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Misperceived Inequality, Mismatched Attitudes, and Missing Support for Redistribution

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Misperceived Inequality, Mismatched Attitudes, and Missing Support for Redistribution

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by

Yuki Yanai

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ABSTRACT OF THE DISSERTATION

Misperceived Inequality, Mismatched Attitudes,
and Missing Support for Redistribution

by

Yuki Yanai
Doctor of Philosophy in Political Science
University of California, Los Angeles, 2017
Professor Miriam A. Golden, Chair

This dissertation addresses the connections between politics and economic inequality. Although the main chapters are three independent essays, they share underlying research questions about redistribution: why do we observe significant differences in the amount of redistribution across democratic nations, and why do unequal countries redistribute less than do countries that are already more equal to begin with?

In Chapter 2, I investigate why the level of economic inequality does not explain the amount of redistribution by focusing on an individual's perception about inequality. I argue that the amount of redistribution does not correspond to the extent of economic inequality because the assumption of the model that voters accurately perceive inequality does not hold. I will demonstrate this by examining survey data and revealing that people do not necessarily know how unequal their society is. People demand a larger public redistribution only if they perceive high inequality.

In Chapter 3, I ask who within a polity underestimates inequality and what consequences does this underestimation have for politics. In Japan, there are more people who underestimate inequality than people who overestimate it. Why do Japanese underestimate inequality rather than overestimate it? I argue that people living in a relatively equal area within a country are more likely to underestimate inequality than those living in a relatively unequal area. The statistical analysis reveals three things. First, certain demographic and politi-

cal factors systematically affect the probability of underestimation at the individual level. Second, the degree of underestimation varies across prefectures in Japan. Third, underestimation of inequality affects electoral outcomes.

In Chapter 4, I show how individuals' income and motivation affect their turnout decisions. Turnout rises as income increases. At the same time, motivation (driven by the salience of the outcome for voters) has a positive effect on turnout as well. This effect of motivation on turnout is stronger among the wealthy than among the poor. Thus, motivation can further widen the gap in turnout between haves and have-nots.

These findings suggest that we should pay more attention to subjective aspects of inequality. It is *perceived* inequality that matters to politics of redistribution.

The dissertation of Yuki Yanai is approved.

Christopher C. Tilly

Michael F. Thies

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University of California, Los Angeles

2017

To my parents, Kesami and Michi

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CHAPTER 1

Introduction

1.1 Politics and Economic Inequality

In this dissertation, I address the connections between politics and economic inequality. This theme has gathered much attention in the literature of political economy, but there remain many problems that have not yet been fully examined. According to a task force of the American Political Science Association, "we know little about the connections between changing economic inequality and changes in political behavior" (APSA Task Force on Inequality and American Democracy 2004, p.661). More than a decade later, as Bartels (2016) puts it, "[i]nterpretations of economic inequality are politically consequential because they shape responses to inequality," and "even the limited range of policies implemented in the United States over the past half-century has had substantial effects on prevailing levels of economic inequality," but "so much public discussion of economic inequality in the New Gilded Age ignores its political dimension" (pp. 23–24).[1] As students of political science, we need to study further the political causes and consequence of economic inequality in order to understand politics better.

Although the main chapters of this dissertation—Chapters 2, 3, and 4—are three independent essays and have different focuses, they share the main underlying research questions about redistribution: why do we observe significant difference in the amount of redistribution across democratic nations and why do unequal countries not redistribute more to alleviate economic inequality than equal nations do? Chapters 2 and 3 try to answer these questions

[1]Strictly speaking, these statements were originally published just four years after the statement by the APSA's task force (Bartels 2008, p. 19). However, Bartels did not have to revise the statements in 2016.

by focusing on a subjective aspect of income inequality. In these chapters, I will show that the demand for government redistribution would be higher if people accurately perceived income inequality. Assuming that governments respond to people's demands, perception could change the extent of government redistribution. In Chapter 4, I will show that inequality causes unequal electoral participation between haves and have-nots. Assuming that it is the median *voters* to whom governments respond, unequal turnout can reduce the amount of government redistribution by moving the median *voters* toward the rich.

Economic inequality has been on the rise in most industrialized democracies over the past three decades (Kenworthy and Pontusson 2005; Smeeding 2005; Atkinson and Piketty 2007, 2010; OECD 2008, 2011; Atkinson 2015; Murtin and Mira d'Ercole 2015). However, the pace and level of inequality increase are not same for all countries, and policy reactions to the rising inequality seem different for different nations. The amount of redistribution significantly varies across democracies. The governments of more equal countries (e.g., Scandinavian countries) sometimes redistribute more than those of less equal countries do (e.g., the U.K. or the U.S.). Atkinson, Rainwater, and Smeeding (1995), for instance, show that the reduction in the poverty rate by taxation and transfers was 82 percent in Sweden, while that in the U.S. was only 13 percent. As a result, post-tax, post-transfer inequality in the mid-1990s is the smallest in Sweden and the largest in the U.S. among 13 western democracies (Kenworthy 2004).

Figure 1.1 provides an updated picture. In the figure, the horizontal axis shows the Gini coefficients of 33 countries in the Organisation for Economic Co-operation and Development (OECD) in 2012. The Gini coefficient is a measure of inequality, whose value is 0 when everybody in a given country has exactly same income and 1 when only one person monopolies the national income; a larger value of the Gini shows higher inequality. The triangles in green represent the Gini coefficients of pre-tax, pre-transfer market income; the circles in red display the Gini of post-tax, post-transfer disposable income. Before governments' redistribution, the national Gini coefficient ranges from 0.338 in South Korea to 0.582 in Ireland among the 33 countries; a range of 0.244. After redistribution, the Gini ranges from 0.249 in Denmark to 0.457 in Mexico; a range of 0.208. Within countries, the horizontal

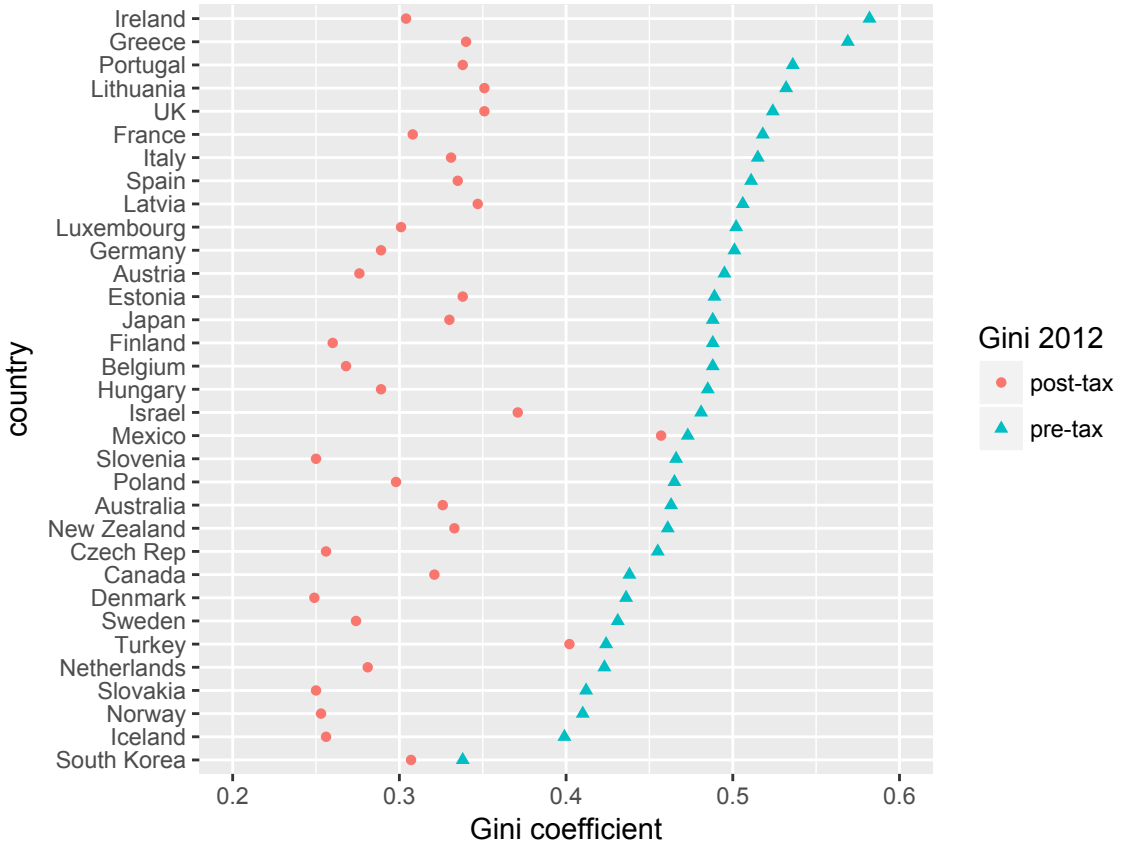


Figure 1.1: The Pre-tax and Post-tax Gini Coefficients of 33 OECD Countries in 2012. *The triangles in green represent the Gini coefficients of pre-tax, pre-transfer market income. The circles in red display the Gini of post-tax, post-transfer disposable income. Data source: OECD Income Distribution Database (`http://www.oecd.org/social/income-distribution-database.htm`).*

distance between two points shows how much inequality is reduced by the government. The amount of reduction (in the Gini scale) ranges from 0.016 in Mexico to 0.278 in Ireland. By dint of government redistribution, differences in inequality decline across OECD countries. However, redistribution does not reduce cross-country differences much, as we can see from the small change in the range of inequality from 0.244 to 0.208. Differences in inequality across countries persist after government redistribution.[2]

Figure 1.2 presents the relationship between the level of inequality and the extent of

[2]The standard deviation declines from 0.051 to 0.047, which does not seem a dramatic change.

government redistribution.[3] In this figure, the horizontal and vertical axes show the Gini of pre-tax, pre-transfer market income and reduction of the Gini by government transfers,[4] respectively. In each panel, the blue line is a regression line, and the shaded area around it is the 95 percent confidence interval. In Panel (a), we can see that the higher the market income inequality is, the larger the amount of government redistribution is. However, this finding depends heavily on a single observation in the bottom-left corner, South Korea. Panel (b) shows the similar figure without South Korea. Now the relationship is not clear. The blue line still has a positive slope, but we can also draw a negatively sloped line inside the confidence interval. Thus, we cannot exclude the possibility that the level of inequality has no effect on the size of government redistribution.

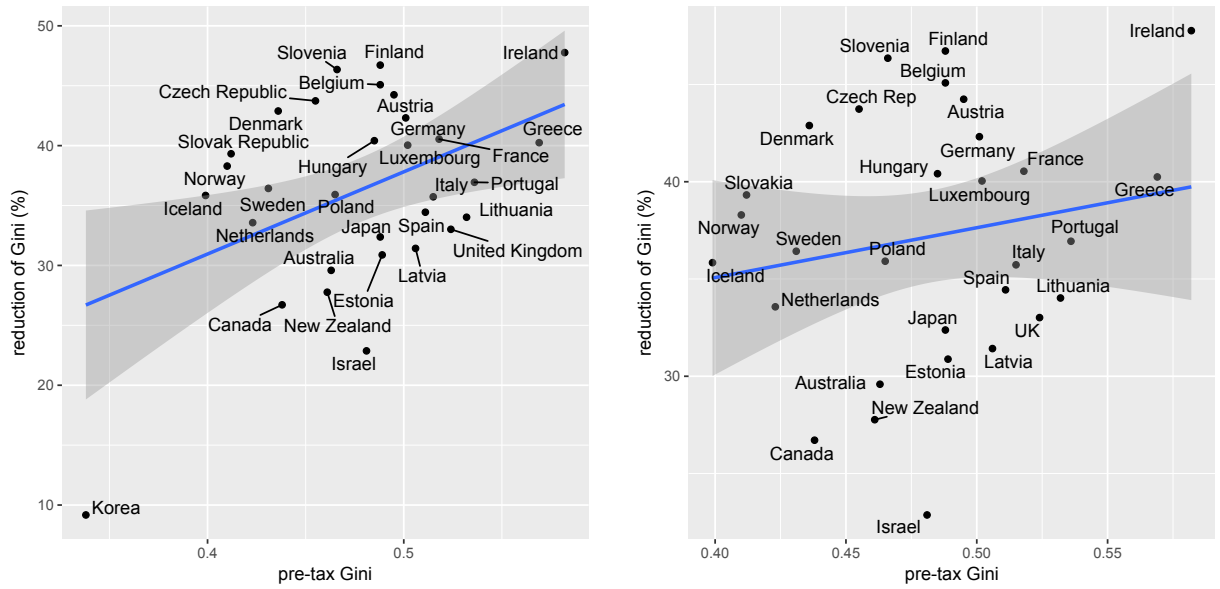
This observation contradicts (or, at least, does not support) the conventional wisdom in the literature on redistribution. The standard prediction is that greater inequality will increase redistribution in democracies, because greater inequality reduces the income of the median voter, and hence leads to more redistribution in response to the demands by the majority (Meltzer and Richard 1981; Roberts 1977; Romer 1975). Why does not this happen? Why do unequal societies not redistribute more in order to alleviate economic inequality? In what circumstances does the average citizen—the median voter—prefer an unequal society to more redistribution? These are the questions that motivate me to write this dissertation.

1.2 Inequality and Redistribution in a Democracy

Circa two millenniums ago, democracy was not popular. Aristotle was concerned about the possibility that a large group of ignorant poor people would exploit a small number of

[3]Mexico and Turkey are excluded because they are outliers in terms of Gini reduction. The mean of inequality reductions in the 33 OECD countries is 35.91 percent, while the reduction in Mexico and Turkey are 3.38 percent and 5.19 percent, respectively. These values are more than 2.5 inter-quantile range (IQR: 9.12) below the first quantile (31.43): $31.43 - 2.5 \times 9.12 = 8.63$.

[4]This is calculated by: reduction $= 100\times$ (pre $-$ post) / pre, where pre and post denote the Gini of pre-tax, pre-transfer income and that of post-tax, post-transfer income, respectively. The smallest and largest reductions are 3.38 percent in Mexico and 47.76 percent in Ireland, respectively.



(a) 31 OECD countries

(b) 30 OECD countries (excluding South Korea)

Figure 1.2: Reduction of Income Inequality by Redistribution. *The horizontal and vertical axes show the Gini of pre-tax, pre-transfer market income and reduction of the Gini by government transfers, respectively. The blue line shows a regression line. The shaded area around the line displays the 95% confidence interval. Panel (a) includes the 31 OECD countries, excluding Mexico and Turkey, which are outliers. Panel (b) further excludes South Korea, which is an influential observation. Including Mexico and Turkey does not change the pattern found in each panel. Data source: OECD Income Distribution Database (`http://www.oecd.org/social/income-distribution-database.htm`).*

educated rich people in a democracy, which could lead to collapse of a country (Aristotle 2009). After the Second World War, democracy became relatively popular. At least, it was considered "the worst form of government except for all those other forms that [had] been tried from time to time."[5] At present, people living in a democracy largely take democratic government for granted. When they would like to reform the government, the reform rarely implies democratic breakdown.[6] We can think of many reasons why democracy gained its popularity, but one reason might be the fact that we have untangled Aristotle's concern about tyranny of the poor. The poor do not seem so powerful in most democracies.

[5]This aphorism was famously invoked on the floor of the U.K. House of Commons on 11 November 1947 by Winston Churchill.

[6]A democracy will not easily break down if it is rich (see, e.g., Przeworski et al. 2000).

Contrary to Aristotle's concern, we are facing the puzzle of "why democracy does not generate more economic equality" (Przeworski 2010, p. 14). Although some studies do show that larger income inequality leads to the larger amount of government redistribution (Aalberg 2003; Milanovic 2000), others show that economic inequality does not have statistically significant effect on government redistribution (Bartels 2016; Bénabou 1996; Perotti 1996; Rodríguez C. 1999, 2004), and some even show that economic inequality *decreases* the amount of redistribution (Bowles and Gintis 2000; Bradley et al. 2003; Iversen and Soskice 2006; Moene and Wallerstein 2001, 2003). Hence, this is "an important unsolved puzzle for comparative political economy" (Iversen 2005, p. 85).

In a simple model assuming rational actors and majority-rule policy making, the median voter is expected to have a strong influence on policy (Black 1948; Downs 1957*a*). Income distribution is skewed to the right, that is, the median of the *eligible voters* is usually poorer than a person with the mean income in a given country. Accordingly, the median citizen should be able to increase his disposable income through government redistribution. Other things equal, income inequality tends to lower the median income away from the mean. As the median citizen becomes poorer, he should demand a greater degree of government redistribution to compensate for his loss of relative income caused by the rise of inequality. Therefore, inequality should enlarge government redistribution (Romer 1975; Roberts 1977; Meltzer and Richard 1981). In other words, democracy has a built-in equalizer.

However, it is evident that this model does not explain the reality well. Why does the standard model fail to predict redistributive outcomes? In this dissertation, I tackle this puzzle by questioning two assumptions of the model: correct perception about inequality and full participation of the citizens. First, I question the assumption that people know the true extent of inequality. Inequality can change political actions of people only when it is perceived more-or-less accurately. Although inequality has been rising in recent years, it is possible that citizen might have not noticed the rise. Even if they have noticed it, they might underestimate the pace and level of the increase. In the U.S., Bartels (2016) has shown that "the substantial increase in economic inequality over the following three decades had virtually no effect on perceptions of inequality" (pp. 107–108). If people do not accurately

perceive inequality, it is no wonder that they do not demand that governments spend more on income transfers; and if people do not demand increased redistribution, it is no wonder that governments do not redistribute more when facing high inequality. I discuss this issue in Chapters 2 and 3.

Second, I question the assumption that all the people turn out to vote, or, the milder assumption that abstention is not related to income. If this assumption were true, the median citizen would be the median *voter*. However, a large number of people abstain. Even in Australia, which strictly enforces compulsory voting,[7] the turnout rate is not 100 percent.[8] With some abstainers, the median *voter* can still be the median citizen—or a person similar to the median citizen—if abstention is random with respect to income. If abstention is not random, however, the median *voter* might be different from the median citizen. The median *voter* can be a person whose income is above the mean, if poor people are more likely to abstain than the wealthy. If this is the case, it is no wonder that the median *voter* does not support redistributive policy; if the median *voter* does not want redistribution, it is no wonder that governments do not enlarge the size of redistribution. I discuss this issue in Chapter 4.

1.3 Plan of the Dissertation

The rest of the dissertation explores the connection between politics and economic inequality. In Chapter 2, I investigate why the level of economic inequality does not explain the size of government redistribution by focusing on the voters' perception about economic inequality. Because we have been experiencing a rise of economic inequality worldwide, we should expect governments experiencing the rise of inequality to increase the amount of redistribution (Romer 1975; Roberts 1977; Meltzer and Richard 1981). It is not necessarily the case, however. I argue that the amount of redistribution does not correspond to the level of eco-

[7]The fine is 20 Australian dollars.

[8]Turnout was 91 percent in the 2016 Federal Election.

nomic inequality because the assumption of the model that voters correctly understand the economic situation in which they reside does not hold. I will demonstrate this by examining survey data and revealing that people do not necessarily know how unequal their society is. People demand a larger public redistribution only if they realize that economic inequality is high. I will show that voters are more likely to support redistributive policies when they *think* inequality is large. On the other hand, voters do not request, and may even dislike redistribution increase unless they *perceive* large inequality. Following previous studies of public opinion on redistribution (e.g., Finseraas 2009), I conduct a multilevel statistical analysis with which I can analyze individuals nested in different countries. Furthermore, I example closely the interesting case of Japan. For the first half-century after the Second World War, Japan combined rapid economy growth with remarkably little inequality. Beginning in the late 1980s, growth stopped and inequality rose, but I show that Japanese voters did not update their perceptions about inequality—most Japanese voters severely underestimate inequality.

In Chapter 3, I ask who within a polity underestimates inequality and what consequences does this underestimation have for politics. Previous studies show that people misperceive overall inequality (Chambers, Swan, and Heesacker 2014; Cruces, Perez-Truglia, and Tetaz 2013; Gimpelson and Treisman 2015; Norton and Ariely 2011) or where their own income is in the income distribution (Fernández-Albertos and Kuo 2015). In Japan, there are more people who underestimate inequality than people who overestimate it. Why do Japanese underestimate inequality rather than overestimate it? People living in a relatively equal area are more likely to underestimate inequality than those living in a relatively unequal area. Furthermore, I show that underestimation changes electoral outcomes, demonstrating this by analyzing Japanese data. To reveal demographic and geographical differences in underestimation, I implement multilevel regression and poststratification (Gelman and Little 1997; Ghitza and Gelman 2013; Park, Gelman, and Bafumi 2004) with individual level data collected by Japanese Electoral Study III and aggregate data at the prefectural level. The statistical analysis reveals three things. First, certain demographic and political factors systematically affect the probability of underestimation at the individual level. Second, the

degree of underestimation varies across prefectures in Japan. Third, underestimation of inequality affects electoral outcomes.

In Chapter 4, I show how individuals' income and motivation affect their turnout decisions. The resource theory of turnout predicts that economic inequality leads to unequal political participation between the poor and the wealthy. Because the wealthy can use their resources for political activities, they should be more likely to vote than the poor. Anderson and Beramendi (2008) argue that not only resources but also incentives are important determinants of turnout. However, their analysis does not clearly separate the two effects. To overcome this shortcoming, I separate the impacts of resource and motivation and show their effects on turnout decision, using the cross-national data collected by the World Values Survey. The statistical analysis reveals that both resource and motivation increase the probability of turnout. On the one hand, turnout rises as income increases, as shown by some previous studies (e.g., Anderson and Beramendi 2008; Solt 2008, 2010). This implies that income inequality is a cause of differences in turnout between the wealthy and the poor. On the other hand, motivation (driven by the salience of the outcome for voters) has a positive effect on turnout as well. This effect of motivation on electoral participation is stronger among the wealthy than among the poor. Thus, motivation can further widen the gap in turnout between haves and have-nots.

