA assumption, the six p values of

⁴⁸ The result is not shown here.

likelihood ratio tests of combining the DPP and the PFP, the DPP and the TSU, the DPP and the KMT, the PFP and the TSU, the PFP and the KMT, and the TSU and the KMT range from 0.000 to 0.049.⁴⁹ This means that some preliminary evidence is found to prove the violation of the IIA assumption. In other words, under the usual circumstance of a SNTV election, the chance that the IIA assumption holds is low. This gives us the first reason to choose MNP over MNL.

3.3 MNL and MNP Models by Bayesian Methods

Bayesian methods are applied to estimate MNL and MNP models explaining vote choice in the Taiwanese 2004 legislative election. One of the advantages of Bayesian methods is that the distribution of coefficient estimators can be acquired. This avoids some traditional problems in explaining the significant level of the null hypothesis.

The MNL and MNP models computed by Bayesian methods are presented in Table 4.4 and Table 4.5. A Monte Carlo Markov Chain simulation is used to estimate Bayesian models. The chain of each simulation has time-series properties and the convergence of model is a very important criterion to judge whether the parameter estimates are correct or not. The criterion of Gelman and Rubin's is lower than 1.1. We can see that the diagnostic of the two models does not have any serious problems. As for the substantive interpretation, parallel arguments can be made according to Table 4.4 and Table 4.5.

First, the coefficient interval of total issue distance is statistically significant negative. This means that when a voter's issue is further from the locations of all political parties, on average, it is less likely that the former will vote for the later. More specifically, if a voter's

⁴⁹ All statistics are computed in Stata 9.

total issue distance is further to the DPP than to the KMT, or closer to the PFP than to the KMT, or more distant to the TSU than to the KMT, s/he has a higher expected probability to vote for the KMT, but not for the other three parties.

Second, voters have a higher expected probability to cast their ballot for their favorite political party. In other words, if a voter likes the DPP more than the KMT, s/he tends to support the DPP probabilistically. Third, Taiwanese identity influences how voters choose between the DPP and the KMT, instead of making decisions between the PFP and the KMT, or the TSU and the KMT. Fourth, satisfaction with Chen Shu-Bian's government impacts how electorate selects which party to vote for among the three pairs. If a voter is more satisfied with the government, s/he is more likely to elect the DPP over the KMT or the TSU over the KMT. In contrast, when a voter is less satisfied with the government, s/he has a higher probability to vote for the PFP over the KMT.

The MNP model can be estimated by the method of simulated likelihood with random sequences in order to overcome the multiple-dimension integration problem. The estimated results are shown in Table 4.5. Notice that the variance-covariance matrix is estimated in the bottom of Table 4.5. This is a four-choice situation. Since only utility differences matter on which choice will be chosen, one choice must be set as the base category, which is the KMT in our example. We have such a variance-covariance matrix:

$$(4-7) \quad \Sigma = \begin{pmatrix} \sigma_{22} + \sigma_{11} - 2\sigma_{12} & \sigma_{23} + \sigma_{11} - \sigma_{12} - \sigma_{13} & \sigma_{24} + \sigma_{11} - \sigma_{12} - \sigma_{14} \\ . & \sigma_{33} + \sigma_{11} - 2\sigma_{13} & \sigma_{34} + \sigma_{11} - \sigma_{13} - \sigma_{14} \\ . & . & \sigma_{44} + \sigma_{11} - 2\sigma_{14} \end{pmatrix}.$$

Table 4.4 Bayesian Multinomial Logit Estimates, 2004 Taiwanese Legislative Election

Parameters	Party Contrast	Posterior	95% BCI		Rhat
		Mean	Lower	Upper	
Total issue distance		-0.708	-1.130	-0.279	1.01
Party affection		0.564	0.460	0.674	1.01
Constant	DPP/KMT	-3.588	-5.839	-1.647	1.02
	PFP/KMT	-0.774	-2.294	0.671	1.02
	TSU/KMT	-6.625	-9.983	-3.505	1.00
Female	DPP/KMT	0.390	-0.202	0.969	1.03
	PFP/KMT	0.467	-0.031	0.995	1.00
	TSU/KMT	0.438	-0.536	1.347	1.10
Education	DPP/KMT	0.200	-0.059	0.487	1.02
	PFP/KMT	0.180	-0.047	0.406	1.02
	TSU/KMT	0.322	-0.048	0.691	1.00
Age	DPP/KMT	0.069	-0.183	0.319	1.01
	PFP/KMT	0.078	-0.163	0.340	1.01
	TSU/KMT	0.151	-0.289	0.588	1.00
Taiwan identity	DPP/KMT	0.847	0.273	1.390	1.03
	PFP/KMT	-0.338	-0.969	0.224	1.00
	TSU/KMT	1.165	-0.118	2.744	1.05
Gov't satisfaction	DPP/KMT	4.779	2.794	7.207	1.01
	PFP/KMT	-1.585	-2.916	-0.145	1.03
	TSU/KMT	5.395	2.385	8.686	1.02
# of draws		15000			
# of observations		600			

Source: TEDS2004LB.

Rhat: Gelman and Rubin's convergence diagnostic.