Lastly, I summarize my arguments and the main findings in Chapter 5. Highlighting the importance of subjective aspects of economic inequality, I will discuss some implications for the study of inequality and redistribution. I offer some recommendations for future research to conclude.

This dissertation shows that it is not only objective inequality but also *subjective* or *perceived* inequality that matters to political behavior. People misperceive inequality, and misperception changes political outcomes. By showing the connection between misperception and redistribution, this dissertation makes two contributions to the political science community. First, it provides the political economy literature on redistribution with another answer for the paradox of redistribution. If people do not know how unequal they are, it is no longer puzzling why governments do not equalize societies, given that governments

respond to citizens' demands. Second, it motivates studies in comparative political behavior to incorporate subjective measures. While scholars of political behavior have long been trying to understand what voters do and do not know, comparative politics has paid too much attention to objective measures of phenomena. This study demonstrates that we sometimes need to study subjective aspects to fully understand politics.

CHAPTER 2

Perceived Inequality and Support for Redistribution

2.1 Introduction

Economic inequality has been rising in many industrialized countries in the past three decades. Thus, following the standard model of redistribution, we expect governments experiencing the rise of economic inequality will increase the amount of redistribution. It is not necessarily the case, however. Cross-national comparisons in the developed world show that the amount of government redistribution does not correspond to the change or level of income inequality. Why do unequal countries not redistribute more than in the past (when they were more equal) or than equal countries do, contrary to the prediction by the standard models (e.g., Meltzer and Richard 1981; Roberts 1977; Romer 1975)?

In this chapter, I argue the amount of government redistribution does not correspond to the level of income inequality because the assumption of the model that voters correctly understand the economic situation in which they reside does not hold. I will demonstrate this by examining survey data and revealing that the level of inequality perceived by the voters vary. Reviewing the literature on the political economy of redistribution, McCarty and Pontusson (2009) put, "[t]he question of whether the lack of information about the link between policy and voters' interests can explain cross-national and temporal variation in redistribution has yet to be explored in any systematic fashion" (p.682). Thus, this chapter provides evidence about how informed voters and uninformed voters differ in support for government redistribution.

Some recent studies show that many people, if not all, fail to understand the level of economic inequality or the income distribution in their countries (Chambers, Swan, and

Heesacker 2014; Engelhardt and Wagener 2014; Fernández-Albertos and Kuo 2015; Gimpelson and Treisman 2015; Niehues 2014; Norton and Ariely 2011). As a result, they do not know if their income is below the mean income of their countries or how far their incomes are from the mean income. The standard political-economy models of redistribution assume that voters have this information, but the assumption seems dubious. Since we are not satisfied with the prediction made by the standard models, the assumption, which enables us to simplify the reality, should be questioned (Gimpelson and Treisman 2015). Without this assumption, we do not have to believe that the level of economic inequality will determine the size of government redistribution. Instead, we expect that the voters' perceptions about economic inequality will affect their demands for redistribution.

Below, I will show that the *perceived* level of inequality affects the demand for government redistribution. More specifically, we expect that voters who *think* the level of inequality in their country is high are more likely to support government-led redistributive policies than those who *think* the level is low, if other conditions are equal. As a result, the level of the support for government redistribution might stay low even when income inequality in a country is rising. Even if income inequality increases, government redistribution might not grow, unless voters correctly perceive rising inequality or incorrectly overestimate the income gap.

The rest of this chapter proceeds as follows. In the next section, I demonstrate the theoretical expectation that perception matters, as well as the main hypothesis of this study. If people are rational in their reasoning but not well informed as assumed by the standard models, what matters to demand for redistribution should not be the objective level of inequality but the subjective level that can be found in their belief. In Section 3, I analyze the data to support the argument. Since we are interested in individual voters living in many different countries, I conduct a multilevel analysis using Bayesian hierarchical modeling. In the model, the first level of the analysis deals with individual voters, and the second, higher level treats the countries as the groups that contain the individual voters. In Section 4, I examine a case study of Japan from the same survey data used in the prior section. Section 5 concludes.

2.2 Redistributive Consequence of Income Inequality

Why does income inequality matter to government redistribution? The standard political-economy model proposed by Meltzer and Richard (1981) predicts that the amount of government redistribution (or tax) increases as income inequality gets larger (see also Roberts 1977; Romer 1975). This is because (1) income distribution is usually skewed to the right,[1] (2) the tax rate determined by the majority voting is a decreasing function of the median-mean income ratio, and (3) higher inequality tends to increase the skewness of income distribution so that the median-mean ratio decreases and the tax rate increases.[2] In other words, rise of inequality tends to decrease the median voter's income, which is usually lower than the mean income, and hence the median voter will demand larger government redistribution in order to shift his disposable income closer to the mean.

However, empirical studies have not necessarily provided us with evidence supporting the theory. Although there exist studies asserting that larger income inequality leads to the larger amount of government redistribution (Aalberg 2003; Milanovic 2000), many studies show that economic inequality does not have a statistically significant effect on government redistribution (e.g., Bénabou 1996; Iversen and Soskice 2006; Moene and Wallerstein 2001, 2003), and some studies even show that economic inequality *decreases* the amount of redistribution (Bowles and Gintis 2000; Bradley et al. 2003; Iversen and Soskice 2006; Moene and Wallerstein 2001, 2003). Hence, this has been "an important unsolved puzzle for comparative political economy" (Iversen 2005, 85). Though we are facing contradictory empirical evidence, the macro-level studies present more evidence opposing the theory than supporting it. That is, the country-level studies tend to tell us that income inequality does not matter to the amount of government redistribution.

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[1]That is, the mean income is larger than the median income. Empirically, this has been always correct in capitalist democracies.

[2]This assumes a mean preserving spread in the income distribution (see, e.g., Lind 2005). Theoretically, we can increase inequality without increasing the skew. Empirically, however, the rising inequality we are currently facing has increased the skew because it has concentrated income in the richest groups of people (Atkinson and Piketty 2007, 2010). For instance, the top one percent fiscal income share in the UK increased from 5.7 percent in 1978 to 15.4 percent in 2007 (World Wealth and Income Database: `http://wid.world`).

This link between income inequality and government redistribution, which these macro-level studies consider, consists of at least two steps: first, the voters change the level of their support for redistribution responding to the level of income inequality, and second, the government responds to the voters' demand. Thus, when we cannot confirm the theoretical expectation, we should know which of these two steps is not followed. This paper focuses on the first step of the link between inequality and redistribution.[3] That is, I examine how income inequality affects support for government redistribution among the voters.

Unlike the macro-level, across-country studies, recent individual-level studies provide evidence that income inequality might matter to voters' demands for government redistribution. Finseraas (2009), for example, finds that inequality measured by the Gini coefficient[4] increases the demand for redistribution, and that interaction between the Gini and a person's income has a significant effect on redistribution.[5] However, we have not yet reached a consensus as to whether income inequality matters to redistribution because some individual-level studies show non-positive effects of inequality on redistribution (Kenworthy and McCall 2008; Lübker 2006).

One possible reason why the standard model fails to explain the reality is that the model assumes fully rational voters, that is, voters who correctly understand the environment that they live in. However, voters might misunderstand the environment in the real world. Some, for instance, might think that income inequality is declining simply because their own income is increasing, even when inequality is rising in their country.

Thus, this chapter incorporates people's perceptions about income inequality into the

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[3]As studies focusing on the second step, see, e.g., Brooks and Manza (2006*a*,*b*); Myles (2006).

[4]Gini coefficient is a measure of inequality, which takes a value between 0 and 1 (or 0 and 100 when rescaled). Higher the value is, the larger the inequality. If all the residents in a society have exactly same amount of income, Gini coefficient will be zero. By contrast, if one person monopolizes all the incomes, the Gini will be one.

[5]See also Rehm (2007, 2011), though the focus of these studies is the unemployment risk rather than inequality itself.

study of redistribution.[6] If the median voter thinks that his income is above the mean, he may not support government taxation and redistribution, even if his income is actually below the mean. Similarly, "if we *perceive* social distribution as just, even though this is not what they are, then nobody will attempt to strive for change" (Wegener 1987, p. 1, sic, italics in original). Using survey conducted in France in 1998, Piketty (2003) shows that many poor people prefer not to tax the "rich" more because they had falsely perceive that there are enough "*super* rich" people so that they can get what they want by increasing tax against only the "*super* rich".

Taking into consideration the possibility that people misperceive the economic situations they confront, I argue that what matters to the support for government redistribution is not the actual level of income inequality in a country but the level of income inequality perceived by the voters.[7] One who thinks the level of inequality in a country (society) is high should be more likely to support redistributive policies than another who thinks it is low. If more people in a given country believe income inequality is smaller than it really is, the amount of government redistribution will stay lower than the Romer-Meltzer-Richard model predicts. Similarly, if voters do not perceive income inequality as rising, even if income inequality is actually rising,[8] the support for redistribution will not be strengthened, and it may be weakened.

Therefore, I propose the following hypothesis. A person is more likely to support government redistribution as his estimate of income inequality increases. What determines an individual's level of support for government redistribution is not the actual level of inequality

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[6] "Inserting the study of factual perceptions into the traditional study of opinions and the newer study of values could fill both theoretical and substantive holes. Theoretically, we know surprisingly little about the relationships among the three elements", and "[s]ubstantively, understanding what people think they know and how they use that "knowledge" would tell us a lot about political choices. People over estimates some facts and underestimate others; they are aware of some institutions and events and unaware of others. Most important, there may well be systematic biases in what people "know" and do not "know"" (Hochschild 2001, p. 333).

[7] Another important aspect to study is the *structure* of inequality instead of the level as Lupu and Pontusson (2011) have shown.

[8] E.g., the Gini coefficients increase.

but his or her individually perceived level of inequality. This is the argument provided by some recent studies (e.g., Engelhardt and Wagener 2014; Gimpelson and Treisman 2015). Here I provide further evidence for this argument by measuring the perceived inequality in ways different from the previous studies.

2.3 Voters' Perception about Income and Inequality

2.3.1 Data

I examine survey data collected by the International Social Survey Programmes' (ISSP) Social Inequality IV module (ISSP Research Group 2011).[9] Among 40 countries included in the original data set, I analyze only the 28 OECD countries: Australia, Austria, Belgium, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Israel, Italy, Japan, Norway, New Zealand, Poland, Portugal, Slovenia, the Slovak Republic, South Korea, Spain, Sweden, Switzerland, the United Kingdom[10], and the United States. The number of respondents is 35,680 in total. However, because there are some missing values in the dataset, the observations with a missing value are omitted from the analysis, and the number of observations left is 24,453.[11]

[9]Full details of the program can be found at `http://www.issp.org`.

[10]The UK is called "Great Britain" in the ISSP surveys.

[11]The complete case analysis (a.k.a. list-wise deletion) undertaken in this study might lead us to biased estimation if missing occurs in some systematic ways (Little and Rubin 1987; van Buuren 2012). I tried to implement multiple imputation, with R packages `mi` and `mice` to avoid such bias, but I have not reached convergence, probably because the number of missing values are large and the variances of the variables that have missing values are quite large. Since list-wise deletion might cause biased results and the reduction of observations is not negligible, the missing mechanism should be modeled within estimated models in the future research in order to make stronger causal inference.

2.3.2 Variables

2.3.2.1 Outcome Variable

The outcome variable used in this study is support for government redistribution. The ISSP asked the respondents: "To what extent do you agree or disagree with the following statements? *It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes.*" Each respondent was asked to choose one of the following five answers: (1) strongly agree, (2) agree, (3) neither agree nor disagree, (4) disagree, or (5) strongly disagree.

Using the answers to this question, I create a dichotomous variable indicating support for government redistribution. In the literature, it is not unusual to use a dichotomous variable created from the answers to multiple-choice questions because the distinction between *strongly agree* (*strongly disagree*) or *agree* (*disagree*) is not clear (see, e.g., Corneo and Grüner 2002; Rehm 2007).[12] Employing this strategy, I consider that those who "strongly agree" or "agree" with the statement support government redistribution, and that the others do not.[13]

2.3.2.2 Explanatory and Control Variables

The main explanatory factor in this study is respondents' perception about income inequality. I argue that one who thinks the level of one's country's income inequality is low should be less likely to support government redistribution than another who thinks the level is high. To obtain respondents' evaluations of their country's level of inequality, the ISSP asked, "To what extent do you agree or disagree with the following statement? *Differences in income in [the respondent's country] are too large.*" Each respondent chose one of the five answers between (1) strongly agree and (5) strongly disagree. Though it seems this question

[12]There are, of course, studies using ordered logit/probit models, but the overall results do not differ. See, e.g., Finseraas (2009).

[13]The proportion of the respondents who support redistribution by country is presented in Table 2.1.

directly measures respondents' perception about income inequality, it is problematic to use this question as an explanatory variable. Because each person might have a different belief about what is large inequality and what is small, we cannot compare the level of perceived inequality across individuals by using this question. For instance, even if person A disagrees with the statement and person B strongly agrees with it, it is possible that these two persons have the exactly same level of income inequality in mind; it is even possible that person A perceives a larger level of inequality than B does. Then, it is possible that the different answers to the question simply reflect the fact that person B would prefer a lower final level of inequality than A. If so, this variable itself might capture support for redistribution, and hence it should not be used to explain the level of redistribution support.

Thus, I use different questions to construct the measures of perceived income inequality. The ISSP asked respondents how much they thought a person with each of the following occupations earned per year: (a) general physician, (b) chairman in a large company, (c) shop assistant, (d) unskilled worker in a factory, and (e) cabinet minister in the national government. Each respondent was asked to give their best guess about the earning of the each occupation. The answers might be incorrect. By examining these answers, we can know how each respondent perceived the income gap between different occupations in their country. If one thought an income difference between occupations was large, one would perceive that income inequality in a country was large, regardless of one's preference for the inequality or redistribution.

To gauge the inequality perceived among the respondents, I use the variance of five incomes answered by the respondents.[14] The variance is calculated for each respondent. If some of five answers were missing, I calculated the variance among the remaining, answered values. Because this variable is skewed to the right, the natural logarithm of the variable is used in the following analyses.

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[14]I choose the variance among many measures of inequality because it is more mathematically tractable than other measures. Because I need to calculate this for about 25 thousands respondents, tractability is important. Although the Theil's entropy index is also easy to compute in general, I cannot calculate it because the income share of each occupation is unknown. To calculate the Theil's index, I need information on what percentage of people each respondent *thinks* has each occupation.

In addition to the questions explained above, the ISSP asked how much they think a person with these occupations *should* earn. I calculate the variance of these "should-earn" amount answered by the respondents as well. This variable is also logged. Then, I take the difference between the two log variances ("do earn" minus "should earn"). The resulting difference shows how much each respondent thinks their country is unequal compared to what it should be. A positive difference implies that a person feels that he lives in an unequal country, and a negative difference means that he would like his country to be more unequal (probably, more competitive). I use this difference as the key explanatory variable in the analysis.

These explanatory variables—and the outcome variable—are summarized in Table 2.1. The perceived level of inequality (the log variance of do-earn answers) ranges from 14.7 (Slovakia) to 34.2 (South Korea).[15] The ideal variation of the earnings (the log variance of should-earn answers) is between 13.04 (Slovakia) and 32.31 (South Korea). And the gap between these two measures is smallest in Estonia (0.95) and largest in Italy (2.92).

Next, I include the variable of household income. According to the standard Meltzer-Richard model, the voters whose income is below the mean should support government redistribution, and the voters whose income is above the mean should oppose it (Meltzer and Richard 1981). Thus, we should control the relative income of respondents in the country. In the literature, household income is usually included in the statistical models (Finseraas 2009; Rehm 2007). I use the household income of the ISSP data. Because the number of family members matters,[16] I divide the income by the square root of the number of families to make adjustment. Then, I standardize the adjusted household incomes, which were recorded in local currency, so that we can compare them across countries. Specifically, I subtract the mean income among the respondents within the country from each family income and then divided it by the standard deviation of the family incomes within the country. That is, I

[15]It is interesting that Korean respondents perceived the largest level of inequality, given that South Korea is one of the most equal countries among OECDs if we look at the pre-tax Gini coefficient.

[16]If the household income is same, the larger the number gets, the poorer the family becomes.

Table 2.1: Perceived and Ideal Levels of Inequality and Redistribution Support by Country Arranged in the Order of the Difference between Perceived and Ideal Earning Variations

	Perceived		Ideal		Difference		Support	
Country	mean	sd	mean	sd	mean	sd	mean	sd
Italy	18.49	2.30	15.59	2.72	2.92	2.56	0.87	0.34
Australia	26.35	2.33	23.67	2.34	2.69	2.33	0.51	0.50
USA	25.52	4.15	22.92	4.03	2.57	3.79	0.33	0.47
France	18.81	3.20	16.61	3.11	2.25	2.62	0.77	0.42
Germany	19.04	3.21	17.07	3.10	2.01	2.62	0.65	0.48
Austria	18.06	2.51	16.09	2.71	1.98	2.42	0.75	0.44
Hungary	27.06	3.34	25.17	3.09	1.95	3.59	0.84	0.37
South Korea	34.22	3.97	32.31	3.89	1.91	3.39	0.75	0.43
Denmark	26.19	1.77	24.93	3.21	1.27	3.03	0.54	0.50
Spain	15.21	3.87	13.39	4.02	1.77	3.88	0.80	0.40
Sweden	21.27	2.18	19.58	2.42	1.76	2.20	0.58	0.49
UK	22.50	3.14	20.80	3.51	1.75	2.74	0.61	0.49
Finland	17.84	1.98	16.17	2.12	1.67	1.75	0.75	0.43
Slovakia	14.67	1.53	13.04	1.90	1.62	1.86	0.75	0.43
Portugal	15.11	4.20	13.60	4.38	1.59	4.06	0.92	0.27
Switzerland	19.63	3.34	18.05	3.02	1.58	3.30	0.63	0.48
Belgium	16.13	1.93	14.56	2.70	1.57	2.38	0.73	0.44
Czech Rep.	21.75	1.47	20.19	1.95	1.55	1.68	0.64	0.48
Chile	29.50	2.91	27.96	4.05	1.51	3.27	0.74	0.44
Iceland	26.35	1.55	24.85	2.68	1.50	2.52	0.72	0.45
Slovenia	15.95	2.09	14.51	2.04	1.44	1.91	0.91	0.29
Japan	32.48	5.35	31.34	6.41	1.44	5.09	0.54	0.50
Norway	26.56	1.98	25.13	2.33	1.42	2.44	0.52	0.50
Poland	18.07	3.15	16.58	2.92	1.39	2.93	0.79	0.41
Israel	19.03	2.36	17.69	2.66	1.35	2.43	0.78	0.41
New Zealand	23.46	1.98	22.42	1.99	1.09	1.89	0.42	0.49
Turkey	15.59	2.76	14.45	2.90	1.09	2.66	0.92	0.27
Estonia	20.46	1.42	19.49	1.73	0.95	1.56	0.78	0.41
All	21.85	6.09	20.07	6.18	1.73	2.87	0.70	0.46

Data source: ISSP Research Group (2011).

obtain the z-score of family income standardized by country. We expect that support for redistribution decreases as income increases.

Thus, I have four different measures related to income: (1) household income, (2) inequality (log variance) of earnings that respondents *think* each occupation is paid (do-earn inequality), (3) inequality (log variance) of earnings that respondents *think* each occupation

should be paid (should-earn inequality), and (4) the difference between do-earn and should-earn inequalities. The standard model predicts that the first measure, household income, will increase the support for government redistribution. They do not pay attention to other measures of subjective inequality. By contrast, I predict that the fourth measure—the perceived difference between do-earn and should-earn inequalities—will increase the support. Because it is possible that perception correctly reflects the actual income and perceived inequality is just another measure of objective income, I control for household income.

Furthermore, I control for several additional factors. First, I add an indicator for gender. It is argued that women are more likely to support welfare policies (Aalberg 2003; Alesina and Giuliano 2011; Blekesaune and Quadagno 2003; Cusack, Iversen, and Rehm 2006; Iversen and Soskice 2001; Linos and West 2003; Rehm 2007; Svallfors 1997). Second, I control for the education level of the respondents with an indicator of the number of years of formal schooling completed. It has been shown that more educated people are less likely to support government intervention (Alesina and Giuliano 2011; Cusack, Iversen, and Rehm 2006; Iversen and Soskice 2001; Rehm 2007). Then, I control for respondents' age. Because the elderly are more likely to depend on the government, mainly through the pension systems, they are though to be more in favor of government redistribution (Alesina and Giuliano 2011; Inglehart 1990; Iversen and Soskice 2001; Rehm 2007). Lastly, I control for the working status of the respondents. Because the degree of dependence on the government is different between those with paid work and those without (Jæger 2006), I create a dummy variable indicating unemployment, retirement, in education, or staying home as homemaker. I expect increase in this variable to boost support for government redistribution. Summary statistics of these control variables can be found in Table 2.5.

2.3.3 Estimated Models with the Multilevel Structure

It is the individual-level support for the government redistribution that we are interested in now. Therefore, the unit of analysis is the respondent participated in the survey. However, because the survey is international, it contains respondents from many different countries.

As a result, we cannot simply compare the respondents with each other because we need to compare people from the same country and from other countries at the same time. To analyze individual-level data clustered by country, I conduct a multilevel analysis.