Table 4.5 Bayesian Multinomial Probit Estimates, 2004 Taiwanese Legislative Election

Parameters	Party Contrast	Posterior	95% BCI		Rhat
		Mean	Lower	Upper	
Total issue distance		-0.328	-0.545	-0.119	1.01
Party affection		0.240	0.171	0.301	1.01
Constant	DPP/KMT	-1.034	-1.950	-0.124	1.02
	PFP/KMT	-0.233	-0.982	0.412	1.02
	TSU/KMT	-1.707	-2.962	-0.461	1.00
Female	DPP/KMT	0.114	-0.176	0.401	1.03
	PFP/KMT	0.200	-0.044	0.480	1.00
	TSU/KMT	-0.021	-0.551	0.445	1.10
Education	DPP/KMT	0.025	-0.098	0.150	1.02
	PFP/KMT	0.063	-0.035	0.182	1.02
	TSU/KMT	0.039	-0.162	0.226	1.00
Age	DPP/KMT	-0.038	-0.174	0.094	1.01
	PFP/KMT	0.003	-0.122	0.113	1.01
	TSU/KMT	-0.066	-0.278	0.123	1.00
Taiwan identity	DPP/KMT	0.415	0.091	0.744	1.03
	PFP/KMT	-0.155	-0.493	0.133	1.00
	TSU/KMT	0.301	-0.254	0.929	1.05
Gov't satisfaction	DPP/KMT	1.699	0.803	2.647	1.01
	PFP/KMT	-0.704	-1.542	0.044	1.03
	TSU/KMT	0.958	-0.205	2.084	1.02
$\sigma_{DPP-KMT,DPP-KMT}$		1.000	1.000	1.000	
$\sigma_{PFP-KMT,PFP-KMT}$		0.746	0.247	1.998	1.02
$\sigma_{TSU-KMT,TSU-KMT}$		1.007	0.322	2.438	1.01
$\sigma_{PFP-KMT,DPP-KMT}$		0.339	-0.091	0.917	1.03
$\sigma_{TSU-KMT,DPP-KMT}$		0.019	-0.606	0.597	1.01
$\sigma_{TSU-KMT,PFP-KMT}$		-0.101	-1.088	0.856	1.03
# of draws		15000			
# of observations		600			

Source: TEDS2004LB.

Rhat: Gelman and Rubin's convergence diagnostic.

Furthermore, the scale of utility function is unidentified. To make the model identifiable, the first element of Equation (4-7) is set to 1. Hence, only five parameters in the variance-covariance matrix can be estimated. Originally there are ten parameters of variance-covariance matrix in a four-choice situation. However, five parameters can be

identified after the utility differencing and the constraint of the first variance component. This is because only these five parameters determine the observable pattern of voting choices (Train 2003, 104-110). The parameters of the estimated variance-covariance matrix in MNP are not directly interpretable as usual covariance or correlation numbers unless more assumptions are imposed on the matrix Σ .

In Table 4.5, two covariance terms are statistically positive at the 0.95 confident level. This evidence verifies the existence of a correlation among error terms among latent utility functions. This gives us confidence that MNP does explain the voting choice in the 2004 Taiwanese legislative election better than MNL does. For the substantive interpretation, we find that all conclusions by MNL stay the same except the influence of satisfaction with the government on choosing between the KMT and the PFP. The estimated coefficient becomes insignificant. Since the DPP is the government party and the DPP belongs to pan-green camp different from pan-blue camp including the KMT and the PFP. Therefore, the government's performance should not have impacted voters' consideration regarding the two opposition parties.

3.4 Substitution Patterns of Voter Choice

As stated previously, the substitution patterns are critical in examining whether the IIA assumption holds at the individual level. When the IIA assumption does not hold, the increase of voting probability with respect to one political party will attract disproportionate vote share from other political parties. This situation is very possible in the Taiwanese political environment because the political spectrum is essentially divided into two pan-green and pan-blue camps. The research question of voting behavior in

Taiwan should not discard this contextual factor, or the model will not explain the question of interest correctly.

The first difference of quantities of interest is computed in Table 4.6. For individual-specific variables like Taiwanese identity and satisfaction with the government, the substitution patterns are similar across different models. However, this is not the case for two alternative-specific variables. As seen in Table 4.3, pan-green and pan-blue camps roughly align themselves on two opposite sides of four issue dimensions. Hence two political parties within the same camp have higher similarity than those in the other camp. Therefore, if a voter's ideal point is one unit further from his favorite party for whatever reason, s/he should prefer the other party in the same camp over those in the other camp.

For example, a supporter of the PFP should have a higher probability to support the KMT once s/he moves away from the PFP or the PFP adopts a more extreme policy position. This scenario cannot be captured in the conditional model as seen in Table 4.6. If the PFP's policy position is one unit further away, in MNL the voting probability decreases 0.0532 with increases of 0.0019 to the TSU, 0.0280 to the DPP, and 0.0232 to the KMT. Yet, in MNP the decreasing probability of voting for the PFP is 0.0697 which is composed of only two increases of 0.0242 to the DPP and 0.0453 to the KMT. The reason that the TSU does not get any benefits when the PFP moves away, is because there are two other political parties closer to the original supporters of the PFP before moving.