The final outcome I am interested in is whether respondent i supports government redistribution or not. I denote this by $s_i \in \{0, 1\}$, where 1 means "support." Which value s_i takes is determined probabilistically. Because the outcome is binary, I assume that s follows a Bernoulli distribution:

$$s_i \sim \text{Bernoulli}(\mu_i),^{17}$$

where μ_i is the probability of i supporting redistribution. I would like to explain this probability by the perceived level of inequality (perception) as follows.

$$\mu_i = \text{logit}^{-1}\left(\alpha_j + \delta_j \cdot \text{perception}_i + X_i\beta\right),^{18}$$

where X_i is the row vector of control variables for i-th respondent and β is the 5-element vector of coefficients.

Now note that the parameter α has the subscript j, which identifies the country. The dataset contains 28 countries. Accordingly, there are 28 different α's. To explain the country-level difference in redistribution support, I use two explanatory variables. One is the Gini coefficient, and the other is GDP per capita. First, the Gini is included to examine the effect of the objective inequality on redistribution. As I reviewed above, we have been provided with the contradictory pieces of evidence. I control for GDP per capita because people might be less dependent on the government in rich countries than in poor ones. People in a poor country might think that the government should provide the most basic social security by redistributing tax revenues, while people in a rich country may think that only a few need

[17] I assume that the outcome is generated by the Bernoulli distribution because the outcome is either 0 or 1 for each observation.

[18] $\text{logit}^{-1}(t) = 1/(1 + \exp(-t))$.

government supports to live.[19] The values for these variables are available in Table 2.6 in Appendix.

With these two country-level variables, I model the parameter α with the following normal-linear model:

$$\alpha_j \sim \text{Normal}(\phi_j, \sigma_\phi^2),$$
$$\phi_j = \gamma_1 + \gamma_2 \text{Gini}_j + \gamma_3 \text{GDP}_j.$$

In addition to the varying intercept, I let the slope δ vary. I use the same country-level variables to model δ.

$$\delta_j \sim \text{Normal}(\theta_j, \sigma_\theta^2),$$
$$\theta_j = \lambda_1 + \lambda_2 \text{Gini}_j + \lambda_3 \text{GDP}_j.$$

I estimate α, β, γ, λ, and δ.[20] The parameter δ is our main concern. I estimate the parameters by Bayesian simulations using RStan (Stan Development Team 2016*a*,*b*), which implements Monte Carlo simulations in R (R Core Team 2016). For each model, 2,000 samples, half of which are discarded later as warm-up samples, are drawn for four separate chains. As a result, I get 4,000 samples for each parameter for each model. No clear evidence for non-convergence was detected for any models reported in this chapter by examining trace plots and Gelman-Rubin statistics (a.k.a. $\hat{R}$).[21]

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[19]This could be also where perception matters. Even in a very rich country, there could be a lot of people suffering from poverty.

[20]I also estimate σ_ϕ, σ_θ, and some hyper-parameters. The full model specifications are provided in Appendix.

[21]It is widely accepted that a model is considered as converged if $\hat{R}$ is less than 1.1 for all parameters in the model. As shown in the tables in Appendix, the values of $\hat{R}$ is smaller than 1.1 for all the parameters in this chapter.

2.3.4 Results

First, let us look at the result with varying intercept and fixed slope for perception, when I use the log variance of the actual earnings perceived by each respondent (do-earn inequality) as the explanatory variable. I do not include the country-level variables at this point. Figure 2.1 shows the posterior distribution of δ, the effect of perceived inequality on redistribution support.[22] As shown in the figure, the posterior samples distribute around zero, which means that I cannot find any effect that is statistically significant. Because the perception is measured by the variance of earnings, this result is not surprising.[23] Thinking that the amount of earning varies across occupations is not enough to support redistribution. To support government redistribution, an individual must also think that the variation is large. To judge if the variation is large, they need a criterion or reference point.

Thus, I replace the explanatory variable used above with the difference between the "perceived" variance of earnings and the ideal variance (do-earn inequality minus should-earn inequality).[24] Now, the ideal variance is used as a reference, and I can measure each respondent's perceived level of income inequality that exceeds the ideal. Figure 2.2 presents the posterior distribution of the effect of this variable.[25] The entire distribution is above the vertical red line of zero effect; it is now clear that the perception increases the support for government redistribution.

Next, I add the country-level variables to explain the varying intercept.[26] Figure 2.3 shows the main result. We can see that the perception matters to redistribution support even after controlling for the country-level objective measure of inequality. This implies that

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[22]Estimates for the other variables are available in Table 2.7.

[23]The results does not change if we add the country-level variables to this model.

[24]As explained above, the difference was calculated after taking natural log of each measure.

[25]The model specifications and the estimates for the other variables are provided in Appendix, where this model is called Model 2.

[26]The detailed model specification and full results are provided in Appendix, where this model is called Model 3.

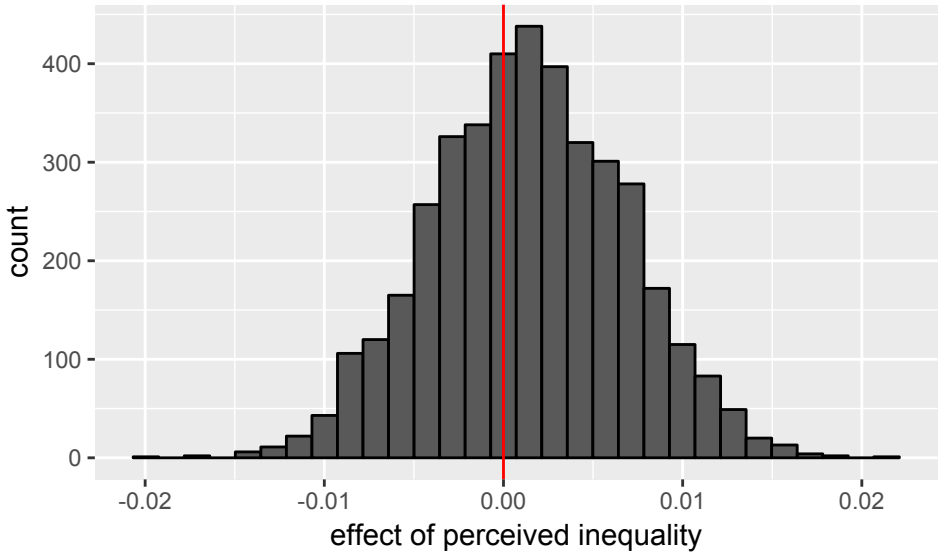


Figure 2.1: Posterior Distribution of the Effect of Perceived Income Inequality on Support for Redistribution. *The outcome variable is the binary variable indicating support for government redistribution. Perception is measured by the natural log variance of five different occupations' earnings. The vertical red line is added to highlight the zero effect..*

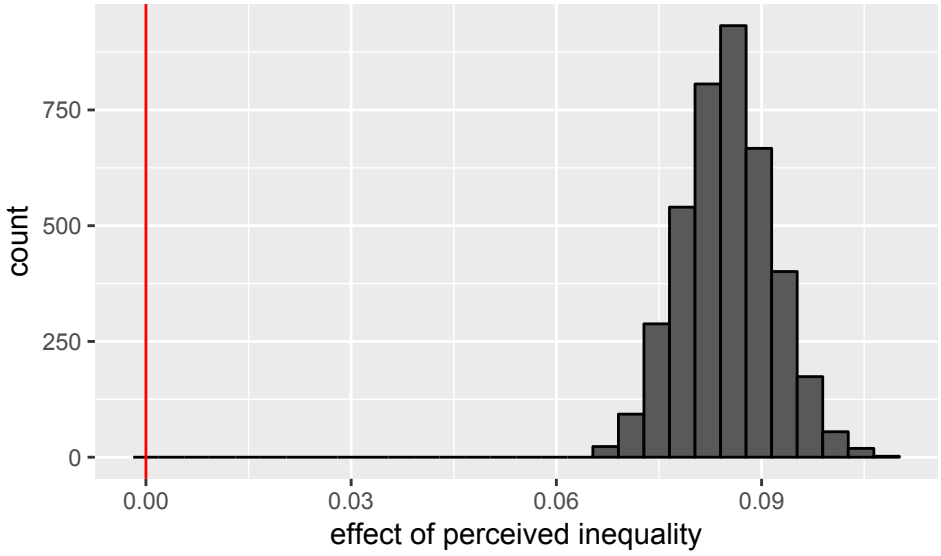


Figure 2.2: Posterior Distribution of the Effect of Perceived Income Inequality on Support for Redistribution with Perception Measured by the Difference between Do-earn and Should-earn Inequalities. *The outcome variable is the binary variable indicating support for government redistribution. Perception is measured by the difference between the natural log variance of five different occupations' earnings and the natural log of the ideal variance of the earnings. The vertical red line is added to highlight the zero effect.*

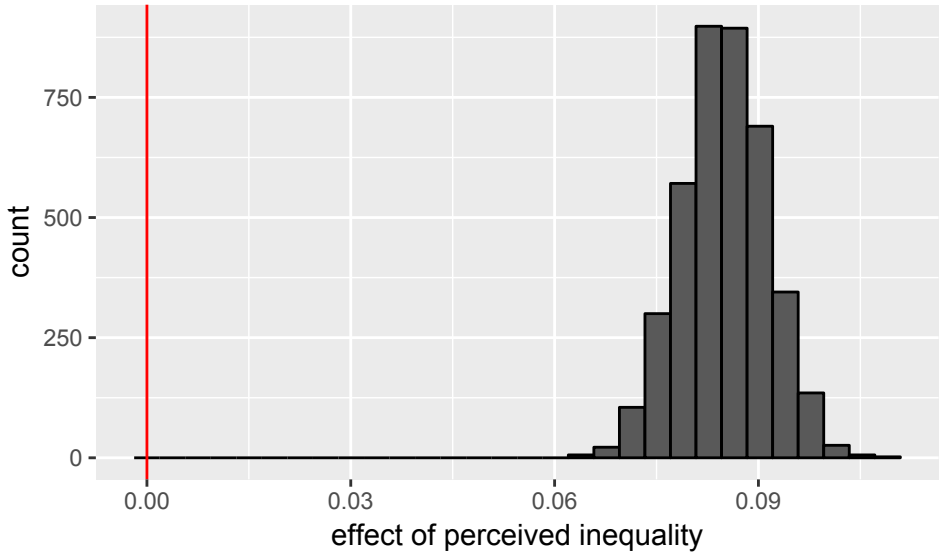


Figure 2.3: Posterior Distribution of the Effect of Perceived Income Inequality on Support for Redistribution with Country-Level Variables. *The outcome variable is the binary variable indicating support for government redistribution. Perception is measured by the difference between the natural log variance of five different occupations' earnings and the natural log of the ideal variance of the earnings. The country-level Gini coefficient and GDP per capita are included in the model to let the intercept vary.*

people might strengthen or weaken their demand for government redistribution regardless of the objective level of income inequality. Or people might not change their preferred level of government redistribution even in an era of rising inequality.

Lastly, I let the effect of perception vary across countries.[27] Figure 2.4 presents the main result. Overall, the effect seems positive. The effect of perceived inequality on the support for redistribution is not negative in any country. However, it is revealed that the effect cannot be distinguished from zero in seven countries: Chile, Hungary, Israel, Japan, South Korea, Spain, and the U.S. In the other twenty-one countries, the support for government redistribution gets stronger as the perceived level of inequality grows. Why do we observe the varying effects?

Since my model has two country-level variables, let us examine the effects of these variables on the effect of perceived inequality. Figure 2.5 displays the posterior distributions of

[27]The detailed model specification and the entire results are provided in Appendix, where this model is called Model 4.

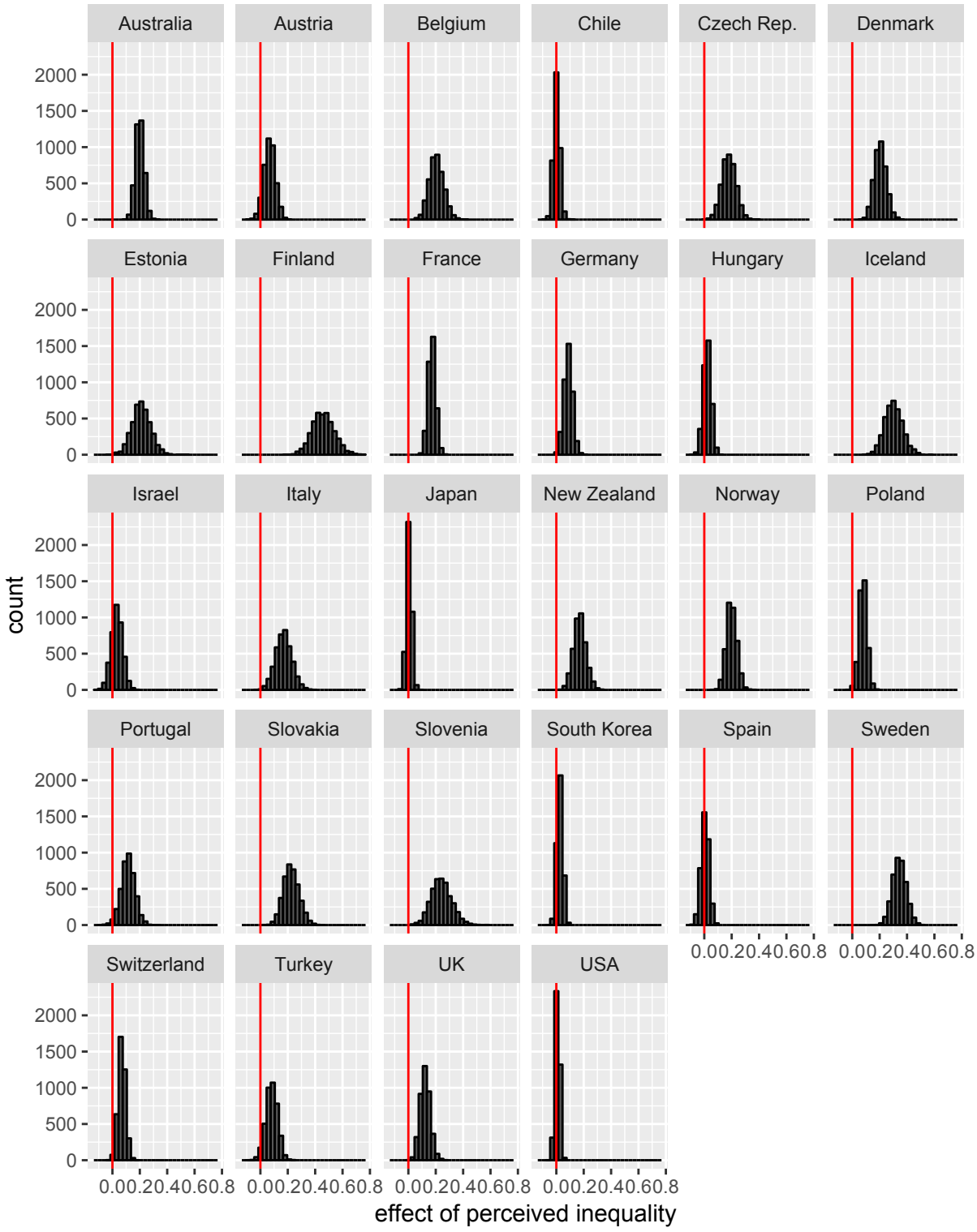


Figure 2.4: Posterior Distributions of the Effects of Perceived Inequality on Redistribution Support across 28 Countries.

the country-level effects obtained by Model 4.[28] Panel (a) in the figure shows the posterior distribution of estimated coefficients of the Gini coefficient on the slope for perception. As can be seen, nearly all (98.8 percent) of the distribution is below zero, which means that higher actual inequality decreases the effect of perception.

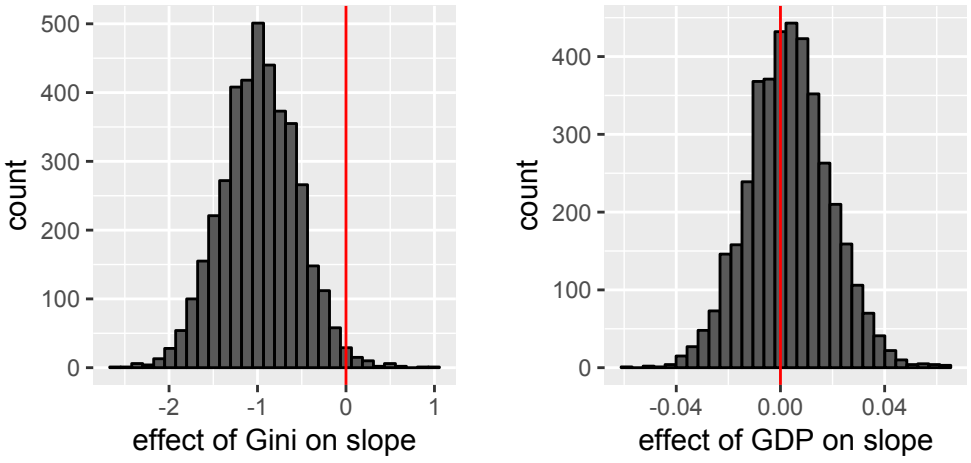
In other words, inequality at the country level attenuates the effect of perception on the support for redistribution in a given country. This relationship between inequality and the effect of perception is presented in Figure 2.6. This figure shows how the effect of perceived inequality changes as inequality (the Gini) increases in a country. In this figure, the horizontal axis is the Gini coefficient, and the vertical axis is the size of the effect of perceived inequality on the support for government redistribution. The line shows the median estimate of the effect given the value of the Gini coefficient. The shaded area around the line shows the uncertainty of the estimates (the central 90 percent of the distribution). We can see that the effect decreases as a country's inequality worsens. Eventually, perception does not matter in a highly unequal society. However, because most countries have Gini coefficients between 0.2 and 0.5, it is unlikely that the effect is reversed in an unequal society.[29]

As shown in Panel (b) of Figure 2.5, GDP per capita does not affect the slope. But it has a negative effect on the intercept, which means that people are less likely to support government redistribution as their country gets richer. In contrast, Gini does not have any effect on the intercept. That is, the country-level objective level of inequality does not increase or decrease the level of redistribution support.

Finally, Figure 2.7 displays the predicted probabilities of supporting government redistribution versus the perceived level of inequality, as measured by the difference between the perceived and ideal variances. The black curve shows the median estimate of the predicted probabilities. The shaded area around the curve is the 90-percent uncertainty of the esti-

[28]See Appendix, Section 2.6.2.3 for model specification.

[29]In the dataset, only Turkey has a Gini larger than 0.4. Even at a Gini of 0.5, the effect is not negative but indistinguishable from zero.



(a) Effect of Gini

(b) Effect of GDP

Figure 2.5: The Posterior Distributions of the Country-level Effects on the Slope of Perception

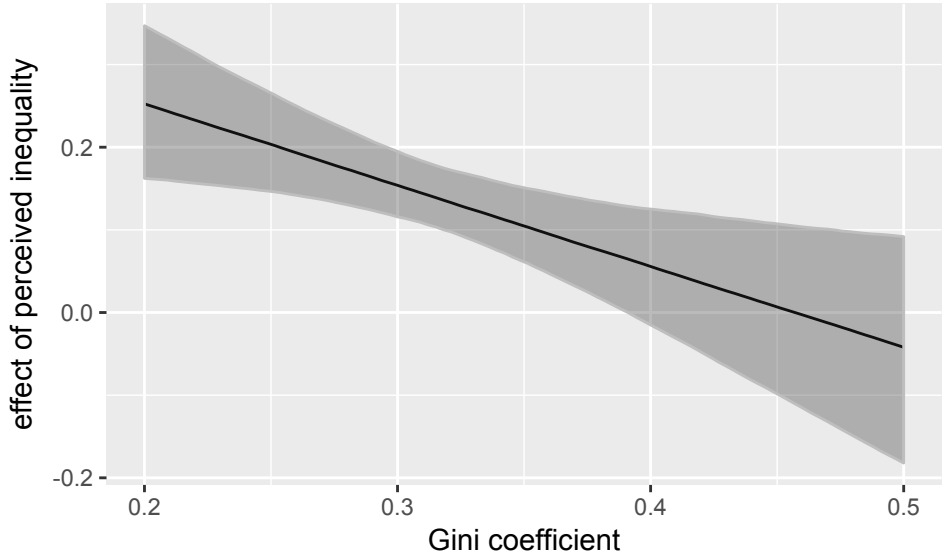


Figure 2.6: Effect of Perceived Inequality vs. the Gini Coefficient. *The line shows the median estimates of the effect of perception on redistribution support given the value of Gini. The shaded area around the line is the 90 percent uncertainty of estimates.*

mates. The income value is set to zero,[30] the female value is set to 0.5,[31] and the values of education, age, and unemployment are set to their means. The values of the country-level variables are set to the observed values, and hence the different values are used in different countries. For each country, the figure shows the predicted values in the range of perception that is observed in the country.[32] For some countries, perception really matters to redistribution support; the probability of supporting government redistribution increases from almost zero to almost one across the range of perceived inequality in Australia, Belgium, the Czech Republic, Denmark, Estonia, France, Germany, Norway, New Zealand, Slovenia, Sweden, Switzerland, and the UK. The importance is more modest for some other countries such as Austria and Poland. There are countries where the perception does not seem to be an important factor to determine redistribution support. In Turkey, government redistribution is popular regardless of perception. By contrast, it is disliked regardless in the U.S.

To sum up, the perceived level of income inequality affects the support for redistribution. A person who *thinks* inequality is larger than it should be is more likely to support government redistribution than a person who *thinks* it is not. By controlling for the objective level of inequality, I have found that the subjective level of inequality is an important driving force of the support (or demand) for government redistribution. The multilevel models have revealed that the effect of perception varies across countries.