Note also that in MNL, the increasing probability of the DPP, at 0.0280, is higher than that of the KMT, at 0.0232. This seems unreasonable because the KMT and the PFP belong to the same political camp. Why would a voter have a higher probability to vote for the DPP rather than the KMT even though the PFP is not his/her favorite choice anymore?

The phenomenon comes from the IIA assumption because the DPP has a larger reported vote share than the KMT.

Table 4.6 First Difference in the Voting Probabilities in 2004 Taiwanese Legislative Election

Model/Variable	Change	TSU	DPP	KMT	PFP
Conditional Logit					
<i>Taiwanese identity</i>	0 → 1	0.0191	0.1953	-0.1354	-0.0791
<i>Satisfaction</i>	Δ Range	0.0720	0.7723	-0.4949	-0.3494
<i>KMT distance</i>	Δ 1	0.0074	0.1088	-0.1432	0.0270
<i>DPP distance</i>	Δ 1	0.0094	-0.1580	0.1143	0.0343
<i>PFP distance</i>	Δ 1	0.0019	0.0280	0.0232	-0.0532
<i>TSU distance</i>	Δ 1	-0.1535	0.0074	0.0061	0.0018
<i>KMT affection</i>	Δ 1	-0.0070	-0.1029	0.1355	-0.0255
<i>DPP affection</i>	Δ 1	-0.0081	0.1360	-0.0984	-0.0295
<i>PFP affection</i>	Δ 1	-0.0025	-0.0364	-0.0302	0.0691
<i>TSU affection</i>	Δ 1	0.0221	-0.0107	-0.0088	-0.0026
Multinomial Probit					
<i>Taiwanese identity</i>	0 → 1	0.0191	0.2064	-0.1383	-0.0889
<i>Satisfaction</i>	Δ Range	0.0850	0.7852	-0.5174	-0.3537
<i>KMT distance</i>	Δ 1	0.0147	0.0739	-0.1628	0.0738
<i>DPP distance</i>	Δ 1	0.0073	-0.1271	0.0814	0.0384
<i>PFP distance</i>	Δ 1	0.0000	0.0242	0.0453	-0.0697
<i>TSU distance</i>	Δ 1	-0.0143	0.0061	0.0097	0.0000
<i>KMT affection</i>	Δ 1	-0.0079	-0.0628	0.1108	-0.0396
<i>DPP affection</i>	Δ 1	-0.0047	0.0894	-0.0605	-0.0237
<i>PFP affection</i>	Δ 1	0.0000	-0.0321	-0.0554	0.0877
<i>TSU affection</i>	Δ 1	0.0172	-0.0066	-0.0113	0.0000
Bayesian MNP					
<i>Taiwanese identity</i>	0 → 1	0.0117	0.1768	-0.1092	-0.0793
<i>Satisfaction</i>	Δ Range	0.0261	0.6175	-0.3413	-0.3023
<i>KMT distance</i>	Δ 1	0.0171	0.0823	-0.1415	0.0421
<i>DPP distance</i>	Δ 1	0.0061	-0.1345	0.0980	0.0304
<i>PFP distance</i>	Δ 1	0.0005	0.0191	0.0405	-0.0602
<i>TSU distance</i>	Δ 1	-0.0021	-0.0069	0.0104	-0.0014
<i>KMT affection</i>	Δ 1	-0.0122	-0.0757	0.1205	-0.0325
<i>DPP affection</i>	Δ 1	-0.0019	0.0938	-0.0691	-0.0228
<i>PFP affection</i>	Δ 1	-0.0043	-0.0291	-0.0311	0.0645
<i>TSU affection</i>	Δ 1	0.0165	-0.0085	-0.0064	-0.0015

Source: TEDS2004LB.

Because of the IIA assumption, the ratio between the DPP and the KMT must stay the same when the voting probability for the PFP changes. But this is not the case for predicting probability in MNP since the increasing probability of the DPP, at 0.0242, is lower than that of the KMT, at 0.0453. The set of predicting probabilities by MNP makes more sense because the voting probability for the TSU is lower and because the voting probability for the DPP is lower than that for the KMT.

Compare a voter whose party affection for the KMT is one unit higher to the average voter, with other variables controlled at their mean levels. In MNL, the increasing voting probability for the KMT is 0.1355, consisting of 0.1029 from the DPP, 0.0255 from the PFP, and 0.0070 from the TSU. The ratio of decreasing probability between the DPP and the PFP is about 4. Although the KMT can be considered as a moderate political party because of its policy position roughly located in the middle between those of the DPP and the PFP, the ratio of 4 is still higher according to the fact that the KMT and the DPP do not belong to the same political camp. The picture in MNP is different again from that in MNL. In MNP, the voting probability for the KMT boosts 0.1108 that comprises 0.0628 from the DPP, 0.0396 from the PFP, and 0.0079 from the TSU. The ratio of decreasing voting probability between the DPP and the PFP is about 1.6. The contrasting ratio of MNP is less than half of that of MNL. This explains the context of Taiwanese politics better because of the existence of two political camps.

The other interesting point is about the discrete change of the TSU party affection. In MNL, one unit increase of the TSU party affection augments the voting probability for the TSU 0.0221 which includes decreasing 0.0107 from the DPP, 0.0088 from the KMT and 0.0026 from the PFP. However, in MNP, the reducing probabilities of the DPP and

the KMT are reverse. The distribution of first difference in MNP is increasing 0.0172 for the TSU, reducing 0.0066 from the DPP, and decreasing 0.0113 from the KMT. A possible explanation is that the TSU used to be a faction within the KMT before it became an independent party. Those voters who identify themselves with the TSU are used to be with the KMT. Therefore, those supporters of the TSU now have more similar feeling to the KMT than to the DPP.

4. Concluding Remarks

Electoral systems create the convergent and non-convergent electoral incentives with substantial impacts on the position-taking strategy of political parties through mechanisms of the electoral formula, and the district magnitude. The combined effects of the various features in electoral systems induce the electoral threshold. Under SMD with a higher threshold, political parties have incentives to converge toward the centrist position. Under PR with a lower threshold, parties can move to a more extreme position to get elected. This general pattern of divergence and convergence of political party positions is also modified by the type of government and voter turnout rates depending on electoral systems. These two aspects cause lower policy dependence under SMD and high under PR.

Voter choice is based on a random utility model. In order to measure the effects of party position-taking strategies, the policy distance between political parties and voters is incorporated into the representative component. The policy dependence among political parties is manifested in the correlation in the error terms. While MNL imposes the IIA assumption to make the error terms uncorrelated, MNP relaxes it. Therefore, MNL is suitable for voter choice under SMD but MNP is more appropriate for voter choice in PR.

Furthermore, to compare the fit of the two statistical models (MNL and MNP), across electoral systems, the statistical indicator of model comparison is a Bayes factor. Suppose that Bayesian factor is calculated as MNP over MNL. The large positive means support for a MNP voter choice model. As the electoral systems is coded from more divergent to more convergent, such as ranked by PR to SMD, the correlation between a Bayes factor and the coding of electoral systems is expected to be positive. The empirical analysis shows that the average of Bayes factor of MNP over MNL is higher under PR than mixed and SMD systems.

The evidence in the analysis of the 2004 Taiwan legislative election shows that the policy dependence exists in political party issue positions. MNP shows that the error terms are significantly correlated. The substitution pattern predicted by MNP model fit the contextual background of Taiwanese politics.

While the research in Taiwan is quite compelling, the analysis is only under one kind of electoral system, SNTV. The evidence needs to be found under other types of electoral systems because the generalization should work also under SMD and PR. Moreover, the mechanism of causing the policy dependence needs to be elaborated in more detail within two types of electoral systems. This can be the direction of future research

CHAPTER 5

Conclusion

The focus of this project is the impacts of electoral institutions on political representation from the view point of how voters decide in elections. The advantage of the approach is to decipher the linkage between the voters' preferences and policy outcomes from the starting point of political participation. Since policy outcomes influence the citizens' welfare, they are the judgment of how well the citizens' preferences are taken into account: this is also the essence of democratic politics. Political participation is the first step that voters make up their minds of whether or not to express their policy preferences. From this forwarding-looking angle, how the citizen's preferences are represented in the policy outcomes, they are aggregated by the electoral system to select political agents who have the power to bargain in the government. In other words, the expression of the citizens' preference is the cornerstone of political representation.

Electoral institutions organize the action of preference expression because the latter is the result of the interaction between the citizens and politicians. By the insight of spatial theory, citizens' preferences can be viewed as a distribution and political agents pick their policy positions to solicit the citizens' support. Electoral systems frame how widespread the policy positions of political agents are on a single issue spectrum. Then the citizens decide whether or not to participate in elections and which political agent to vote for. There are three aspects of political participation influenced by electoral institutions: voter turnout, the biases of the citizens' preferences, and voter choices. These three elements are the focus of the project. The first element is how electoral systems affect higher or lower turnout; the second is to explore if the citizens' preferences is distorted by electoral systems;

the final is whether electoral institutions frame various types of political competition. These three intertwined steps are about agents selections with concerns on the final results of policy outcomes. In other words, these important steps shows how the agents are chosen in the first place but they are related to the government policies. This project intends to investigate that electoral systems have serious consequences on political representation from the view point of voters' behavior.

This first chapter tackles the micro-foundations of voting and addresses why PR systems are associated with higher turnout than SMD systems. The micro-foundations are built upon the calculus of voting and spatial theory. The central claim is that individual evaluations of the B term in the calculus of voting are affected by spatial party competition framed by electoral institutions. While SMD constrains the number of political parties and creates large centripetal forces for party competition, it reduces individual perceptions of the two components of the B term. In contrast, PR allows more political parties to survive and does not generate many centripetal forces; thus, it helps voters acquire higher estimates of the two counterparts of the B term.

The calculus of voting helps us understand why voting rates differ across countries. The cost-benefit approach under a synthesized spatial theory facilitates explaining citizens' voting behavior driven by electoral institutions. Since every election is specific based on the constraints of political institutions, and country-level contextual factors, *interactions* between political agents and electorates are centrally important in explaining individual voting behavior.