2.4 A Case Study of Japan

To explore another aspect of perceived income inequality among voters, I now focus on the Japanese respondents. Japan is an interesting case. It had been one of the most equal countries for a long period of time, but it is now an "average" country among OECDs regarding income inequality. Income inequality in Japan started rising in 1980s, but only

[30]This is because the income variable in our data set is z-score.

[31]This is because we are not interested in gender difference.

[32]Predicted probabilities for the entire observed range of the whole data set is provided in Figure 2.12.

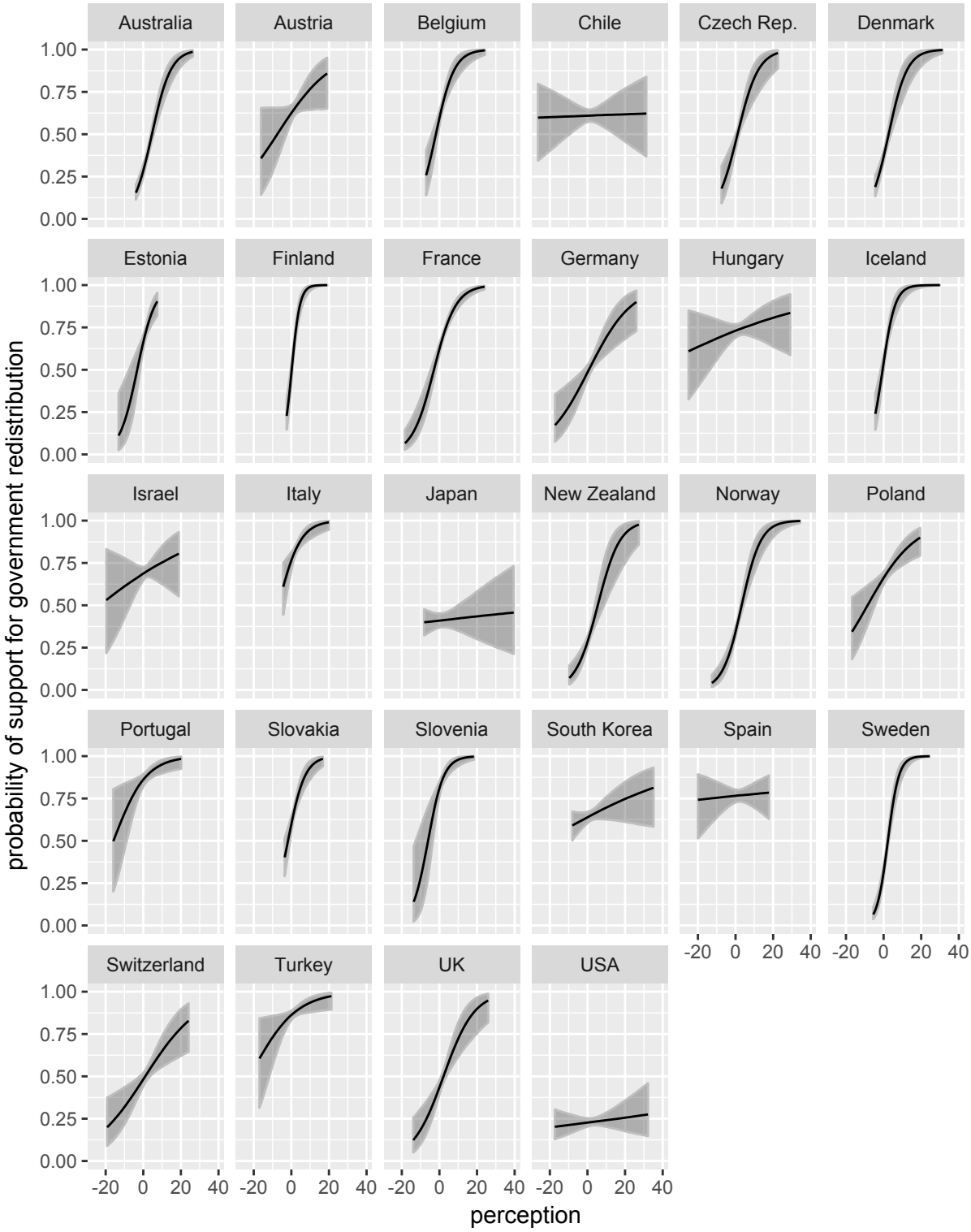


Figure 2.7: Predicted Probabilities of Redistribution Support. *The black solid curve shows the median estimate of the predicted probability. The shaded area around the curve represents the 90 percent uncertainty of the estimates.*

a small proportion of the population realized that before 2000s. This section reveals how mis-informed Japanese are about their income inequality.

2.4.1 Variables

The outcome variable used is again support for government redistribution. I utilize the same ISSP question used above. The main explanatory factor here is again the perceived level of inequality. I use the same questions used for multilevel analysis above but construct different measures of perceived inequality.

Figure 2.8 shows the distributions of answers by Japanese respondents to the question regarding occupational incomes. The mean income of each occupation in Japan is shown in Table 2.2. Overall, the means of the answers are close to the means of factual incomes. That is, the collective guess about occupational income seems accurate. However, some respondents' guesses are wildly off from the factual mean. Thus, it is worth considering individual-level perception about incomes more carefully.

Here, I consider five ideal types of perception about income inequality as shown in Figure 2.9, in keeping with the spirit of Osberg and Smeeding (2006). First, a person might perceive the incomes correctly (the black solid line in the figure). If all voters have this type of perception, rising inequality should increase demand for redistribution.[33] Second, people might overestimate the incomes for all occupations (the orange dashed line). Third, people might underestimate the income for all occupations (the green line). Fourth, some might think inequality is larger than the factual level of inequality (the steep red line). These people overestimate the incomes of high-income occupations and underestimate those of low-income occupations. Finally, there are citizens who think income inequality is smaller than the truth (the blue line). These people overestimate the incomes of low-income occupations and underestimate those of high-income occupations.

Comparing these answers to the factual mean income of each occupation, I construct

[33]In the standard political-economy model, it is sufficient that the median voter knows that his income declines further from the mean income in order to increase his demand.

Figure 2.8: Perceived Earnings of Five Occupations. *These box-and-whisker plots show the distributions of the perceived earnings of five occupations: unskilled worker, shop assistant, general physician, chairman of a large company, and minister of the national government. The vertical axis is the logged earning of the respondent's guess of each occupation in Japanese Yen. Black points are possible outliers, which are more than 1.5IQR away from the bottom or upper quartile. Japanese respondents think that an unskilled worker is paid the least, and that a cabinet minister the most. In fact, the average income of the unskilled workers is the lowest among five occupations in Japan, and that of the ministers is the highest. That is, Japanese respondents, on average, have correct perception of the order of occupational earnings. In some countries, a shop assistant is paid the least, and/or a chairman is paid the most.*

two different measures of perception about income inequality at the individual level. First, I consider how many occupational incomes a respondent overestimates or underestimates, and create an index of perceived income inequality. Among the five occupations asked about in the ISSP survey, unskilled factory workers and shop assistants are occupations whose wages are below the mean income of the country, while the other occupational incomes are above the mean. Therefore, if one overestimates the incomes of the first two occupations and underestimates those of the last three, one's perceived income inequality should be smaller than the actual inequality. In contrast, if one underestimates the incomes of poor occupations and overestimate those of rich occupations, then one overestimates inequality. Therefore, to create the index of perceived income inequality, I add one point if a respondent overestimates a rich income or underestimates a poor income. Similarly, I subtract one

Table 2.2: Occupational Incomes

Occupation	Mean[a]	Log value	Source
Cabinet minister	37,530	17.44	Nensyū Labo, 2010[d]
Chairman[b]	32,000	17.28	Sanro Research Institute, 2005[e]
General physician	11,410	16.25	Nensyū Labo, 2010[d]
Shop assistant	3,200	14.98	Nensyū Labo, 2010[d]
Unskilled worker[c]	2,481	14.72	ILO's ILOSTAT[f] and Statistics Bureau of Japan[g]

[a] Unit is 1,000JPY.
[b] Chairman of small companies are also included. Therefore, the mean income of chairman of large companies might be higher.
[c] Wage of workers in manufacture of wearing apparel is used. Wages of other manufacturing industries are similar. Since the gender gap in wage is large, the mean is calculated by weighting wages of each gender by the proportion of working population of each gender in the industry.
[d] `http://nensyu-labo.com/`
[e] `http://www.e-sanro.net/`
[f] `http://ilo.org/ilostat/`
[g] `http://www.stat.go.jp/english/index.htm`

point if a respondent underestimates a rich income or overestimates a poor income. Since we have answers for five occupations, the range of the variable is -5 to 5. Table 2.3 shows the distribution of the variable. The variable is created only for those who provided answers to all of five occupational income questions. A respondent who takes the value of 5 on this variable is thought to overestimate the level of income inequality in his country. In contrast, one with -5 is thought to underestimate income inequality.[34] As Table 2.3 shows, more Japanese respondents think income inequality is smaller than the actual level of inequality among five occupations. I expect that support for redistribution grows as this variable gets larger.

Second, I regress the guesses of occupational incomes of each respondent i on the factual mean incomes of the occupations in order to construct dummy variables that categorize

[34]Zero does not mean there is no inequality. Instead, it means that a respondent correctly understand the level of income inequality of his country. However, since nobody answered an occupational income exactly correctly, and the number of questions is odd, we do not have the value of zero in the dataset.

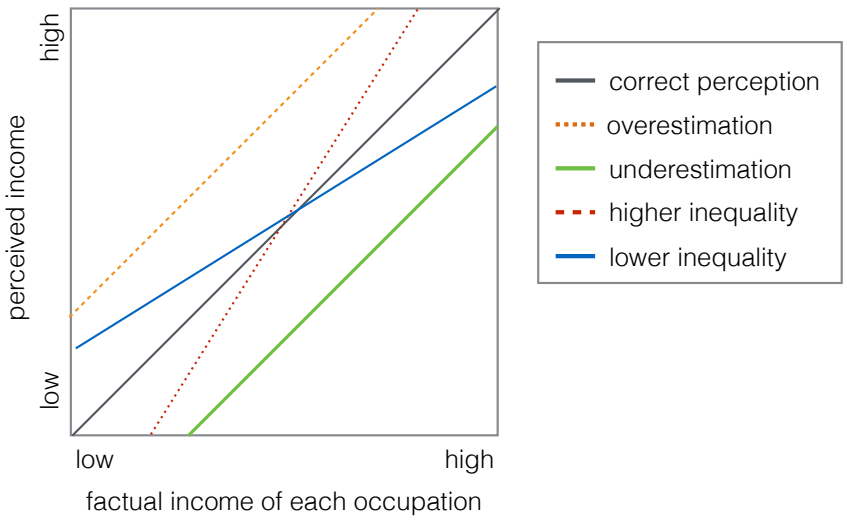


Figure 2.9: Types of Perception about Income. *The horizontal axis is the factual earnings of different occupations. The vertical axis is the perceived earnings of the occupations. If one knows exactly how much each occupation earns, the values on the horizontal and vertical axes should agree, and his perception is described by the 45-degree line, which is represented by the gray solid line. If a person tends to think other people earn more than they actually do, he overestimates the income overall. This overestimation is represented by the orange, dashed line. In contrast, he might underestimate the earnings of all occupations. The underestimation is shown by the green solid line. Then, one can overestimate some occupations' earnings and underestimate the other. If he overestimates the earnings of the rich and underestimates those of the poor, he would think the level of inequality is higher than in reality. This situation is shown by the red dotted line. Alternatively, he might overestimate the earnings of the poor and underestimate those of the rich. Then, he should think inequality is smaller than it actually is. This is represented by the blue solid line. These five lines are merely ideal types. Thus, I do not argue that these are only possible types. Rather, one can think many other situations including those represented by curves instead of straight lines.*

respondents in accordance with perception on inequality.[35] Using a 2-column matrix X whose first column has 1's for the intercept, I will estimate the respondents' perception of the income distribution by

$$Y_i = XB_i + \epsilon_i,$$

for each i. In this equation, Y_i is a 5-element column vector of the i-th respondent's answers

[35]In other words, this linear regression is *not* for inference regarding a population but for description of each individual.

Table 2.3: Index of Perceived Inequality

	Underestimate inequality			Overestimate inequality		
Score	-5	-3	-1	1	3	5
Number	25	128	181	138	65	18
Percentage	5	23	33	25	12	3

* Negative values mean that one perceives his country's income inequality is smaller than the factual level, and positive values mean that one perceives it is larger than the factual level.

of occupational incomes:

$$Y_i = (\text{unskilled}_i, \text{shop assistant}_i, \text{physician}_i, \text{chairman}_i, \text{minister}_i)^T,$$

X is the matrix of explanatory variables of which the first column is 1's and the second column has the means of the observed incomes of the five occupations in Japan:[36]

$$X = \begin{pmatrix} 1 & \overline{\text{unskilled}} \\ 1 & \overline{\text{shop assistant}} \\ 1 & \overline{\text{physician}} \\ 1 & \overline{\text{chairman}} \\ 1 & \overline{\text{minister}} \end{pmatrix},$$

B_i is the row vector of coefficients:

$$B_i = (a_i, b_i),$$

and ϵ_i is the error term.[37] In other words, this is a simple regression where the outcome is the perceived income, and the explanatory variable is the objectively observed income.

[36]The incomes are reported in Table 2.2. The matrix X is fixed for all respondents.

[37]Respondents who answered at least two occupational incomes are used to create this variable.

Calculating the OLS estimates for each respondent, I ask which line in Figure 2.9 resembles each of the estimated OLS lines best. I classify each respondent's fitted line into four types with two criteria. The first criterion is whether a respondent overestimates the unskilled workers' income.[38] In Japan, the unskilled worker is the lowest-income occupation among the five.[39] Thus, I gauge how respondents evaluate the income of the poor by looking at their guesses on the unskilled workers' income. The second criterion is the slope of the fitted line. If the slope is steeper than 1, it implies that a person thinks the income difference among the occupations is larger than the actual income. On the contrary, if the slope is less than one, it means that a respondent perceives that the income difference is smaller. Based on these criteria, we can create four dummy variables as shown in Table 2.4. The table shows that most people belong to Type 3, which is the group of people who think the poor earn more than they really earn and income inequality is smaller than it really is. Hence, these people are not expected to support government redistribution. Among the four types, people belonging to Type 4 should be most likely to demand a large amount of government redistribution. In sum, I expect that Types 2 and 3 weakens support for government redistribution, and that Types 1 and 4 strengthen it.

Because I have only the small numbers of respondents for Types 2 and 4, I create a dichotomous variable based on these types and use it in the statistical model. The variable is called "underestimation", and it takes the value of one if the type is either 2 or 3 and zero otherwise.

The control variables used for the analyses are the same as above: family income, gender, education, age, and unemployment status.

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[38] I compare $\hat{a} + \hat{b} \times$unskilled worker's mean income, which is the estimated income of an unskilled worker, with the mean income of the unskilled workers. If the former is greater than the latter, it means that a respondent overestimates the income of the unskilled workers.

[39] There are countries where the shop assistant is paid less than the unskilled manufacturing worker.

Table 2.4: Four Types of Income Perception

Estimate of income gap	Estimate of unskilled workers' income: overestimate	Estimate of unskilled workers' income: underestimate
$\hat{b} > 1$	322 (Type 1)	47 (Type 4)
$\hat{b} < 1$	427 (Type 3)	2 (Type 2)

* People belonging to Type 4 are most likely to support redistribution. Type 1 should follow Type 4. Type 3 is least likely to demand government redistribution because they overestimate the income of the poor and underestimate the income gap between the poor and the wealthy.

2.4.2 Estimation Methods and Results

2.4.2.1 Methods

Using the variables described above, I examine the effect of the perception of inequality on support for the government redistribution. Because the outcome variable is dichotomous and I am interested in the individual-level probability of support for redistribution, I use a logit model, assuming that logit can be expressed in some linear forms. That is, I suppose that

$$\text{Support}_i \sim \text{Bernoulli}(\theta_i),$$

and

$$\theta_i = \text{logit}^{-1}(\boldsymbol{x}_i\boldsymbol{\beta}),$$

where θ_i is person i's probability of redistribution support, $\boldsymbol{x}_i$ is a vector of explanatory and control variables for i, and $\boldsymbol{\beta}$ is a vector of coefficients for these variables.[40]

[40] A probit model yields the similar results.

2.4.2.2 Results

Figure 2.10 shows the results of the logit model estimations.[41] Model 1 is the baseline model that does not include any variable measuring perception of income inequality. As the standard model predicts and some previous individual-level studies showed, support for government redistribution decreases as income increases.[42]

In Model 2, the index of perception of inequality is added to Model 1. Income still has a statistically significant effect: wealthier respondents are less likely to support government redistribution than poorer respondents. In addition, it is shown that perceived inequality matters.[43] Japanese who overestimate income inequality are more likely to support government redistribution. Or those who underestimate the inequality are less likely to support it. This implies that demand for redistribution increases as perceived level of income inequality rises, perhaps regardless of the actual level of income inequality.

Panel (a) of Figure 2.11 presents the predicted probabilities of support for government redistribution estimated by Model 2. The vertical axis represents the probability of support for redistribution, and the horizontal axis is the logged income in Japanese Yen. When a person correctly perceives the level of income inequality, his probability of support for redistribution ranges from about 0.65 when he is poor to about 0.4 when he is rich. If he perceives inequality to be much larger, the probability increases by about 0.1, keeping his income constant. On the contrary, if he perceives inequality to be much smaller, the probability decreases by about 0.1, his income being equal.

Finally, Model 3 adds the dummy variables for underestimation of income inequality to Model 1.[44] Again, income is a statistically significant predictor of support for redistribution. In addition, the dummy variable of underestimation has a statistically significant effect on

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[41]Table 2.14 in an appendix presents the full results.

[42]The effect is statistically significant: $p < .0001$.

[43]The effect is barely statistically significant: $p < .10$. Substantive significance is, however, not negligible.

[44]The dummy indicates a respondent belonging to Type 2 or Type 3.

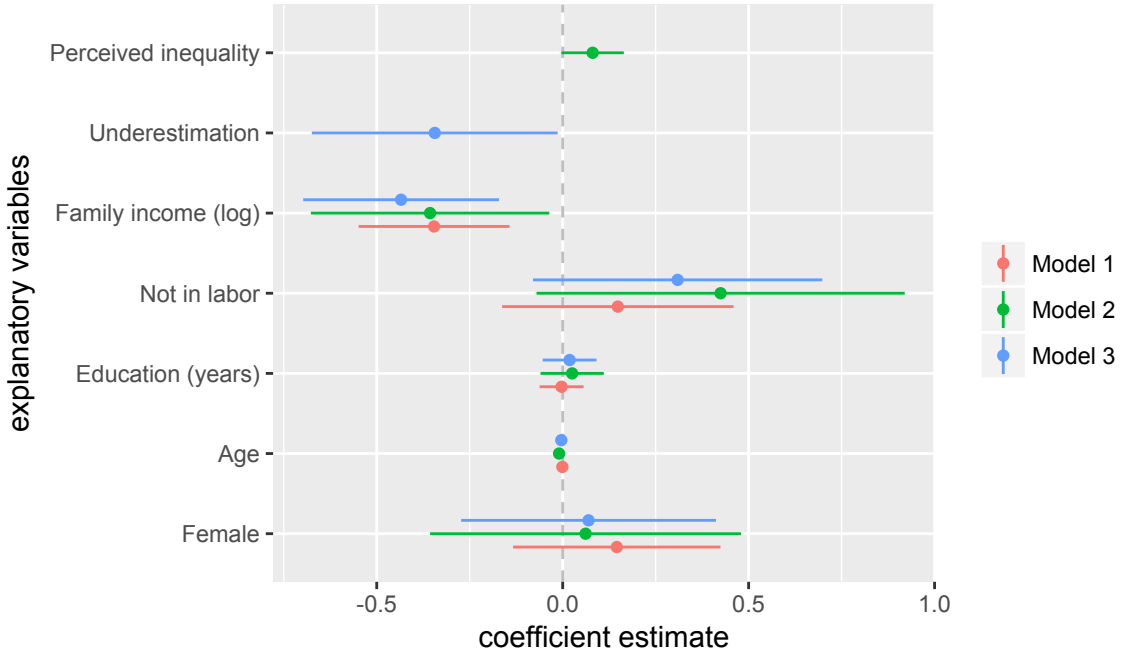


Figure 2.10: Estimation Results of the Logit Models. *The outcome variable is support for government redistribution. Each point represents a point estimate. The line segments attached to the points are 95 percent confidence intervals. The values of the point estimates and robust standard errors are available in Table 2.14 in Appendix.*

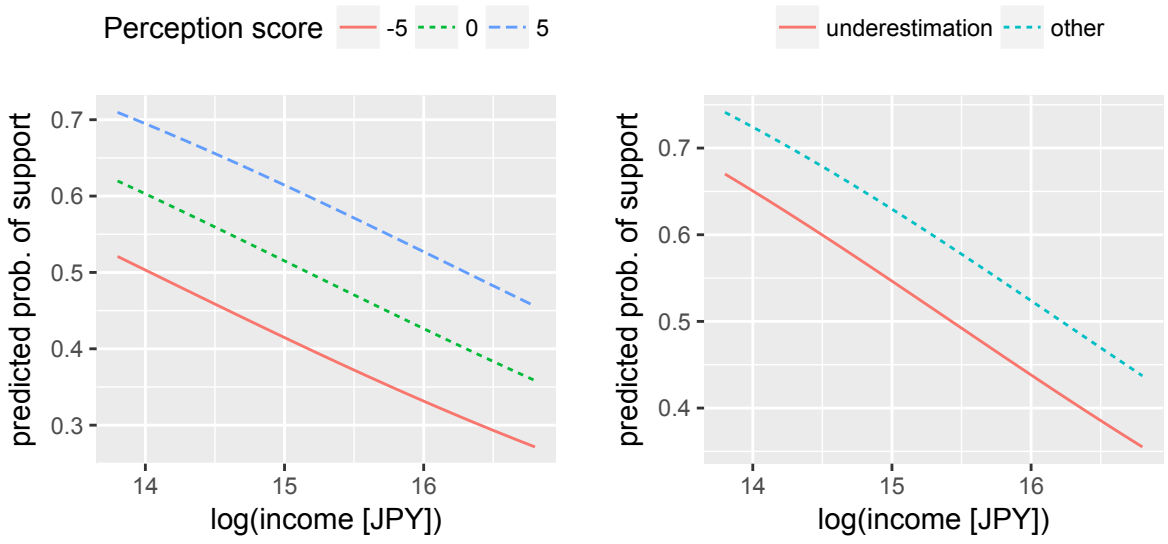
the outcome variable.[45] As we expected, Japanese who underestimate the country's income inequality are less likely to support government redistribution.

Panel (b) of Figure 2.11 shows the predicted probabilities of support for redistribution estimated by Model 3. Again, the vertical axis represents the probability of support, and the horizontal axis is the logged income in Japanese Yen. Shifting from "others" (Type 1 or Type 4), to "underestimation" (Type 2 or Type 3) decreases the probability of supporting government redistribution by about 0.08. That is, if one underestimates inequality, one's probability of supporting redistribution drops by about 8 percentage points.[46]

In sum, the statistical analysis shows that perception of income inequality matters to support for redistribution. Despite inequality has risen, many Japanese underestimate inequality. Japanese citizens who underestimate inequality support government redistribution

[45] $p < 0.05$.

[46] Controls show statistically significant effects in no model.



(a) Model 2

(b) Model 3

Figure 2.11: Predicted Probabilities of Support for Redistribution. *In either panel, the horizontal axis is logged income in Japanese Yen, and the vertical axis is the probability of supporting government redistribution. These figures show how the probability of redistribution support changes as the level of income changes. As the Meltzer-Richard model predicts, it is shown that the support for redistribution is a decreasing function of income. In addition, the figure shows how the probability of support shifts as one's perceived level of inequality changes. Panel (a) tells that the probabilities of redistribution support gets higher among those who overestimate inequality than those who underestimate it. In Panel (b), it is presented that a person is more likely to support redistribution if his perception type is 1 or 4 (others) than if the type is 2 or 3 (underestimation).*

less than people who accurately perceive (or overestimate) inequality.

2.5 Conclusion

In this chapter, I have examined the determinants of support for the government redistribution at individual and country levels. Using the ISSP survey data, I investigated if the individually perceived level of inequality affects one's support for redistribution.

Through a multilevel analysis using the ISSP survey, I have shown that in general the level of individually perceived inequality affects the level of the support for government redistribution. As perceived inequality rises, the support is strengthened. However, this

result does not necessarily apply to all OECD countries. In addition, the strength of the effect varies across countries.

A case study of Japan reveals that many people underestimate the level of income inequality, and that those who underestimate income inequality are less likely to support redistribution. That is, underestimation of income inequality decreases the amount of demand for government redistribution. If the government responds to voters' demands, such underestimation might decrease the amount of redistribution by the government. This could be a reason why we do not necessarily observe expansion of redistributive policies in an era of rising inequality.

As the standard Romer-Roberts-Meltzer-Richard model predicts, it turns out that income affects the level of support for redistribution: the poor demand redistribution more than the wealthy do. The standard model, however, overlooks the possibility that people do not understand how unequal their society is. Thus, in this chapter, I have measured people's perceptions about income inequality and examined how those perceptions affect the level of support for redistribution. It is not only the objective level of inequality but also the subjective perception of inequality that affects the support and demand for government redistribution.

2.6 Appendix

2.6.1 Data

Table 2.5: Summary Statistics of Individual-level Variables

	Income		Female		Education		Age		Unemployment	
Country	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Australia	−0.06	0.69	0.57	0.50	13.63	3.73	52.53	16.78	0.46	0.50
Austria	−0.12	0.76	0.53	0.50	11.47	2.55	45.06	17.08	0.42	0.49
Belgium	−0.08	0.66	0.51	0.50	12.72	3.30	48.88	17.63	0.45	0.50
Chile	−0.02	0.56	0.58	0.49	10.76	4.41	46.56	17.64	0.47	0.50
Czech Rep.	−0.09	0.69	0.55	0.50	12.51	2.42	46.79	16.78	0.50	0.50
Denmark	−0.10	0.71	0.53	0.50	12.88	4.52	50.21	16.96	0.40	0.49
Estonia	−0.08	0.73	0.65	0.48	12.64	3.41	50.94	18.76	0.51	0.50
Finland	−0.04	0.63	0.55	0.50	12.88	4.53	47.62	16.46	0.43	0.50
France	−0.04	0.70	0.51	0.50	13.65	4.74	55.06	15.66	0.50	0.50
Germany	−0.08	0.71	0.50	0.50	11.02	3.51	49.55	17.90	0.47	0.50
Hungary	−0.08	0.65	0.54	0.50	11.80	3.08	46.17	15.93	0.49	0.50
Iceland	−0.07	0.66	0.52	0.50	14.20	4.20	46.06	17.34	0.32	0.47
Israel	−0.03	0.61	0.53	0.50	12.85	3.19	43.45	17.53	0.43	0.50
Italy	−0.03	0.61	0.54	0.50	13.77	6.15	48.33	17.06	0.46	0.50
Japan	−0.05	0.59	0.53	0.50	12.80	2.57	49.22	17.59	0.41	0.49
New Zealand	−0.06	0.68	0.56	0.50	13.97	3.11	50.58	17.01	0.32	0.47
Norway	−0.01	0.63	0.52	0.50	14.57	3.26	47.43	15.40	0.31	0.46
Poland	−0.04	0.61	0.54	0.50	11.88	3.04	45.95	17.10	0.47	0.50
Portugal	−0.08	0.70	0.60	0.49	8.99	5.09	49.38	18.11	0.40	0.49
Slovakia	−0.08	0.65	0.60	0.49	12.72	2.41	46.27	16.33	0.47	0.50
Slovenia	−0.08	0.59	0.55	0.50	11.75	3.63	46.66	17.82	0.46	0.50
South Korea	−0.04	0.63	0.52	0.50	12.67	3.47	43.51	15.25	0.40	0.49
Spain	−0.05	0.65	0.51	0.50	12.51	6.51	47.09	17.89	0.58	0.49
Sweden	−0.08	0.69	0.52	0.50	12.61	3.63	48.46	16.34	0.31	0.46
Switzerland	−0.12	0.78	0.55	0.50	11.42	3.62	50.07	17.66	0.36	0.48
Turkey	−0.01	0.58	0.53	0.50	7.67	3.52	41.19	15.47	0.63	0.48
UK	−0.07	0.72	0.56	0.50	12.37	2.95	50.13	17.20	0.46	0.50
USA	−0.05	0.68	0.55	0.50	13.62	2.90	49.53	17.07	0.42	0.49
All	−0.06	0.67	0.54	0.50	12.41	4.12	48.21	17.21	0.44	0.50

Note: Income is the household income adjusted by the household size. Because the unit of measurement differs across countries, the variable is standardized. Female is a dummy variable. Education represents the years in shcoool. Unemployment is a dummy variable indicating that the respondent is not on paid job, which include the retired or students. Data are taken from the ISSP Research Group (2011).

Table 2.6: Country-level Variables and the Number of Observations

Country	Gini	GDP per capita	Respondents
Australia	0.32	3.40	1,112
Austria	0.26	3.82	692
Belgium	0.27	3.70	814
Chile	0.51	0.77	1,088
Czech Rep.	0.26	1.33	777
Denmark	0.23	4.88	1,066
Estonia	0.34	1.03	754
Finland	0.26	3.90	556
France	0.29	3.49	2,057
Germany	0.30	3.47	940
Hungary	0.29	1.12	669
Iceland	0.27	5.64	757
Israel	0.38	2.06	768
Italy	0.33	3.20	659
Japan	0.33	3.58	495
New Zealand	0.34	2.78	790
Norway	0.28	6.68	1,198
Poland	0.33	0.80	878
Portugal	0.37	1.88	440
Slovakia	0.28	1.17	843
Slovenia	0.24	1.82	484
South Korea	0.31	1.87	1,314
Spain	0.32	2.65	584
Sweden	0.23	4.31	879
Switzerland	0.27	5.48	807
Turkey	0.43	0.71	1,024
UK	0.34	4.15	722
USA	0.38	4.43	1,286

Note: The Gini coefficients are obtained from the World Income Inequality Database Version 3.0b of UNU-WIDER. For most countries, the household disposable Gini coefficients after tax are taken with following exceptions: the values for Australia, Finland, Germany, Italy, Norway, and Sweden are from 2004, Japan and South Korea from 2006, and New Zealand from 2003. GDP per capita measured in 10,000 USD for 2005 is provided by the World Bank Open Data (`http://data.worldbank.org`). The number of respondents for each country shows the number of observations analyzed in this study.

2.6.2 Models and Results for Multilevel Models

2.6.2.1 The Model with Perceived Level of Inequality

To estimate the effect of perceived inequality on support for government redistribution, the following multilevel model was fit to the data by RStan (Stan Development Team 2016*a*,*b*).

$$
\begin{aligned}
\mathrm{s}_i \sim & \text{Bernoulli}(\mu_i), \\
\text{logit}(\mu_i) = & \alpha_{\text{country}_i} + \delta \text{perceived}_i \\
& + \beta_1 \text{income}_i + \beta_2 \text{female}_i + \beta_3 \text{education}_i + \beta_4 \text{age}_i + \beta_5 \text{unemployment}_i, \\
\alpha_j \sim & \text{Normal}(a, \sigma_a), \\
\delta \sim & \text{Normal}(0, 100), \\
\beta_k \sim & \text{Normal}(0, 100), \\
a \sim & \text{Normal}(0, 100), \\
\sigma_a \sim & \text{Half-Cauchy}(0, 100),
\end{aligned}
$$

where i identifies individual respondents, $j \in \{1, 2, \ldots, 28\}$ indicates the country each respondent lives in, and $k \in \{1, 2, 3, 4, 5\}$.

Table 2.7 shows the result of this model when the variable *perceived* measures the level of income inequality perceived by the respondents. Because the intercept α varies by country, we obtained 28 intercepts. We can see that the effect of *perceived*, δ, distributes around 0 in our Monte Carlo samples.

Table 2.8 presents the result of the same model when I replace the perceived level with the difference between the levels of perceived and ideal inequality.

Table 2.7: Result of Model 1

Variable	Estimate	Std. Dev.	2.5%	97.5%	Effective samples	$\hat{R}$
Perceived inequality	0.00	0.00	−0.01	0.01	216	1.01
Income	−0.41	0.00	−0.46	−0.36	2518	1.00
Female	0.23	0.00	0.17	0.29	1720	1.00
Education	−0.04	0.00	−0.05	−0.03	3703	1.00
Age	0.00	0.00	0.00	0.00	1539	1.00
Unemployment	0.05	0.00	−0.02	0.12	1886	1.01
Intercepts:						
Australia	−0.08	0.01	−0.40	0.23	204	1.01
Austria	0.98	0.01	0.71	1.25	291	1.01
Belgium	0.99	0.01	0.73	1.24	297	1.01
Chile	0.76	0.01	0.40	1.10	217	1.01
Czech Rep.	0.39	0.01	0.11	0.68	248	1.01
Denmark	0.01	0.01	−0.31	0.32	215	1.01
Estonia	1.19	0.01	0.89	1.49	281	1.01
Finland	0.90	0.01	0.61	1.19	277	1.01
France	1.20	0.01	0.95	1.44	218	1.01
Germany	0.45	0.01	0.18	0.72	241	1.01
Hungary	1.35	0.01	0.99	1.71	250	1.01
Iceland	0.85	0.01	0.51	1.17	234	1.01
Israel	1.18	0.01	0.90	1.46	288	1.01
Italy	1.96	0.01	1.64	2.28	364	1.01
Japan	−0.05	0.01	−0.44	0.35	223	1.01
New Zealand	−0.41	0.01	−0.72	−0.11	228	1.01
Norway	−0.05	0.01	−0.36	0.25	206	1.01
Poland	1.11	0.01	0.84	1.38	275	1.01
Portugal	2.31	0.01	1.93	2.71	675	1.00
Slovakia	1.07	0.01	0.81	1.31	304	1.01
Slovenia	2.06	0.01	1.72	2.42	468	1.01
South Korea	0.92	0.01	0.52	1.31	206	1.01
Spain	1.56	0.01	1.27	1.85	404	1.01
Sweden	0.10	0.01	−0.18	0.37	230	1.01
Switzerland	0.38	0.01	0.11	0.65	250	1.01
Turkey	2.25	0.01	1.95	2.56	400	1.01
UK	0.28	0.01	−0.02	0.58	239	1.01
USA	−0.88	0.01	−1.19	−0.58	211	1.01

Table 2.8: Result of Model 2

Variable	Estimate	Std. Dev.	2.5%	97.5%	Effective samples	$\hat{R}$
Perceived inequality	0.09	0.00	0.07	0.10	4000	1.00
Income	−0.40	0.00	−0.44	−0.35	3598	1.00
Female	0.22	0.00	0.16	0.28	1829	1.00
Education	−0.04	0.00	−0.05	−0.03	4000	1.00
Age	0.00	0.00	0.00	0.00	451	1.01
Unemployment	0.05	0.00	−0.02	0.12	3609	1.00
Intercepts:						
Australia	−0.25	0.00	−0.41	−0.08	905	1.00
Austria	0.87	0.00	0.67	1.07	1310	1.00
Belgium	0.90	0.00	0.71	1.10	1263	1.00
Chile	0.71	0.00	0.55	0.88	1190	1.00
Czech Rep.	0.31	0.00	0.13	0.48	1162	1.00
Denmark	−0.05	0.00	−0.21	0.11	956	1.01
Estonia	1.15	0.00	0.95	1.37	1408	1.00
Finland	0.79	0.00	0.57	1.01	1531	1.00
France	1.05	0.00	0.90	1.20	644	1.01
Germany	0.32	0.00	0.15	0.49	1110	1.00
Hungary	1.28	0.00	1.05	1.50	1610	1.00
Iceland	0.79	0.00	0.61	0.97	1360	1.00
Israel	1.11	0.00	0.92	1.31	1542	1.00
Italy	1.77	0.00	1.51	2.03	1566	1.00
Japan	−0.07	0.00	−0.28	0.13	1389	1.00
New Zealand	−0.46	0.00	−0.64	−0.29	1043	1.00
Norway	−0.12	0.00	−0.26	0.03	693	1.00
Poland	1.04	0.00	0.85	1.24	1425	1.00
Portugal	2.23	0.00	1.88	2.61	2829	1.00
Slovakia	0.96	0.00	0.77	1.15	1211	1.00
Slovenia	1.98	0.00	1.68	2.31	2428	1.00
South Korea	0.85	0.00	0.69	1.00	1023	1.00
Spain	1.46	0.00	1.23	1.71	2052	1.00
Sweden	0.00	0.00	−0.18	0.17	1091	1.00
Switzerland	0.29	0.00	0.12	0.47	1256	1.00
Turkey	2.21	0.00	1.96	2.48	4000	1.00
UK	0.18	0.00	−0.01	0.36	1311	1.00
USA	−1.05	0.00	−1.21	−0.89	902	1.01

2.6.2.2 Model with Country-level Variables

Next, we will add country-level variables to explain the variation of intercepts across countries. The variables used here are the Gini coefficient and GDP per capita (measured in USD). The model can be written as follows.

$$
\begin{aligned}
\mathrm{s}_i \sim & \text{Bernoulli}(\mu_i), \\
\text{logit}(\mu_i) = & \alpha_{\text{country}_i} + \delta \text{perceived}_i \\
& + \beta_1 \text{income}_i + \beta_2 \text{female}_i + \beta_3 \text{education}_i + \beta_4 \text{age}_i + \beta_5 \text{unemployment}_i, \\
\alpha_j \sim & \text{Normal}(\phi, \sigma_\phi), \\
\phi_j = & \gamma_1 + \gamma_2 * \text{Gini}_j + \gamma_3 \text{GDP}_j, \\
\sigma_\phi \sim & \text{Half-Cauchy}(0, 100), \\
\delta \sim & \text{Normal}(0, 100), \\
\beta_k \sim & \text{Normal}(0, 100), \\
\gamma_l \sim & \text{Normal}(0, 100),
\end{aligned}
$$

where i identifies individual respondents, $j \in \{1, 2, \ldots, 28\}$ indicates the country each respondent lives in, $k \in \{1, 2, 3, 4, 5\}$, and $l \in \{1, 2, 3\}$.

The result is presented in Table 2.9, which shows the estimates and their uncertainties of the individual-level and country-level variables, and Table 2.10, which displays the varying intercept for 28 countries.

Table 2.9: Result of Model 3: Variables

Variable	Estimate	Std. Dev.	2.5%	97.5%	Effective samples	$\hat{R}$
Individual-level:						
Perceived inequality	0.08	0.00	0.07	0.10	4000	1.00
Income	−0.39	0.00	−0.44	−0.35	3070	1.00
Female	0.22	0.00	0.16	0.28	2020	1.00
Education	−0.04	0.00	−0.05	−0.03	4000	1.00
Age	0.00	0.00	0.00	0.00	447	1.02
Unemployment	0.05	0.00	−0.02	0.12	3246	1.00
Country-level:						
Intercept	2.12	0.03	0.12	4.00	1224	1.00
Gini	−1.58	0.07	−6.54	3.59	1389	1.00
GDP per capita	−0.30	0.00	−0.49	−0.10	1510	1.00

Table 2.10: Result of Model 3: Intercepts

Country	Estimate	Std. Dev.	2.5%	97.5%	Effective samples	$\hat{R}$
Australia	−0.25	0.00	−0.40	−0.09	682	1.01
Austria	0.86	0.00	0.67	1.06	1483	1.00
Belgium	0.90	0.00	0.71	1.09	1348	1.01
Chile	0.71	0.00	0.55	0.88	913	1.01
Czech Rep.	0.32	0.00	0.14	0.50	985	1.01
Denmark	−0.05	0.00	−0.20	0.12	751	1.01
Estonia	1.16	0.00	0.95	1.37	1109	1.01
Finland	0.79	0.00	0.58	1.01	1211	1.01
France	1.05	0.00	0.90	1.20	695	1.02
Germany	0.32	0.00	0.15	0.49	929	1.01
Hungary	1.29	0.00	1.07	1.52	1423	1.01
Iceland	0.78	0.00	0.59	0.97	974	1.01
Israel	1.11	0.00	0.92	1.31	1448	1.01
Italy	1.76	0.00	1.51	2.02	1151	1.01
Japan	−0.07	0.00	−0.27	0.13	1130	1.01
New Zealand	−0.45	0.00	−0.62	−0.28	951	1.01
Norway	−0.12	0.00	−0.27	0.04	733	1.02
Poland	1.05	0.00	0.86	1.24	1254	1.01
Portugal	2.22	0.00	1.87	2.60	2771	1.00
Slovakia	0.97	0.00	0.78	1.16	1256	1.01
Slovenia	1.99	0.00	1.70	2.31	2485	1.00
South Korea	0.85	0.00	0.70	1.02	916	1.01
Spain	1.46	0.00	1.23	1.69	1890	1.00
Sweden	0.00	0.00	−0.16	0.17	912	1.01
Switzerland	0.29	0.00	0.12	0.47	950	1.01
Turkey	2.21	0.00	1.97	2.46	1998	1.00
UK	0.17	0.00	−0.01	0.35	1033	1.01
USA	−1.05	0.00	−1.20	−0.89	725	1.01

2.6.2.3 Model with Varying Slopes

Lastly, we let the effect of perception vary across countries, assuming the country-level variables affect the size of the effect.

$$
\begin{aligned}
\mathrm{s}_i \sim & \text{Bernoulli}(\mu_i), \\
\text{logit}(\mu_i) = & \alpha_{\text{country}_i} + \delta_{\text{country}_i}\text{perceived}_i \\
& + \beta_1\text{income}_i + \beta_2\text{female}_i + \beta_3\text{education}_i + \beta_4\text{age}_i + \beta_5\text{unemployment}_i, \\
\alpha_j \sim & \text{Normal}(\phi, \sigma_\phi), \\
\phi_j = & \gamma_1 + \gamma_2 * \text{Gini}_j + \gamma_3\text{GDP}_j, \\
\sigma_\phi \sim & \text{Half-Cauchy}(0, 100), \\
\delta_j \sim & \text{Normal}(\theta_j, \sigma_\theta), \\
\theta_j = & \lambda_1 + \lambda_2 * \text{Gini}_j + \lambda_3\text{GDP}_j, \\
\sigma_\theta \sim & \text{Half-Cauchy}(0, 100), \\
\beta_k \sim & \text{Normal}(0, 100), \\
\gamma_l \sim & \text{Normal}(0, 100), \\
\lambda_m \sim & \text{Normal}(0, 100),
\end{aligned}
$$

where i identifies individual respondents, $j \in \{1, 2, \ldots, 28\}$ indicates the country each respondent lives in, $k \in \{1, 2, 3, 4, 5\}$, and $l, m \in \{1, 2, 3\}$.

The result is provided by three tables. First, Table 2.11 displays the estimates for the individual-level and country-level variables. Then, Table 2.12 shows the varying intercept for the 28 countries analyzed. Lastly, Table 2.13 presents the varying slope for the perception variable across countries.