The second chapter is to explore the question of how electoral institutions affect the degree of political representation through the perspective of comparing the distribution of

voter preferences versus that of all electorate. The effects of electoral systems on political representation are based upon voters' response to party competition under spatial theory. The main argument is that different types of electorate according to their relative locations in the distribution of voter preferences have various incentives to voting. The moderate type of electorate with location in the interquartile range has lower benefit evaluations for voting across PR and SMD. However, the extreme type of electorate with location toward two ends of the issue spectrum has dissimilar profit schemes under PR and SMD. The profit calculation for the extreme type is lower under SMD than PR because of indifference and alienation for political parties' policy position convergence toward the median voter. Thus, due to inconsistent benefit evaluations among different types of electorate, PR has a higher probability to induce disproportionality defined above.

The third chapter discusses how electoral institutions impact the pattern of political competition with implication of the selection of statistical models. The single-member district and proportional representational electoral systems have institutional consequences on interactions among political parties in the decision-making process in parliament. SMD usually creates a mandate delegated to a single political party and PR has a power-sharing system with more than one party. The policy implication is the degree of dependence in the issue positions of political parties within electoral systems. When voters ponder which political party to support, they can see whether or not there is policy dependence among political parties under SMD or PR.

The concept of no policy dependence under SMD is equal to independence of irrelevant alternatives related to multinomial logit. Another model which relaxes IIA is multinomial probit which allows policy dependence in PR. To capture the effects of

electoral systems on vote choice, I examine whether MNL or MNP has a better model fit under two electoral systems. Since two statistical models are non-nested, I conduct the model fit comparison through Bayes factor with MNP over MNL. To test these hypotheses, I compare the patterns of voter choice affected by electoral systems across countries. The data are round 1 and round 2 of the Comparative Studies of Electoral Systems including various types of electoral institutions. Furthermore, the case study of Taiwan 2004 legislative election proves that the substitution pattern among political parties derived from MNP makes more sense conditional on the context of the real world.

Apart from mere analysis for representation typology, my research connects the effects of electoral systems with the participation. Since the institutions of electoral systems are inalienable in the process of democratic representation. Past research does not discuss how electoral systems affect the expression of citizens' preferences (Mansbridge 2003; Pitkin 1967; Young 2000). Even though the research of electoral systems has turned the attention to citizens' preferences, it does not care about how the preferences are derived from participation (Blais and Bodet 2006; Budge and McDonald 2007; Golder and Stramski 2010; Huber and Powell 1994; McDonald and Budge 2005; McDonald et al. 2004; Powell 2000, 2006, 2009; Powell and Vanberg 2000). My research bridges the gaps in these two lines of previous research.

What kinds of preferences are expressed is influenced by electoral systems in different aspects. The major implication of my arguments is that electoral systems have positive and negative effects on varied aspects of participation. PR has a positive effect motivating more citizens to vote; PR has a higher possibility to induce a biased preference distribution than SMD; Under PR, the vote choice is more difficult for citizens because of the policy

dependence requires more information to make correct selection of representatives, meaning that the information cost is higher. This conclusion is not surprising because the electoral systems have contradictory effects on participation and the linkage of citizens' preferences and government policy is not a smooth process.

From a methodological perspective, the project has two contributions to the current research of electoral institutions. The project is to emphasize the impacts of electoral institutions at the micro level. The coherent argument of the three chapters is to explain the voters' decision-making process when facing the configuration of political agents' policy positions. This method promotes the understanding of how different institutions generate various incentive structures to influence individual behavior. Furthermore, this project adopts a unifying approach of spatial theory to develop the theoretical arguments. The advantage is that the micro-foundation mechanisms can be extended beyond the country borders and the comparison of the institutional effects across countries is plausible.

The micro-foundation mechanisms increase our understanding of how different kinds of electoral systems work at different stages of political representation. Every type of electoral systems has its own advantages and disadvantages in promoting or decreasing political representation. Through this exercise, we can have more complete knowledge about the good and bad of electoral institutions. In the future of institutional design, we are able to adjust some parts of the institutions to achieve a better political representation.

For future research, there are several directions. First, to establish the validity of proposed micro-foundation mechanisms in three chapters, they need to be tested by more data collected both at macro and micro levels. To assure the reliability of corroboration, macro- and micro- level data is necessary to gauge the effects of political institutions. These

hypotheses should be verified with new information to check if they still hold because these mechanisms may evolve. We need to track the changes to understand the effects of electoral systems more clearly. One way to do it is to expand the time period of the data sets. Second, this project focuses only on the voters' decision-making process. To have more comprehensive knowledge of linking the citizens' preferences to the policy outcomes, the part of political parties can not be ignored. We need to have a more thorough theory of party positioning strategies to know more about the interactions between voters and politicians, influenced by electoral institutions. Finally, the forward-looking approach, which is how the citizens' preferences are represented in government policy, is only one part of the meaning of political representation. The other standard is that political officials are accountable to their constituents and the voters utilize elections as a tool to control politicians. The feedback mechanisms are also important and should be integrated into the voters' decision-making process of political participation and voter choice. We need to know how two kinds of mechanisms affect each other. These are possible directions for more investigations to understand how the electoral process transforms the citizens' preferences into the final policy outcomes.