Figure 2.12 displays the predicted probabilities of supporting government redistribution for the full range of the perception variables observed in the dataset. The black curve for each country is the median estimate of the predicted probabilities. The shaded area around

Table 2.11: Result of Model 4: Variables (except Perception)

Variable	Estimate	Std. Dev.	2.5%	97.5%	Effective samples	$\hat{R}$
Individual-level:						
Income	−0.38	0.00	−0.43	−0.33	4000	1.00
Female	0.22	0.00	0.16	0.28	4000	1.00
Education	−0.04	0.00	−0.05	−0.03	4000	1.00
Age	0.00	0.00	0.00	0.00	1146	1.00
Unemployment	0.06	0.00	−0.01	0.13	4000	1.00
Country-level						
for intercepts:						
intercept	1.66	0.02	−0.27	3.62	2869	1.00
Gini	−0.29	0.05	−5.53	4.83	3275	1.00
GDP	−0.30	0.00	−0.50	−0.11	4000	1.00
for slopes:						
intercept	0.44	0.00	0.12	0.78	2297	1.00
Gini	−0.99	0.01	−1.86	−0.12	2547	1.00
GDP	0.00	0.00	−0.03	0.04	3449	1.00

the curve represents the 90 percentile of the estimates. The figure that only depicts the range observed in each country is provided in Figure 2.7.

Table 2.12: Result of Model 4: Intercept

Country	Estimate	Std. Dev.	2.5%	97.5%	Effective samples	$\hat{R}$
Australia	−0.54	0.00	−0.77	−0.32	2229	1.00
Austria	0.89	0.00	0.66	1.13	4000	1.00
Belgium	0.76	0.00	0.53	0.99	2209	1.00
Chile	0.83	0.00	0.64	1.01	1951	1.00
Czech Rep.	0.19	0.00	−0.04	0.41	2220	1.00
Denmark	−0.17	0.00	−0.35	0.02	1984	1.00
Estonia	1.06	0.00	0.83	1.30	4000	1.00
Finland	0.29	0.00	0.00	0.58	2147	1.00
France	0.88	0.00	0.69	1.07	1700	1.00
Germany	0.32	0.00	0.11	0.52	2160	1.00
Hungary	1.38	0.00	1.15	1.62	4000	1.00
Iceland	0.54	0.00	0.31	0.77	4000	1.00
Israel	1.17	0.00	0.95	1.40	4000	1.00
Italy	1.56	0.00	1.19	1.92	2821	1.00
Japan	0.02	0.00	−0.20	0.22	4000	1.00
New Zealand	−0.55	0.00	−0.75	−0.35	2006	1.00
Norway	−0.27	0.00	−0.45	−0.09	1964	1.00
Poland	1.05	0.00	0.85	1.25	4000	1.00
Portugal	2.21	0.00	1.84	2.58	4000	1.00
Slovakia	0.78	0.00	0.54	1.02	2487	1.00
Slovenia	1.83	0.00	1.49	2.17	4000	1.00
South Korea	0.95	0.00	0.79	1.12	2032	1.00
Spain	1.57	0.00	1.31	1.83	4000	1.00
Sweden	−0.40	0.00	−0.62	−0.18	2347	1.00
Switzerland	0.31	0.00	0.12	0.50	2139	1.00
Turkey	2.22	0.00	1.96	2.48	4000	1.00
UK	0.12	0.00	−0.09	0.32	2155	1.00
USA	−0.84	0.00	−1.02	−0.67	1893	1.00

Table 2.13: Result of Model 4: Perceived Inequality

Country	Estimate	Std. Dev.	2.5%	97.5%	Effective samples	$\hat{R}$
Australia	0.20	0.00	0.14	0.26	4000	1.00
Austria	0.07	0.00	−0.01	0.15	4000	1.00
Belgium	0.21	0.00	0.11	0.31	4000	1.00
Chile	0.00	0.00	−0.04	0.05	4000	1.00
Czech Rep.	0.18	0.00	0.08	0.28	4000	1.00
Denmark	0.20	0.00	0.13	0.29	4000	1.00
Estonia	0.21	0.00	0.08	0.35	4000	1.00
Finland	0.46	0.00	0.31	0.62	4000	1.00
France	0.17	0.00	0.12	0.23	4000	1.00
Germany	0.09	0.00	0.03	0.15	4000	1.00
Hungary	0.02	0.00	−0.03	0.08	4000	1.00
Iceland	0.30	0.00	0.18	0.44	4000	1.00
Israel	0.03	0.00	−0.05	0.11	4000	1.00
Italy	0.17	0.00	0.06	0.29	4000	1.00
Japan	0.01	0.00	−0.03	0.04	4000	1.00
New Zealand	0.17	0.00	0.08	0.26	4000	1.00
Norway	0.20	0.00	0.13	0.27	4000	1.00
Poland	0.08	0.00	0.02	0.13	4000	1.00
Portugal	0.11	0.00	0.01	0.21	4000	1.00
Slovakia	0.23	0.00	0.12	0.34	4000	1.00
Slovenia	0.24	0.00	0.11	0.40	4000	1.00
South Korea	0.03	0.00	−0.01	0.07	4000	1.00
Spain	0.01	0.00	−0.05	0.06	4000	1.00
Sweden	0.34	0.00	0.25	0.44	4000	1.00
Switzerland	0.07	0.00	0.02	0.12	4000	1.00
Turkey	0.08	0.00	0.00	0.16	4000	1.00
UK	0.12	0.00	0.05	0.20	4000	1.00
USA	0.01	0.00	−002	0.04	4000	1.00

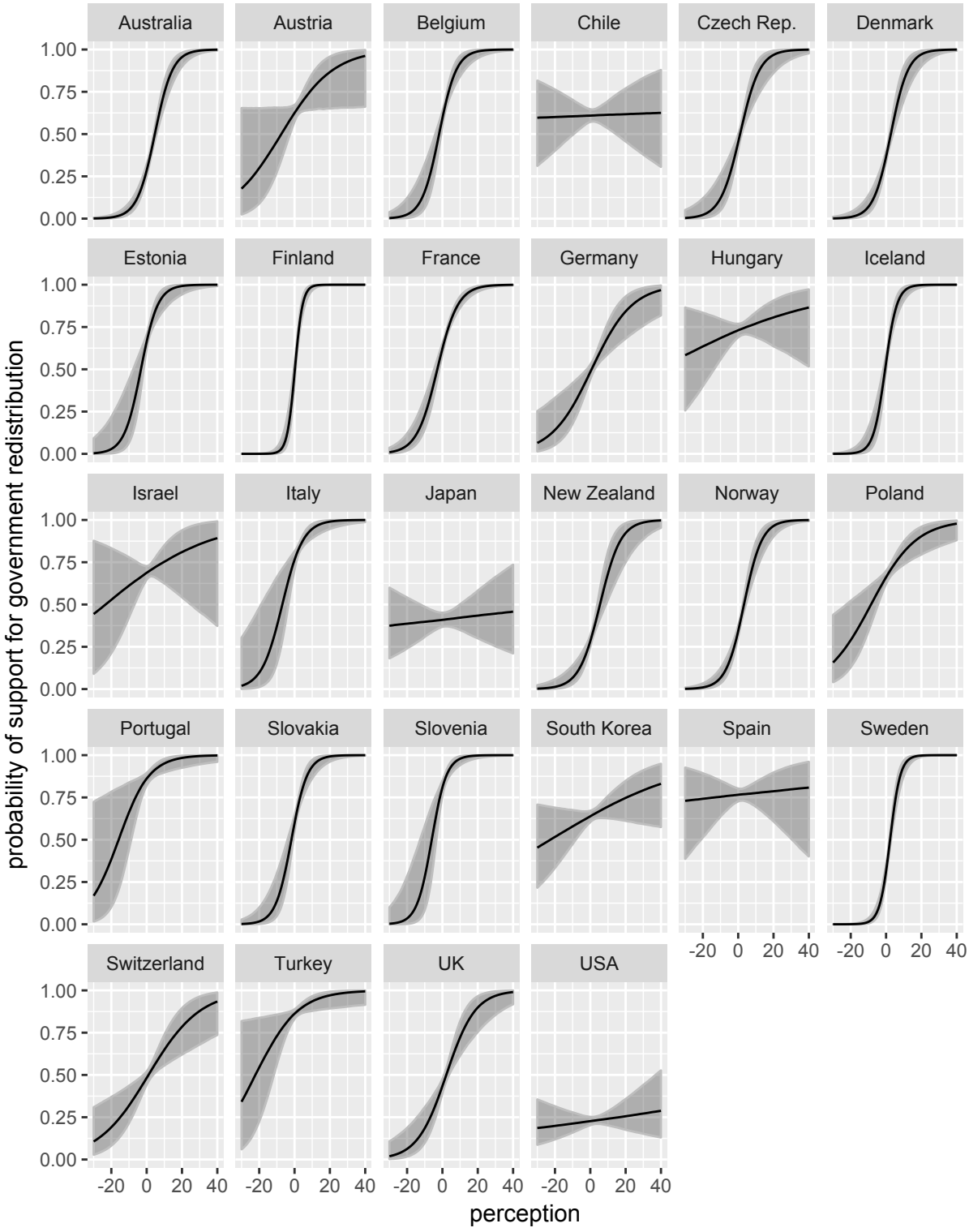


Figure 2.12: Predicted Probabilities of Redistribution Support for Full Range of Perception. *The black solid curves shows the median estimate of the predicted probability. The shaded areas around the curves represent the 90 percentile of the estimates.*

2.6.3 Results for the Case of Japan

Table 2.14: Results of Logit Models: Outcome Variable = Support for Redistribution

Variable	Model 1	Model 2	Model 3
Perceived Inequality[a]		0.081^{*}	
		(0.043)	
Underestimation			-0.344^{**}
			(0.169)
Family income (log)[b]	-0.346^{***}	-0.357^{**}	-0.435^{***}
	(0.104)	(0.164)	(0.134)
Not in labor market[c]	0.148	0.425∗	0.309
	(0.159)	(0.253)	(0.198)
Education (years)	−0.003	0.025	0.019
	(0.030)	(0.043)	(0.037)
Age	−0.001	−0.010	−0.004
	(0.005)	(0.007)	(0.006)
Female	0.145	0.062	0.070
	(0.142)	(0.213)	(0.175)
Intercept	5.425^{***}	5.630^{**}	6.832^{***}
	(1.599)	(2.528)	(2.059)
Observations	882	416	597
Deviance	1199	560	802

Standard errors are in parentheses.
*: $p < 0.1$, **: $p < 0.5$, ***: $p < 0.01$.

[a] Index of perceive inequality ranges from −5 to 5. Positive values indicate that the perceived inequality is larger than the factual inequality. Negative values indicate the perceived inequality is smaller than the truth.

[b] Unit is Japanese Yen.

[c] Dummy variable for a person who is retired, unemployed, student or homemaker.

CHAPTER 3

Underestimation of Inequality in Japan

3.1 Introduction

Worldwide, economic inequality has been on the rise since the 1980s (OECD 2011). Scholars notice this change; many studies have been conducted on economic inequality in the past two decades (Ackerman et al. 2000; Atkinson 2015; Bartels 2016; Beramendi 2012; Bourguignon 2015; Bowles 2012; Carnes 2013; Deaton 2013; Firebaugh 2003; Gilens 2012; Gornick and Jäntti 2013; Heckman and Krueger 2003; Jacobs and Skocpol 2005; Kelly 2008; Kenworthy 2004; Leighley and Nagler 2013; McCall 2013; Milanovic 2011; Neckerman 2004; Pontusson 2005; Stiglitz 2012; Thompson 2007; Wilkinson 2005, to name but a few). Even outside the academic world, many people are interested in this issue as we can see by the fact that a 700-page book on economic inequality, *Capital in the Twenty-First Century* (Piketty 2014), became a bestseller. The fact that people are interested in economic inequality, however, does not mean that they accurately perceive levels or changes in actual inequality. In the previous chapter, I showed that many people, especially in Japan, underestimate inequality within their countries.

Underestimation of inequality could be politically consequential. If poor people underestimate inequality, they might not demand government redistribution as much as a fully informed rational voter would. In fact, people who underestimate inequality are less likely to support government redistribution, as I have shown. This might be a reason why the amount of government redistribution does not correspond to the level of income inequality in a given country. Underestimation of inequality leads to lower demand for government redistribution than expected by the standard models (Meltzer and Richard 1981; Roberts

1977; Romer 1975). Governments, who are supposed to respond to voters' demands, do not have to provide a large scale of income transfers, even in an era of rising inequality. Alternatively, underestimation could lower the demand for redistribution by the rich. Some rich people are in favor of redistribution, because they prefer an equal society to an unequal one. If there is a large number of such people, underestimation could reduce the support for income transfers by the government. Either way, we need to study underestimation of inequality to better understand how inequality affects politics.

In this chapter, I investigate who underestimates inequality and what consequences underestimation has for politics. I argue that people living in a relatively equal area are more likely to underestimate inequality than those living in a relatively unequal area. Furthermore, I show that underestimation changes electoral outcomes. I demonstrate these by analyzing Japanese data. To reveal demographic and geographical differences in underestimation, I implement multilevel regression and poststratification (MRP—see Gelman and Little 1997; Ghitza and Gelman 2013; Park, Gelman, and Bafumi 2004) with individual level data collected by Japanese Electoral Study III (JES III) and aggregate data at the prefectural level.

The chapter proceeds as follows. In the next section, I provide two main reasons why Japanese tend to underestimate inequality. In Section 3, I analyze individual and aggregate data. First, I examine the individual level survey data to understand what factors determine underestimation. Next, I implement an MRP to estimate the degree of underestimation for some population subgroups defined by demographic and geographical factors. Third, I analyze the estimates obtained by the MRP to understand political causes and consequences of underestimation at the prefectural level. Section 4 concludes.

3.2 Underestimation of Inequality

Inequality has been rising since the 1980s, at least in the majority of advanced industrial democracies (Atkinson and Piketty 2007, 2010; Atkinson 2015; Champernowne and Cowell 1998; Gornick and Jäntti 2013; Kenworthy 2004; OECD 2011). However, people might not know how unequal their countries are. Previous studies show that people misperceive

inequality (Niehues 2014; Norton and Ariely 2011; Cruces, Perez-Truglia, and Tetaz 2013; Gimpelson and Treisman 2015) or where their own income is in the income distribution (Fernández-Albertos and Kuo 2015). Japan is no exception (Mira d'Ercole 2006; Murata and Aramaki 2013; Moriguchi and Saez 2008; Ohtake 2008; Tachibanaki 2005). Even if they realize that Japan is becoming more unequal (Hara 2010), many Japanese underestimate inequality, as shown in the previous chapter.

It is difficult to measure inequality; inequality is not readily visible. To observe inequality, many different measures have been proposed: the range of incomes, relative mean deviation, variance, coefficient of variation, standard deviation of logarithm, relative mean difference, the Atkinson index, the Theil index, and the Gini coefficient, to name but a few (see, e.g., Cowell 2000). In social science research, we use the ratio of percentiles, such as Q90/Q10,[1] as well. Recently, many studies have used the concentration of incomes among the rich or the top incomes (Atkinson and Piketty 2007, 2010). Each measure has pros and cons, and different measures show us different pictures of inequality. Therefore, scholars might not agree on the exact level of inequality in a given country, even though there is almost no disagreement on the point that inequality is rising.

Given the scholars do not agree, how can ordinary people reach an agreement on how unequal their society is? If it is difficult for social scientists to measure inequality, it is not unnatural that people misperceive inequality, as Gimpelson and Treisman (2015) argue. But how do people misperceive inequality? If they simply do not know how they should measure inequality, they could overestimate as easily as underestimate. As a result, their collective guess might provide an accurate estimate of inequality (Surowiecki 2004). If this is the case, misperceiving inequality might not matter much for politics or policy. As long as policies are determined by the median voter's preference, which is rationally formed because the median voter's perception should not be very far from the average perception among the voters, the policies can reflect the opinions of the voters.

---

[1] Q90/Q10 is the ratio of the income at the 90th percentile to that at the 10th percentile. Q90/Q50 and Q50/Q10 are also frequently used.

However, as shown in the previous chapter, there are more Japanese who underestimate inequality than those who overestimate it. Accordingly, Japanese underestimate inequality on average. Why do Japanese underestimate inequality rather than overestimate it? I argue there are two reasons for this: one is the widely shared belief about Japanese society; another is the geographic/social structure of Japan.

First, Japanese people tend to underestimate inequality because many believe that "every Japanese is in the middle class." After the economic miracle in the 1960s, the Japanese economy became one of the biggest in the world. Accordingly, most found steady jobs in this period and became better off compared to the past. Akita and Kataoka (2003) show that income inequality had declined since 1958 and hit its bottom in 1979. In Japanese, people say, "*Ichioku Sōchūryū*," which literally means "all of the 100 million people are in the middle." According to the Japanese Census, the population passed 100 million in 1970. Thus, it is in this period when the aforementioned belief about Japanese equality was formed, which was correct perception at that time.

However, Japanese inequality started rising again in 1979. Consequently, the statement "every Japanese is in the middle class" became inaccurate, and it now should be called a myth. In fact, many people abandoned the myth in the era of rising inequality. It is shown that many Japanese perceive widening income gap and are interested in the decline of the middle class (Ohtake 2005; Tachibanaki 2005). Nevertheless, the majority of Japanese still underestimate income inequality. This might be because it is hard for people to abandon strongly-held beliefs. Because the aforementioned belief was widely shared among Japanese, the baseline perception of inequality must have been very low in the 1970s. People have been updating since the 1980s, but the degree of adjustment is not kept pace with the change in objective inequality. Because a required adjustment should be possible once people learn the facts, improvements in education should lower the probability of underestimation of this kind.

Second, I argue that people underestimate the national level of inequality when inequality in their local society is small. To perceive inequality, we need to compare at least two different incomes. Most people compare their own income with other people's income to know how

unequal their society is. More broadly, they might compare their own life with lives of their friends, family, or neighbors (Miller, Wlezien, and Hildreth 1991; Merton and Rossi 1968). People tend to compare themselves with people close to them. To take a simple example, a person is more likely to perceive large inequality when he finds that his neighbor earns twice as much as he does than when he learns that a professional baseball player earns ten times more than he. Therefore, I expect that an individual's immediate situation strongly affects his likelihood of misperceiving national trends in inequality.

In this study, I use geographic closeness to define closeness of situations. More precisely, I contend that Japanese use their prefecture of residence as their reference groups. Japan consists of 47 prefectures,[2] which are mutually exclusive and exhaust Japan's territory. Each prefecture elects its own governor and prefectural assembly. Therefore, prefectures are politically meaningful subdivisions of Japan.[3]

Figure 3.1 presents the change of prefectural Gini coefficients between 2009 and 2014. The gray lines are for prefectures, and the red line is the mean of 47 Gini coefficients. As the red line shows, the inequality has been rising slowly on average.[4] However, the lines for the Gini for prefectures do not share a simple pattern. Inequality has increased in some

[2]Strictly speaking, there are only 43 prefectures or *ken*. In addition to 43 *ken*s, Japan has one metropolis or *to* (Tokyo-to), one territory or *do* (Hokkaido), and two urban prefectures or *fu* (Kyoto-fu and Osaka-fu). I treat all of them as prefectures.

[3]Another important division is municipality, which is the most essential administrative division of Japan. The Local Autonomy Law stipulates that the municipality is the basic administrative division (Article 2, Section 4), and that the prefecture is the umbrella local body of municipalities (Article 2, Section 5). I do not use municipality as geographic area for this study because the number of municipalities is large. In 2001, there were about 2,000 municipalities (cities, towns, and villages) in Japan. It is almost impossible to obtain meaningful results for 2,000 different areas with the survey containing only 2,053 observations.

[4]At the national level, we can observe more rapid increase in inequality with a different survey. See Figure 3.10, which adds data from a different survey. If the data from another source shown in the appendix reflect the Gini coefficient at the national level more accurately, my argument will be stronger. Ohtake (2008) compares the Gini coefficients calculated by three different surveys, two of which are the Gini shown in Figure 3.10, and contends that the Gini provided by Statistics Bureau tends to smaller than one published by the Ministry of Health, Labour and Welfare. The main reason is that the former only includes households with two or more people while the latter contains single-member households. However, the 2014 survey of Statistics Bureau covers single-member households, and it still gives the lower level of inequality than the national Gini. In addition, the prefectural Gini does not clearly show an increasing trend, at least since 1999, while the national inequality has been rising since the 1980s.

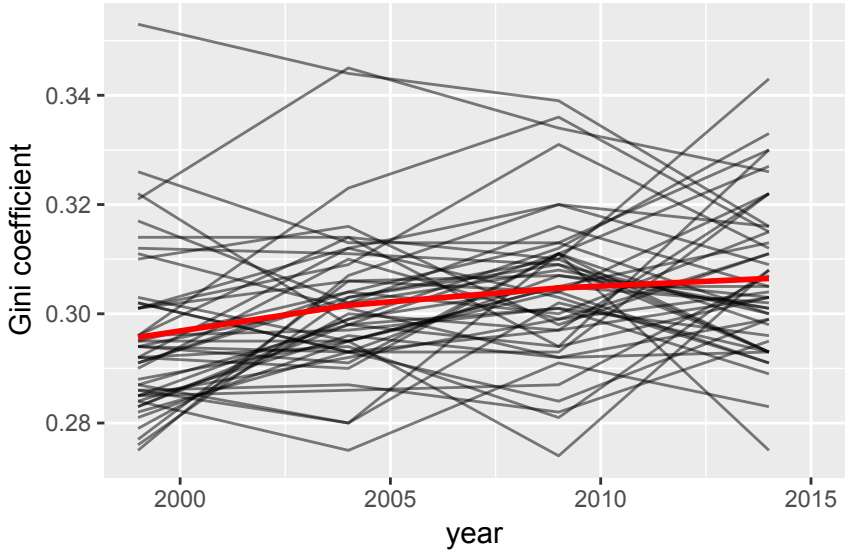


Figure 3.1: Change of the Gini Coefficients over Time for Each Prefecture in Japan, 1999–2014. *The gray lines represent the Gini coefficients of 47 prefectures in Japan. The red line is the mean of prefectural Gini coefficients. The Gini coefficients for prefectures are measured in 1999, 2004, 2009, and 2014 (Statistics Bureau of Japan 1999, 2004, 2009, 2014).*

prefectures, decreased in other, and fluctuated in yet others. Furthermore, some prefecture are more equal than other prefectures. In other words, some prefectures are more equal than the mean, and the rest are more unequal than the mean.

I argue that this difference in prefectural inequality makes a difference in perceived inequality. Assuming that people try to learn the level of national inequality from inequality within their prefecture of residence, a person in an equal prefecture should perceive less inequality than another in an unequal prefecture. While people living in an unequal society have a chance to know their society is unequal, other people living in an equal society have no such opportunity. It is argued that people tend to be biased toward what they observe (Kahneman 2011).[5] Therefore, I expect the larger proportion (or probability) of underestimation in prefectures with small Gini coefficients than in prefectures with larger Ginis.

In the next section, I show some statistical evidence supporting my arguments.

[5]This is called WYSIATI (what you see is all there is) bias (Kahneman 2011, pp. 85–88).

3.3 Statistical Analysis

To understand the causes and consequences of underestimation of inequality, I conduct statistical analyses. I take the following three steps. First, I analyze individual level data to understand who underestimates inequality, using an electoral survey conducted in Japan. Second, I estimate the proportion of underestimation for population subgroups defined by demographics and geography. By so doing, I show that the degree of underestimation varies across geographic areas in Japan. To demonstrate this, I will conduct multilevel regression and poststratification (MRP) with survey and census data. Lastly, with the estimates obtained by the MRP, I investigate political causes and consequences of underestimation of income inequality.

3.3.1 Analysis of Survey Data

To analyze underestimation of inequality in Japan, I use the survey data of Japanese Electoral Studies III (JES III). JES III is a nine-wave panel study of voting behavior of Japanese people.[6] I analyze JES data for three reasons. First, JES III has a question that I can use to construct a measure of inequality underestimation. Second, it provides us with political variables, such as party identification, which are not available in other surveys on inequality. Lastly, it has a variable indicating which prefecture a respondent lives in. This is essential for poststratification; I cannot poststratify the estimates by prefecture without this variable.[7]

Underestimation is measured by the question that asks, "Do you think inequality is becoming smaller or larger in Japan?"[8] The possible answers are (1) much smaller, (2) smaller, (3) neither smaller nor larger, (4) larger, (5) much larger, and (6) do not know. I

[6]For more information about the JES project, visit `http://www.res.kutc.kansai-u.ac.jp/JES/en/`.

[7]The survey data collected by International Social Survey Programme provides a variable of area that is larger than prefectures.

[8]The author's translation from Japanese. The original questionnaire written in Japanese is available at the website of the JES project: `http://www.res.kutc.kansai-u.ac.jp/JES/en/jes3.html`. Inequality here does not necessarily mean income inequality. The original sentence asks about inequality of *kurashimuki* or livelihood.

create a dummy variable indicating underestimation of inequality based on this question. Unfortunately, the JES asks this question only in the pre-election survey for the 2001 House of Councillors held in July, 2001. Therefore, I use only one wave of the JES in this study.[9] Given that inequality was increasing when this survey was conducted (see Figures 3.1 and 3.10), I assign the value of 1 to the answers between 1 and 3, and 0 otherwise.[10]

To explain underestimation of inequality at the individual level, I use five demographic and socio-economic factors, which are considered to be important to explain the attitudes toward inequality or redistribution. These factors are gender, age, education, employment status, and home ownership, which are considered in a previous study on perception of inequality in Japan (Ohtake 2005). I use a female dummy for gender. It is argued that women support welfare policies more than men (Aalberg 2003; Alesina and Giuliano 2011; Blekesaune and Quadagno 2003; Cusack, Iversen, and Rehm 2006; Iversen and Soskice 2001; Linos and West 2003; Rehm 2007; Svallfors 1997), and hence women might be more sensitive to inequality and less likely to underestimate it. Age is a continuous variable,[11] and the standardized value[12] is used in statistical analyses.[13] Previous studies show that the elderly support redistribution more than the young because they need help from the government more (Alesina and Giuliano 2011; Inglehart 1990; Iversen and Soskice 2001; Rehm 2007). Because the outcome variable is not the attitude toward inequality but the estimation of inequality, how these demographic variables affect the outcome is an empirical question.

Next, I add education level as an explanatory variable to statistical models. In the context of redistribution, educated people are believed to be against government redistribution—or

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[9]JES IV does not ask this question either.

[10]I treat "do not know" as missing and impute an integer value between 1 and 5. I will explain how I impute missing values shortly.

[11]The mean is 48.7, the median is 49, and the standard deviation is 14.3.

[12]The standardized values is sometimes called z-value, and the z(age) = (age - mean(age)) / sd(age).

[13]Age-squared is also considered to capture nonlinear effects of age. However, the estimated effects is almost zero in each model and standard error are huge compared to the effect. In addition, inclusion of the squared term does not change the results. Therefore, it is omitted in this chapter.

government intervention, more broadly—compared to the less educated (Alesina and Giuliano 2011; Cusack, Iversen, and Rehm 2006; Iversen and Soskice 2001; Rehm 2007). When it comes to perception of inequality, we should expect educated people to perceive inequality more accurately compared to the less educated. Thus, the probability of underestimating inequality should decrease with the education level of a person. I use a category variable describing the highest degree earned for education. This variable has four categories: (1) less than high school or no education, (2) completed high school, (3) some college level education,[14] and (4) completed college education or higher. In the following analysis, three different dummies for the last three categories are used, excluding the first category as reference. By using the category variable instead of continuous variable of education, such as years in school, I can capture any non-linear relationship between education and underestimation.

In addition, I take into account the employment status of respondents. For this, I include two dummy variables. One is the dummy for unemployment; the other is the dummy for self-employment. For the unemployment dummy, I assign the value of 1 for people who are students, homemaker, and unemployed.[15] Because their main source of income is not market income, the unemployed should have less amount of information about incomes people receive in the market. This lack of information might lead to underestimation of inequality. In addition, the unemployed might believe that their income would dramatically increase if they found a job (see, e.g., Alesina and La Ferrara 2005; Bénabou and Ok 2001; Cojocaru 2014). Consequently, they might underestimate inequality by averaging their currently low income and higher future income, even though the biggest difference in income might exist between the employed and the unemployed, and it might be difficult for them to find a well-paid job (c.f. Lindbeck and Snower 1988; Rueda 2005). The self-employment dummy is added to examine the effect of risk aversion.[16] It is argued that risk-averse people are less

[14]Those who finished two-year college education or quit before receiving the degree.

[15]In JES III, the possible answers for this question do not contain "retired." Thus, I assume that the retired are included in the unemployed.

[16]Ohtake (2005) measures the risk by asking people what percentage of precipitation probability in a

likely to choose to be self-employed (e.g., Ekelund et al. 2005), so self-employment could be a proxy for preference for economic risk. Because risk-averse people should be more sensitive to a subtle change in economy than risk-takers, the former should perceive the level of inequality more accurately than the latter. That is, the self-employed should be more likely to underestimate inequality.

As an economic variable, I include home ownership. This is a dummy variable taking a value of 1 if a respondent owns a home, and 0 otherwise. Home ownership can be thought as a proxy for wealth, and wealth might affect how one perceives inequality.[17] For home owners, their income is high enough that they can afford to purchase a house, even though they perceive themselves to be in the middle class.[18] Thus, they might underestimate inequality. For people who do not own a home, their income is not sufficiently high, even though they may also perceive themselves to be in the middle class.[19] As a result, they might overestimate inequality. To sum up, home ownership is expected to increase the level of underestimation.

Furthermore, I use several political variables. First, I examine party identification of respondents. I create four dummy variables for three major political parties—Liberal Democratic Party (LDP), Clean Government Party (CGP or *Kōmeitō*), and Democratic Party of Japan (DPJ)—and independents.[20] Party identification might affect inequality perception. On the one hand, people tend to dislike inequality in general. Some might prefer a certain level of inequality to complete equality. However, when we compare rising inequality with shrinking inequality, many people should feel that shrinking inequality is better. On the other hand, some people favor or disfavor the governing political parties, regardless of the

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weather forecast makes them bring an umbrella when they go out. Because this type of question is not available in the JES survey, I use a proxy.

[17]As I will explain shortly, more direct measure of wealth, income, is not a reliable measure in JES III.

[18]This might not apply to home owners who inherit a house.

[19]This might not apply to people who choose not to buy a home, even though they are rich enough to buy one, for some reason.

[20]Other choices are Social Democratic Party, Japan Communist Party, Conservative Party, Liberal Party, and another political party. Respondents are allowed to choose "do not know."

current situation of economy. For those who like the governing parties, it should be cognitively more costly to perceive rising inequality, because they have to blame for the party they like if they think the government is responsible for the relatively bad economic situation. Because the coalition of LDP and CGP was in the government in 2001, the dummy variables for the LDP and the CGP should increase underestimation. Voters who favored the DPJ, the main opposition party at the time, should be less likely to underestimate inequality.

Moreover, I include two different evaluations of government performance as well. One is the evaluation of the government's economic policies; the other is that of overall performance. Both evaluations are measured by five-point scale answers to the questions about government performance.[21] Possible answers are: (1) very good, (2) good, (3) neither good nor bad, (4) bad, and (5) very bad. I treat these variable as continuous in regression models for simplicity. These evaluations could be correlated with perceived inequality. People who appreciate the government performance might tend to believe inequality becomes "better." For most people, "better" inequality should mean smaller inequality, as explained above. If so, evaluation of government performance should heighten the probability of underestimating inequality. Because a large value on performance variables implies poor government performance, we expect these variable to have negative effects on underestimation.

In addition to these variables for which the results are reported below, I examine the household income. It is possible that the wealthy and the poor perceive inequality in different ways. I use the nine-point scale of household incomes: (1) annual income is less than 2 million yen, (2) 2–4 million, (3) 4–6 million, (4) 6–8 million, (5) 8–10 million, (6) 10–12 million, (7) 12–14 million, (8) 14–20 million, and (9) 20 million yen or more.[22] I treat this variable as a categorical variable. The estimated effect of this variable is, however, not statistically significant for any of nine categories. It is possible that perception is not affected by income, but there are at least two potential problems in this variable. First, this variable does not

[21]The questions ask for evaluation of the Koizumi administration, because the prime minister then was Junichiro Koizumi, the leader of LDP.

[22]Respondents are allowed to choose "do not know."

take the number of family members into consideration. Naturally, the larger the household size is, the poorer the family becomes, given the same amount of household income. One could divide the household income by the square root of the number of household members to make an adjustment.[23] But I cannot rely on this method because the number of members is unknown. Second, there is a large number of missing values for this variable. Out of 2,053 respondents who were 20 years or older, 665 people (32 percent) did not provide information on their incomes (see Table 3.4). For these two reasons, the variable of household income taken by JES III is unreliable. Because inclusion of this variable does not change results,[24] I report the results with this variable only in the appendix (see Table 3.6).[25]

The dataset of the first wave of JES III survey, which I analyze,[26] has 2,053 observations.[27] However, I cannot use all the observations as they are if I use the variables explained above, because there are missing values. The number of complete observations, which do not have a missing value for the variables introduced, is 1,141 (see Table 3.4). In other words, I have to delete more than 44 percent of observations if I decide to analyze only the complete observations. Eliminating observations with missing values should not matter much if the proportion of those observations is very low (e.g., 1 percent), which is not the case here. Complete observation analysis does not bias results if missing is completely at random (MCAR) or if it is at random (MAR) and all the relevant variables are included (Little and

[23]I followed this convention in Chapter 2, using ISSP survey data.

[24]The only seemingly important change is that the effect of education becomes larger when the income is controlled for.

[25]This is mainly for simplicity and to save space. Because AIC for the model with the income variable (2,777) is larger than that for Model 5 reported in Table 3.1 (2,768), the former is not better than the latter. This is another justification for my choice to focus on Model 5, which does not include the income variable. I also tried two other models with household income. First, I included household income as a continuous variable, and the estimated effect is not statistically significant (the coefficient estimate is 0.031, and the standard error is 0.029). Second, I used fewer categories of income: (1) less than 2 million, (2) 2–4 million, (3) 4–6 million, (4) 6–10 million, and (5) 10 million or more. Again, no category has a statistically significant effect. I leave it for future research to investigate the effect of income, which is measured and adjusted appropriately, on underestimation of inequality.

[26]Summary statistics for these variables are available in Table 3.3.

[27]Excluding respondents younger than 20 years old.

Rubin 1987). However, we do not know if the pattern of missingness observed in the dataset is MCAR or MAR. Because this is a survey data and the survey has some personal questions (e.g., income or partisanship), it should be safer to suspect that missing is not MCAR or MAR. Therefore, it is likely that I will obtain a biased result with complete observations.[28] To mitigate bias caused by missing value problems, I impute missing values multiple times (Rubin 1987). Strictly speaking, multiple imputation does not eliminate all the bias if missing pattern is not at random (MNAR). However, multiple imputation is preferable to complete observation analysis, because it can reduce the degree of bias if missing pattern is correlated with variables included in the model, and because it is more efficient (Lall 2016). I implement multiple imputation and create five imputed datasets using `mi` package in R (Su et al. 2011).[29]

Using the imputed datasets with 2,053 observations, I explain what factors affect underestimation of inequality. Because the outcome, underestimation, is a binary variable, I use a logit model. Let $Y_i \in \{0, 1\}$ denote the person i's response, where $Y_i = 1$ means that i underestimates inequality. I assume:

$$Y_i \sim \text{Bernoulli}(\theta_i),^{30}$$

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[28]Ross (2006), for instance, shows that complete observation analysis biases a sample to advanced democracies, and hence that the results excluding missing observations are biased.

[29]The model used to impute values for each variable depends on the type of the variable. A logit model is used for binary variables; an ordered logit model is used for ordered-categorical variables; a multinomial logit model is used for unordered-categorical variables; and a liner regression is used for continuous variables. The type of each variable is displayed in Table 3.3. Estimates are obtained by a Bayesian version of generalized linear models (see Gelman et al. 2008). The variables I used for multiple imputations are perception of inequality, party identification, gender, age, prefecture, education level, household income, house ownership, employment status, dummy for self-employment, evaluation of economic policy of the government, and evaluation of overall government performance. The number of missing values, and imputation results are available in Tables 3.3 and 3.4. In order not to be overconfident about the results obtained by the imputed values, I inflate the standard errors by incorporating the variance between the datasets, following the Rubin's rule (see Footnote 32).

[30]I assume that each outcome is generated by the Bernoulli distribution because the outcome is either 0 or 1 for each observation.

$$\theta_i = \text{logit}^{-1}(\boldsymbol{x}_i\boldsymbol{\beta}),^{31}$$

where θ_i is the probability of i's underestimating inequality, $\boldsymbol{x}_i$ is a row vector of explanatory variables for i, and $\boldsymbol{\beta}$ is a vector of coefficients. I estimate the coefficients $\boldsymbol{\beta}$ using this logit model.

I fit five different models, each of which contains different combinations of explanatory variables, to the datasets.[32] Model 1 uses only demographic and socio-economic variables. Then, political variables are added to the model. Models 2 through 4 all contain the variables for party identification and evaluation of government performance. Model 2 has evaluation of economic policy, Model 3 includes that of overall performance, and Model 4 contains both evaluations. Table 3.1 presents the results of these models. It shows that most variables included here do not help to explain the variation of underestimation. Gender (female dummy), for example, has almost zero effect on underestimation—the standard error for the female dummy is about double the effect size. To make it easier to interpret the results, Model 5 drops variables that show almost zero effects. Now let us focus on the result of this

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[31] $\text{logit}^{-1}(t) = 1/(1+\exp(-t))$.

[32] I fit the same models to five imputed datasets and combine the results, following the Rubin's rule (Rubin 1987). The coefficient estimate b is obtained by the formula:

$$b = \frac{1}{5}\sum_{m=1}^{5}\hat{\beta}_m,$$

where m is the index of imputed datasets and $\hat{\beta}_m$ is the coefficient estimate obtained by the m-th dataset. Using the standard error of $\hat{\beta}_m$, s_m, the standard error of b, se(b), is calculated by:

$$\text{se}(b) = \sqrt{W + \left(1+\frac{1}{5}\right)B},$$

where W, the variation within each dataset, is:

$$W = \frac{1}{5}s_m^2,$$

and B, the variation across datasets, is:

$$B = \frac{1}{5-1}\sum_{m=1}^{5}(\hat{\beta}_m - b)^2.$$

model.[33]

Figure 3.2 shows the result of Model 5. Given this result, we can find some effects on underestimation of inequality. First, the dummy variables for supporters of the governing parties—the LDP and the CGP—have positive effects on underestimation. That is, people who like the governing parties are more likely to underestimate inequality. However, because I have analyzed the data taken at a single time period, we cannot judge if this is the effect of governing parties in general or the effects peculiar to the LDP and the CGP. In addition, evaluation of government performance affects underestimation. People who are unsatisfied with the government performance (with a large value for the variables of economic policy or government performance) tend to have more accurate perception about inequality than those who are satisfied. This result does not necessarily imply that satisfaction with the current government causes underestimation. It is possible that people give the government a high evaluation because they do not realize how large inequality is in Japan. Either way, it is evident from the data that higher evaluation of government is associated with more severe underestimation of inequality. Furthermore, education has a negative effect on underestimation. Compared to the respondents who did not finish high school, people who graduated high school are less likely to underestimate inequality. In other words, education makes people perceive inequality more accurately, which is not surprising. Lastly, unemployed people are more likely to overestimate inequality, but its effect is not far away from zero.

To understand substantive importance of these factors, Figure 3.3 shows the predicted probabilities of underestimation. For each panel, 1,000 values are simulated using the result of Model 5, and the violin and box plots[34] display the distribution of simulated probabilities. Panel (a) shows the probability of underestimation by education levels for people who are employed, neutral about government performance, and are not identified with the LDP or

[33]This is for simplicity. As we can see from the table, dropping the variables does not make a difference for the effects of the remaining variables. In other words, I do not drop the variables to obtain smaller p values. In addition, AIC (Akaike Information Criterion) is smallest in Model 5, which suggests that Model 5 is most preferable among five models considered here.

[34]A violin plot is used to visualize the distribution of the data and its probability density. It is a density plot rotated and placed on each side to reveal the shape of distribution, which a box plot cannot clarify.

Table 3.1: Results of Logit Models for Underestimation of Inequality

Explanatory Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Female	−0.052	−0.024	−0.017	−0.021	
	(0.100)	(0.101)	(0.101)	(0.102)	
Age (standardized)	0.032	0.019	0.014	0.014	
	(0.050)	(0.051)	(0.051)	(0.051)	
High school[a]	−0.364***	−0.329***	−0.334***	−0.328***	−0.301**
	(0.123)	(0.125)	(0.126)	(0.126)	(0.126)
Some college[a]	−0.634***	−0.560***	−0.568***	−0.560***	−0.540***
	(0.161)	(0.164)	(0.163)	(0.164)	(0.163)
College+[a]	−0.591***	−0.496***	−0.488***	−0.485***	−0.428***
	(0.160)	(0.164)	(0.165)	(0.165)	(0.164)
Unemployed	0.144	0.099	0.111	0.108	0.182*
	(0.110)	(0.112)	(0.112)	(0.113)	(0.096)
Self-employed	−0.155	−0.200	−0.199	−0.194	
	(0.137)	(0.139)	(0.140)	(0.140)	
House owner	0.130	0.148	0.139	0.144	
	(0.125)	(0.125)	(0.126)	(0.126)	
Economic policy[b]		−0.178***		−0.099	−0.098
		(0.060)		(0.070)	(0.069)
Overall[b]			−0.244***	−0.197**	−0.210***
			(0.072)	(0.082)	(0.081)
LDP[c]		0.459**	0.423**	0.402**	0.300***
		(0.185)	(0.182)	(0.184)	(0.098)
CGP[c]		0.734**	0.755**	0.717**	0.610**
		(0.308)	(0.302)	(0.307)	(0.243)
DPJ[c]		0.322	0.289	0.278	
		(0.219)	(0.218)	(0.218)	
No party[c]		0.070	0.078	0.058	
		(0.203)	(0.202)	(0.203)	
Intercept	0.464***	0.698**	0.778***	0.984***	1.120***
	(0.151)	(0.306)	(0.286)	(0.321)	(0.252)
Observations	2,053	2,053	2,053	2,053	2,053
AIC	2,806	2,780	2,774	2,774	2,768

Standard errors are in parentheses. Results obtained by five imputed datasets are combined, following the Rubin's rule. See Footnote 32.

*: $p < 0.1$, **: $p < 0.5$, ***: $p < 0.01$.

[a] The cateogry of less than high school is excluded as reference.

[b] Evaluation of government performance. A smaller value means a higher evaluation; a larger value means a lower evalution.

[c] Dummy for party identification of a responedent. LDP: Liberal Democratic Party. CGP: Clean Government Party or *Kōmeitō*. DPJ: Democratic Party of Japan.