As stated in the introduction chapter, the focus of policy preferences excludes other properties of citizens' preferences, such as gender, culture, economy, and ethnicity. There is a significant amount of research on women representation. For instance, see Rule (1994) and Schwindt-Bayer (2010) for details. These attributes need to be operationalized for advanced research on representation. Here are some of my conjectures. For the culture attributes, it can be measured by a modernization index (Inglehart and Welzel 2005). Since the data sets of World Value Survey are available for many countries, we already have the

citizens' preferences in hand. The second step is to conduct the interview on the representative counterpart. Then we can check this dimension of culture is representative across electoral systems. In a similar vein, the economy representation can be measured by matching the income distribution of citizens and that of representatives.

For the matter of generalizability hindered by issue voting, it is necessary to construct a more exhaustive theory construction to accommodate two types of linkages: policy and patronage. The building of such a unified theory will let us know how two linkages interact with each other. Are they mutually exclusive? Or are they mutually reinforced? What causes a country to have more one type of linkage, but not the other? Do they depend on different stages of economic development? These are research questions worth investigating in the future.

Appendices

Appendix Table A.1: Sixty-four Elections used in Chapter 1 Analysis (Part 1)

	Year	Aggregate Turnout	Survey Turnout	Centripetal	Polity2
Established					
CSES1					
Australia	1996	82.5	98.9	2	10
Canada	1997	56.2	78.3	2	10
Mexico	2000	63.7	94.8	2	8
UK	1997	71.5	81.7	2	10
Hungary	1998	56.7	67.2	1	10
Mexico	1997	57.7	72.5	1	6
South Korea	2000	57.2	58.7	1	10
Belgium	1999	90.5	83.5	0	10
Czech Republic	1996	76.3	88.3	0	10
Denmark	1998	86.6	93	0	10
Germany	1998	83.0	83.3	0	10
Iceland	1999	84.1	83.3	0	10
Netherlands	1998	73.4	89.9	0	10
New Zealand	1996	88.3	96.2	0	10
Norway	1997	78.0	85.7	0	10
Poland	1997	47.9	55.2	0	9
Portugal	2002	62.8	62.0	0	10
Spain	1996	78.0	78.1	0	10
Spain	2000	68.7	80.6	0	10
Sweden	1998	81.4	87.0	0	10
Switzerland	1999	43.4	58.8	0	10
CSES2					
Australia	2004	94.8	97.9	2	10
Canada	2004	61.2	90.8	2	10
France	2002	71.6	79.3	2	9
UK	2005	61.4	72.1	2	10
USA	2004	56.2	78.5	2	10
Hungary	2002	70.5	82.7	1	10
Mexico	2003	41.7	71.9	1	8
South Korea	2004	59.9	79.0	1	10
Czech Republic	2002	58.0	73.9	0	10
Denmark	2001	87.1	96.0	0	10
Finland	2003	69.7	80.6	0	10
Germany	2002	79.1	91.3	0	10
Iceland	2003	87.7	96.0	0	10
Ireland	2002	62.6	85.3	0	10
Italy	2006	83.6	81.3	0	10

Appendix Table A.1: Sixty-four Elections used in Chapter 1 Analysis (Part 2, cont'd)

	Year	Aggregate Turnout	Survey Turnout	Centripetal	Polity2
CSES2					
New Zealand	2002	77.0	83.8	0	10
Norway	2001	75.5	82.8	0	10
Poland	2001	46.3	58.1	0	10
Portugal	2005	65.3	81.4	0	10
Spain	2004	75.7	89.2	0	10
Sweden	2002	80.1	88.4	0	10
Switzerland	2003	45.4	74.0	0	10
Non-Established					
CSES1					
Lithuania	1997	70.7	90.0	2	10
Peru	2000	78.6	94.4	2	5
Peru	2001	78.6	95.4	2	9
Taiwan	1996	76.9	81.4	2	8
Romania	1996	78.2	82.0	1	8
Russia	1999	59.9	77.5	1	4
Ukraine	1998	68.1	69.0	1	7
Israel	1996	84.7	91.0	0	9
Slovenia	1996	75.7	75.8	0	10
CSES2					
Brazil	2002	82.3	87.9	2	8
Chile	2005	87.1	95.8	2	9
Peru	2006	87.7	94.7	2	9
Philippines	2004	77.1	86.5	2	8
Russia	2004	64.4	78.8	2	7
Taiwan	2004	80.3	91.2	2	10
Albania	2005	48.7	91.5	1	9
Romania	2004	58.5	80.4	1	9
Taiwan	2001	66.2	82.4	1	9
Bulgaria	2001	72.1	78.9	0	9
Israel	2003	67.8	89.2	0	10
Slovenia	2004	60.7	77.4	0	10

* Aggregate turnout is defined as Vote / VAP according to IDEA, where VAP is voting age population.

Appendix Table A.2 Replication of Table 2.2 Replacing Self-Judged Party Positions with
Average Party Positions (Part 1)

<i>Fixed Part</i>	Coefficient	Robust SD	P-value
<i>Intercept of β_0, $\gamma_{0(0)}$</i>	-1.996	1.712	0.250
<i>Compulsory1, $\gamma_{0(1)}$</i>	0.909	0.344	0.011
<i>Compulsory2, $\gamma_{0(2)}$</i>	0.222	0.288	0.445
<i>Compulsory3, $\gamma_{0(3)}$</i>	1.440	0.215	0.000
<i>Closeness, $\gamma_{0(4)}$</i>	-0.764	0.410	0.068
<i>ENP, $\gamma_{0(5)}$</i>	-0.091	0.044	0.047
<i>District magnitude, $\gamma_{0(6)}$</i>	-0.002	0.002	0.425
<i>Frequency, $\gamma_{0(7)}$</i>	-2.180	0.498	0.000
<i>Concurrent, $\gamma_{0(8)}$</i>	0.416	0.217	0.061
<i>Log District size, $\gamma_{0(9)}$</i>	-0.002	0.033	0.953
<i>Politil Competition, $\gamma_{0(10)}$</i>	-0.014	0.007	0.064
<i>GDP per capita, $\gamma_{0(11)}$</i>	0.169	0.140	0.233
<i>Developing, $\gamma_{0(12)}$</i>	1.179	0.275	0.000
<i>L_GDP Chang, $\gamma_{0(13)}$</i>	-0.029	0.024	0.234
<i>L_GC_Developing, $\gamma_{0(14)}$</i>	-0.003	0.037	0.943
<i>PR, $\gamma_{0(15)}$</i>	0.297	0.184	0.114
<i>MIX, $\gamma_{0(16)}$</i>	-0.208	0.288	0.475
<i>Female, β_1</i>	0.019	0.027	0.471
<i>Education, β_2</i>	0.096	0.011	0.000
<i>Income, β_3</i>	0.092	0.010	0.000
<i>Inpower, β_4</i>	0.100	0.010	0.000
<i>Makediff, β_5</i>	0.184	0.016	0.000
<i>Partyid, β_6</i>	0.739	0.040	0.000
<i>Age26_35, β_7</i>	0.279	0.035	0.000
<i>Age36_45, β_8</i>	0.617	0.046	0.000
<i>Age46 and above, β_9</i>	0.987	0.054	0.000
<i>F slope, β_{10}</i>			
<i>Intercept $\gamma_{10(0)}$</i>	0.006	0.002	0.001
<i>PR, $\gamma_{10(1)}$</i>	0.008	0.003	0.021

Appendix Table A.2 Replication of Table 2.2 Replacing Self-Judged Party Positions with
Average Party Positions (Part 2, cont'd)

<i>Fixed Part</i>	Coefficient	Robust SD	P-value
<i>H slope, β_{11}</i>			
<i>Intercept $\gamma_{11(0)}$</i>	0.031	0.006	0.000
<i>PR, $\gamma_{11(1)}$</i>	0.015	0.007	0.041
<i>Random Part</i>	Std. Dev.	χ^2	P-value
σ_e (scale factor)	1.81	3.29	
σ_{u0}	0.696	2372.21	0.000
σ_{u10}	0.010	116.47	0.000
σ_{u11}	0.022	88.28	0.016

Appendix Table A.3: The Classifications of Sixty-Eight Elections Used in Analysis (Part 1)

	Year	Agg. Turnout	Survey Turnout	SMD1	Mixed1	PR1	SMD2	MMM	MMP	PR2
Established										
CSES1										
Canada	1997	56.2	78.3	1	0	0	1	0	0	0
UK	1997	71.5	81.7	1	0	0	1	0	0	0
USA ⁺	1996	64.7	75.6	1	0	0	1	0	0	0
Australia	1996	82.5	98.9	1	0	0	1	0	0	0
Mexico	2000	63.7	94.8	1	0	0	1	0	0	0
Korea	2000	57.2	58.7	0	1	0	0	1	0	0
Mexico	1997	57.7	72.5	0	1	0	0	1	0	0
Hungary	1998	56.7	67.2	0	1	0	0	1	0	0
New Zealand	1996	88.3	96.2	0	0	1	0	0	1	0
Germany	1998	83.0	83.3	0	0	1	0	0	1	0
Spain	1996	78.0	78.1	0	0	1	0	0	0	1
Spain	2000	68.7	80.6	0	0	1	0	0	0	1
Iceland	1999	84.1	83.3	0	0	1	0	0	0	1
Netherlands	1998	73.4	89.9	0	0	1	0	0	0	1
Norway	1997	78.0	85.7	0	0	1	0	0	0	1
Portugal	2002	62.8	62	0	0	1	0	0	0	1
Switzerland	1999	43.4	58.8	0	0	1	0	0	0	1
Belgium	1999	90.5	83.5	0	0	1	0	0	0	1
Czech Republic	1996	76.3	88.3	0	0	1	0	0	0	1
Denmark	1998	86.6	93	0	0	1	0	0	0	1
Poland	1997	47.9	55.2	0	0	1	0	0	0	1
Sweden	1998	81.4	87	0	0	1	0	0	0	1
CSES2										
Canada	2004	61.2	90.8	1	0	0	1	0	0	0
UK	2005	61.4	72.1	1	0	0	1	0	0	0
USA	2004	56.2	78.5	1	0	0	1	0	0	0
France	2002	71.6	79.3	1	0	0	1	0	0	0
Australia	2004	94.8	97.9	1	0	0	1	0	0	0
Mexico	2003	41.7	71.9	0	1	0	0	1	0	0
Korea	2004	59.9	79	0	1	0	0	1	0	0
Hungary	2002	70.5	82.7	0	1	0	0	1	0	0
Italy	2006	83.6	81.3	0	0	1	0	0	1	0
Germany	2002	79.1	91.3	0	0	1	0	0	1	0
New Zealand	2002	77.0	83.8	0	0	1	0	0	1	0
Belgium ⁺	2003	91.9	94.64	0	0	1	0	0	0	1
Ireland	2002	62.6	85.3	0	0	1	0	0	0	1
Iceland	2004	87.7	96	0	0	1	0	0	0	1
Finland	2003	69.7	80.6	0	0	1	0	0	0	1

Appendix Table A.3: The Classifications of Sixty-Eight Elections Used in Analysis
(Part 2, cont'd)

	Year	Agg. Turnout	Survey Turnout	SMD1	Mixed1	PR1	SMD2	MMM	MMP	PR2
Established										
CSES2										
Netherlands ⁺	2002	79.1	96.88	0	0	1	0	0	0	1
Norway	2001	75.5	82.8	0	0	1	0	0	0	1
Poland	2001	46.3	58.1	0	0	1	0	0	0	1
Portugal	2005	65.3	81.4	0	0	1	0	0	0	1
Sweden	2002	80.1	88.4	0	0	1	0	0	0	1
Spain	2004	75.7	89.2	0	0	1	0	0	0	1
Czech Republic	2002	58.0	73.9	0	0	1	0	0	0	1
Denmark	2001	87.1	96	0	0	1	0	0	0	1
Switzerland	2003	45.4	74	0	0	1	0	0	0	1
Non-established										
CSES1										
Chile ⁺	1999	72.8	84.2	1	0	0	1	0	0	0
Israel	1996	84.7	91	0	0	1	0	0	0	1
Lithuania	1997	70.7	90	1	0	0	1	0	0	0
Peru	2000	78.6	94.4	1	0	0	1	0	0	0
Peru	2001	78.6	95.4	1	0	0	1	0	0	0
Romania	1996	78.2	82	0	1	0	0	1	0	0
Russia	1999	59.9	77.5	0	1	0	0	1	0	0
Slovenia	1996	75.7	75.8	0	0	1	0	0	0	1
Taiwan	1996	76.9	81.4	1	0	0	1	0	0	0
Ukraine	1998	68.1	69	0	1	0	0	1	0	0
CSES2										
Albania	2005	48.7	91.5	0	1	0	0	1	0	0
Brazil	2002	82.3	87.9	1	0	0	1	0	0	0
Bulgaria	2001	72.1	78.9	0	0	1	0	0	0	1
Chile	2005	87.1	95.8	1	0	0	1	0	0	0
Israel	2003	67.8	89.2	0	0	1	0	0	0	1
Peru	2006	87.7	94.7	1	0	0	1	0	0	0
Philippines	2004	77.1	86.5	1	0	0	1	0	0	0
Romania	2004	58.5	80.4	0	1	0	0	1	0	0
Russia	2004	64.4	78.8	1	0	0	1	0	0	0
Slovenia	2004	60.7	77.4	0	0	1	0	0	0	1
Taiwan	2001	66.2	82.4	0	1	0	0	1	0	0
Taiwan	2004	80.3	91.2	1	0	0	1	0	0	0

* Aggregate turnout is defined as Vote /VAP according to IDEA, where VAP is voting age population.

⁺ This indicates the case is excluded from multilevel analysis in Table 3.4 and Table 3.5

Appendix A.4: Codebook for MNL and MNP Models:

Dependent variable:

Lepavote: 1. Vote for KMT; 2. Vote for DPP; 3. Vote for PFP; 4. Vote for TSU; others and no response are coded as missing.

Alternative-specific:

- Total issue distance: the square root of Euclidean distance of four issue dimensions which are independence versus union, environmental protection versus economic growth, non-welfare state versus welfare state, and reform versus stability.
- Party affection: 0 to 10 to represent how much each respondent like each political party.

Individual-specific:

- Female: 1. Female; 0. Male.
- Age: Age in groups. 1. 21-29; 2. 30-39; 3. 40-49; 4. 50-59; 5. 60 and above.
- Education: 1. elementary school and below; 2. junior school and below; 3. senior high school and below; 4. professional school and below; 5. university and above.
- Taiwanese identity: 1. those who thinks he is a Taiwanese or Taiwanese is a more important identity than Chinese; 0. others.
- Satisfaction with Chen Shui-Bian's Government: 0 to 1 with 0 indicating the least satisfaction and 1 the most.

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