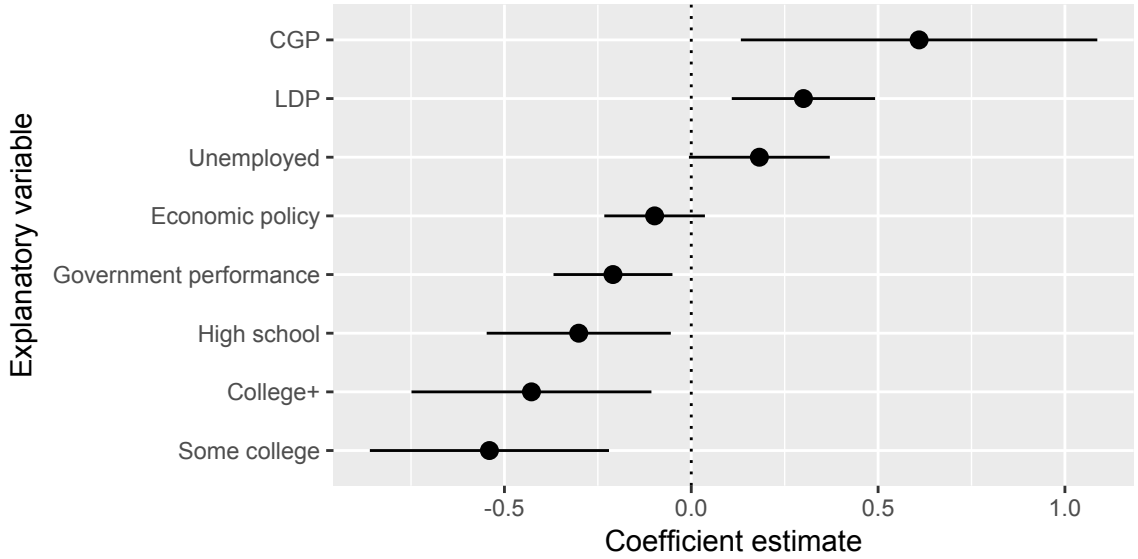


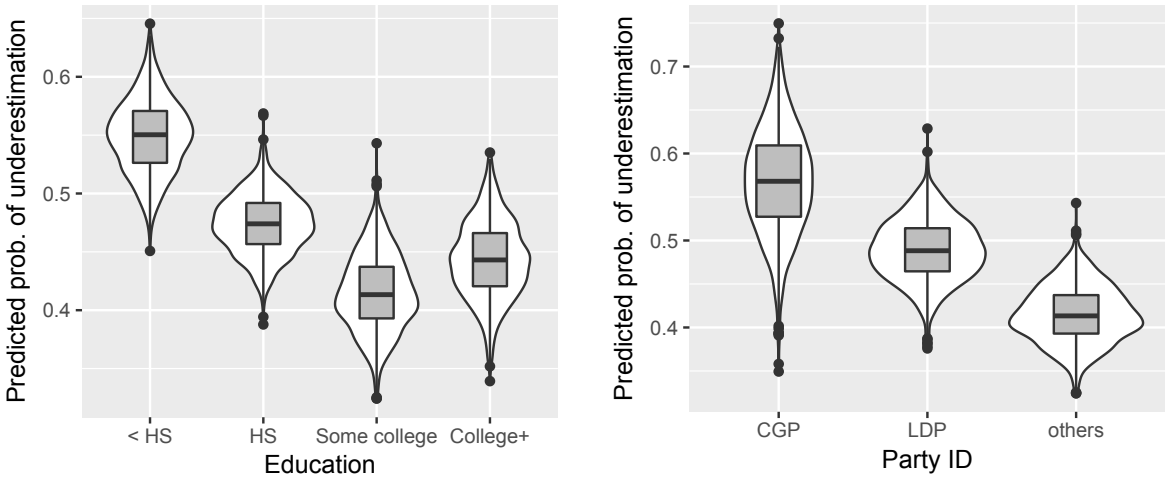
Figure 3.2: Coefficient Estimates of a Logit Model for Underestimation of Inequality, Model 5. *The outcome variable is underestimation of inequality, which is a binary variable. The dots in the figure represent the point estimates, and the horizontal lines show 95 percent confidence intervals.*

CGP.[35] From this figure, we find the probability of underestimation is higher among people who have not finished high school by about 15 percentage points than those who have received college education. Although it is not surprising that education affects perception about inequality, this effect size deserves more than a passing notice.[36] Panel (b) presents the probability of underestimation by party identification for people who are employed, neutral about government performance, and have some college education but have not completed four-year college.[37] The probability of underestimation is highest for CGP supporters among three groups. Compared to Japanese who do not support the LDP or CGP, the predicted probability of underestimation by CGP supporters is higher by about 15 percentage points.

[35]That is, I set the unemployed dummy at 0, the evaluation of economic policy at 3, the evaluation of overall government performance at 3, the LDP dummy at 0, and the CGP dummy at 0.

[36]As I explained above, these effects do not disappear even if I control for income. In fact, when I control for income, the effects are not smaller but larger than those in Model 5. See Table 3.6 for the result with income controlled for.

[37]That is, I set the unemployed dummy at 0, the evaluation of economic policy at 3, the evaluation of overall government performance at 3, the dummies for high school and college+ at 0, and the dummy for some college at 1.



(a) Effect of education

(b) Effect of party ID

Figure 3.3: Predicted Probabilities of Underestimation of Inequality. *Using the result of Model 5, 1,000 values are simulated for each panel. Panel (a) on the left shows the distribution of predicted probabilities by education level. People are assumed to be employed, have neutral evaluation of government performance, and are not LDP or CGP supporters. Panel (b) on the right shows the distribution of predicted probabilities by party identification. People are assumed to be employed, have neutral evaluation of government performance, and have received some college education but not finished four-year college.*

In addition, the distribution of the probabilities is wider for the CGP than the other groups. The difference between the LDP and "others" is not large, but the LDP supporters show higher probability of underestimation than people in the "others" group.

3.3.2 Multilevel Regression and Poststratification of Underestimation

In the previous subsection, I have analyzed the individual-level effects on underestimation of inequality. In this subsection, I add a geographical factor to understand underestimation of population subgroups in more detail. I use prefectures as my geographic variable. JES III provides us with the variable indicating the prefectural home for each respondent. Thus, I can use it to divide the respondents into prefectures. However, each prefecture has only the small number of respondents. For some prefectures,[38] the number is less than 10. Therefore, simply adding the variable of prefectures into regression models does not help us understand

[38]In Toyama, Saga, and Okinawa.

underestimation of inequality.

To estimate underestimation of inequality by subgroups based on geographic and demographic variables, I use a multilevel regression and poststratification (MRP), which enables us to estimate the outcome at sub-national levels using a national level survey (Park, Gelman, and Bafumi 2004; Ghitza and Gelman 2013; Kastellec, Lax, and Phillips 2014). Lax and Phillips (2009) show that state-level public opinion can be estimated by a survey with about 1,400 respondents. Because the number of prefectures is slightly smaller than that of the states in the U.S. and JES III has more than 2,000 respondents, an MRP should be able to produce reasonable estimates about prefectural-level public opinions.

To implement an MRP, I first fit a regression model for a survey response using demographic and geographic variables. Given the results of the logit models, I use only education (a four-category variable) and employment status (a binary variable). Because I later poststratify using the population data, I do not include political variables. As a result, I estimate underestimation for $4 \times 2 \times 47 = 376$ different cells. I treat the outcome $Y_i \in \{0, 1\}$ as a function of person i's demographics and prefectures. For a person i who belongs to the cell c:

$$\begin{aligned} Y_{i \in c} \sim & \text{Bernoulli}(\theta_c), \\ \theta_c = & \text{logit}^{-1}(\alpha_{c \in p} + \beta^{\text{edu}}_{c \in j} + \beta^{\text{emp}}_{c \in k}), \end{aligned}$$

where θ_c is the probability of underestimation for people in the cell c, and $p \in \{1, 2, \ldots 47\}$, $j \in \{1, 2, 3, 4\}$, and $k \in \{1, 2\}$ are the indexes for prefecture, education level, and employment status respectively.[39] The coefficients are sampled from a normal distribution with mean zero and an estimated variance:

$$\begin{aligned} \beta^{\text{edu}}_{c \in j} &\sim \text{Normal}(0, \sigma^2_{\text{edu}}), \\ \beta^{\text{emp}}_{c \in k} &\sim \text{Normal}(0, \sigma^2_{\text{emp}}). \end{aligned}$$

[39]Instead of adding a series of dummy variables, I let the intercept vary across cells.

The prefectural effects α's are modeled as a function of the Gini coefficient within the prefectures[40]:

$$\begin{aligned}
\alpha_p &\sim \text{Normal}(\mu_p, \sigma_p^2), \\
\mu_p &= \alpha_0 + \gamma \text{Gini}_p, \\
\gamma &\sim \text{Normal}(0, \sigma_\gamma^2), \\
\alpha_0 &\sim \text{Normal}(0, \sigma_0^2).
\end{aligned}$$

With this model, I obtain the estimates of θ_c, which represent the predicted probability of underestimating inequality for people in the cell c.[41]

Then, I poststratify to adjust the result to the size of each population subgroup. I average over the voting-age population, that is, people who are 20 years or older.[42] For each prefecture, I calculate the average underestimation over each cell c in prefecture p:

$$\theta_p^{\text{MRP}} = \frac{\sum_{c \in p} N_c \theta_c}{\sum_{c \in p} N_c},$$

where θ_c is the estimated proportion of inequality underestimation and N_c is the actual population frequency of the cell c in each prefecture. Therefore, I need to obtain N_c to implement poststratification.

To get the cell population size N_c for each prefecture, I use the Census of Japan for 2000, which is available at the Japanese government's e-Stat website.[43] Japanese government takes a census every five years and collects a wide range of demographic information. The Japanese

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[40]I estimated the model with other prefectural-level variables: GDP per capita, population, land area, and the population density. None of these has a statistically significant effect, and inclusion of these variable does not change the result. Therefore, I do not include these variables in this chapter.

[41]Table 3.7 shows the result of this multilevel regression.

[42]In Japan, voting age was lowered to 18 in 2016.

[43]e-Stat is the portal site of official statistics of Japan: `http://e-stat.co.jp`.

census is a population survey. All residents in Japan must fill out a survey and submit it.[44] As a result, the non-response rate is usually low. For the 2000 Census, non-response was only 1.7 percent.[45] Thus, I treat the counts obtained from the census as truth. I use the information on education level and employment status[46] for each prefecture. Because I am interested in voting age population, I only use the counts for people who are 20 years old or older. Cross-tabulations of variables for some combination, such as the contingency table of age and gender, are available for each prefecture. However, I cannot access to the cross-tabulation between education level and employment status.[47] Therefore, I need to estimate the count of each cell using the Census data.

To construct cell estimates, I use the iterated proportional fitting (IPF) method. This method calculates weights for individuals with specific demographic characteristics. For instance, if we use age (with 4 categories: 20–29 years old, 30–44, 45–64, and 65-and-over), gender (male and female), and employment status (employed and unemployed), we can think of $4 \times 2 \times 2 = 16$ different types of individuals. For each type (or cell), I would like to know how many people live in each prefecture. The IPF estimates these counts by calculating a series of deterministic weights, using the marginals of aggregate counts. The IPF is the "most widely used and mature *deterministic* method to allocate individuals to zones" (Lovelace and Dumon 2016, p. 70, italics in original).[48]

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[44]Article 13 of Statistics Act stipulates that. If a resident refuses to report, he might incur a penalty of 500 thousands yen or be sentenced to six months in prison (Article 61, Statistics Act), though it does not seem to be strictly enforced.

[45]However, it has been becoming higher.

[46]I also used age, gender, income, and house ownership, but the result does not change, because these factors do not affect underestimation at the individual level. Many other counts are also available, but I cannot use those variables because the survey (JES III) does not provide a lot of demographic variables.

[47]In general, three-way cross-tabulations are available if we submit a request to the government office. However, cross-tabulations of higher orders are not available for public use. Because I tried to include more than a few demographic variables, I did not order the two-way tabulation of education and employment status.

[48]As suggested in the quote, there exist stochastic methods, such as combinatorial optimization methods (see, e.g., Hermes and Poulsen 2012).

I implement an IPF with the `mipfp` package in R and obtain N_c for each cell. Then, I poststratify the estimates obtained by the multilevel regression. Figure 3.4 presents the result. The figure shows a series of prefectural maps of Japan. On the maps, the proportion of people underestimating inequality is shown by colors. A colder color (blue) represents higher level of underestimation, and a warmer color shows lower level of underestimation. Different maps are drawn for different combinations of education level and employment status. As we have already seen in the individual level analysis, the educated people are less likely to underestimate inequality. Therefore, the maps at the bottom of Figure 3.4 have more orange and those at the top have more blue. Unemployed Japanese are more likely to underestimate inequality. Thus, we see more blue in the maps on the right than those in the left. However, even after controlling for these demographic factors,[49] we still see some variation in underestimation across prefectures (see Figure 3.12 for prefectural estimates of underestimation, averaging over demographic subgroups). How can we explain the prefectural differences in underestimation?

Figures 3.5 and 3.6 show the distribution of prefectural/demographic population subgroups in the JES III survey in 2001. The horizontal and vertical axes in each figure show the within-prefecture Gini coefficient and the proportion of people who underestimate inequality, respectively. The size of the circles and triangles reflects the population size of each subgroup: the larger a circle or a triangle is, the more population each subgroup has. In Figure 3.5, people are grouped by their prefecture *and* education level—(1) less than high school, (2) completed high school, (3) some college, and (4) completed college or more. Four different colors are assigned to different levels of education. In Figure 3.6, people are further distinguished by employment status, and the circles and triangles represent the employed and the unemployed respectively. From these figures, we find a huge difference in perceived inequality among population subgroups. The proportion of people who underestimate inequality is about 37 percent for the people who are employed and have received some college education in Okinawa, which is the most unequal prefecture (Gini = 0.351). For the unem-

[49]Other demographic factors—gender, age, income, and house ownership—do not have an effect or change the overall result, as I explained above.

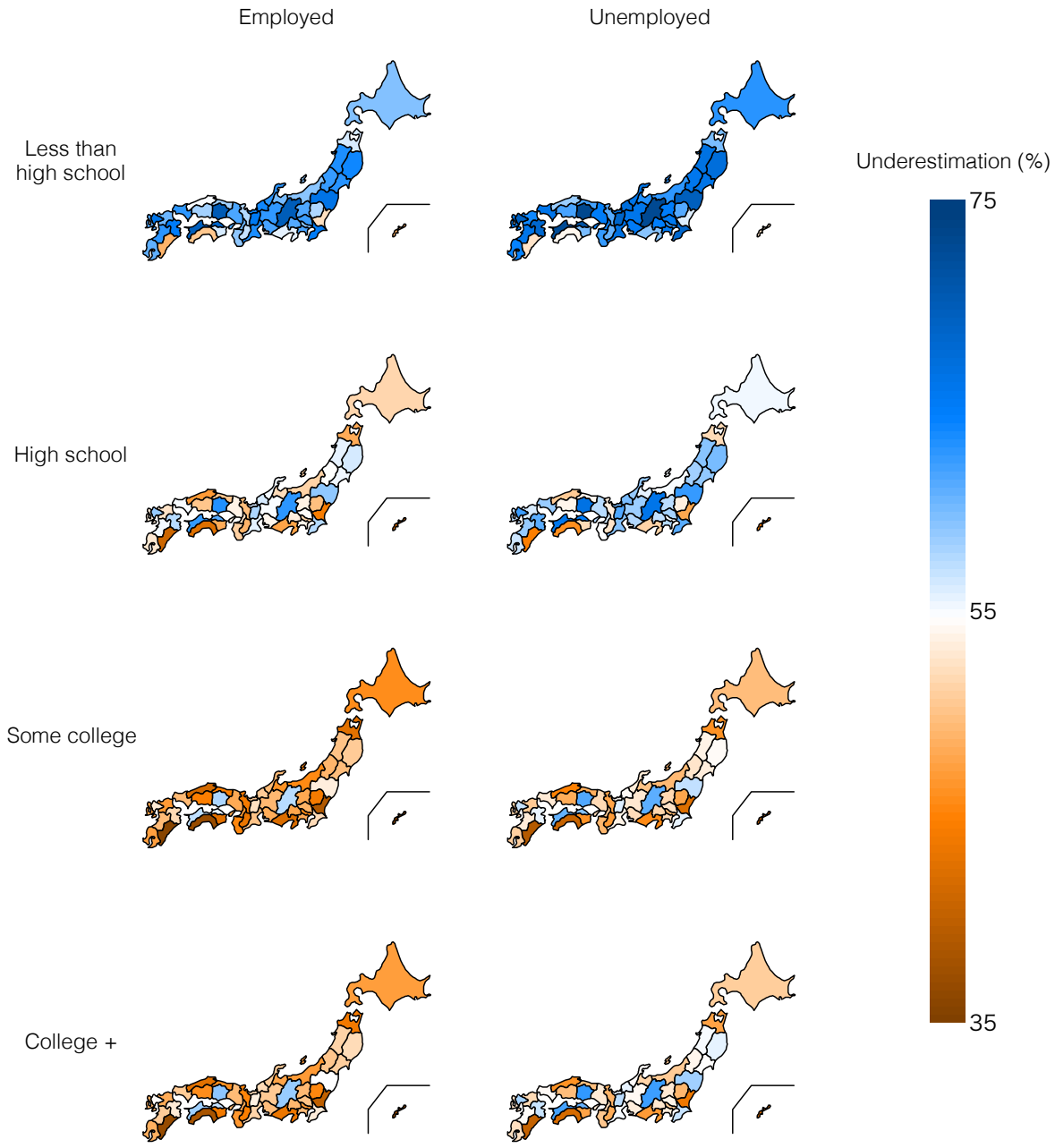

Figure 3.4: Underestimation of Inequality Estimated by the MRP for Population Subgroups Defined by Education Level and Employment Status by Prefecture. *A colder color (dark blue) shows stronger underestimation, and a warmer color (orange) shows less severe underestimation. The map is drawn in R by modifying a code provided by Shigenobu Aoki (`http://aoki2.si.gunma-u.ac.jp/R/src/map.R`).*

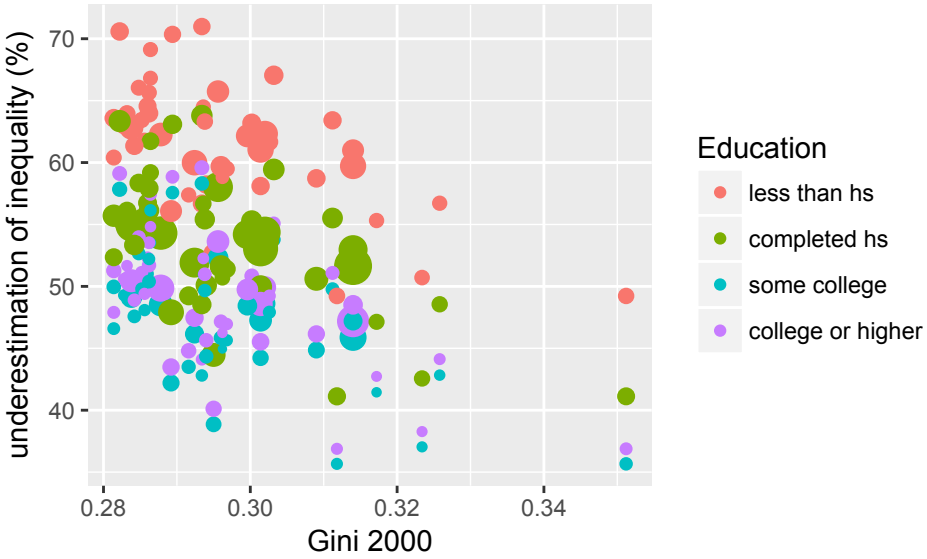

Figure 3.5: Underestimation of Inequality and Prefectural-level Inequality for Population Subgroups by Education Level. *The horizontal axis shows the Gini coefficient within each prefecture. The vertical axis show the estimated proportion of people who underestimate inequality. The size of circles is proportional to the population size of the subgroup. Different colors are assigned to different levels of education.*

ployed people without high school diplomas living in Nagano, which is the third most equal prefecture (Gini = 0.282),[50] the same proportion is about 73 percent. Between these two groups, the difference in the probability of underestimating inequality is about 36 percentage points, which is substantial. From these figures, we can see a tendency that people living in an equal prefecture with a small Gini index tend to underestimate inequality more. In addition, most people live in prefectures where income inequality is small. Combining these observations together, it is evident that people underestimate the national level of inequality because the local level of inequality is low, as predicted. The result of the multilevel regression shows that the effect of the Gini coefficient on underestimation is not statistically significant ($p = 0.118$, see Table 3.7). Given that we have only 47 observed values of the Gini coefficient and that the p value is just over 0.1, it might be the case that we make the Type II error of accepting the null of no effect incorrectly due to the small sample size.

[50]The most equal prefectures are Miyagi and Toyoma whose Ginis are 0.2814

Figure 3.6: Underestimation of Inequality and Prefectural-level Inequality for Population Subgroups by Education and Employment Status. *The horizontal axis shows the Gini coefficient within each prefecture. The vertical axis show the estimated proportion of people who underestimate inequality. The circles and triangles represent the employed and the unemployed respectively. The size of circles and triangles is proportional to the population size of the subgroup. Different colors are assigned to different levels of education.*

3.3.3 Analysis of the MRP Estimates

To understand the causes and consequences of inequality underestimation, I analyze the prefectural level data. First, I fit a linear regression (OLS) to the prefectural level data in order to explain underestimation as the outcome. The outcome variable is the proportion of population who underestimate national inequality, which is estimated by the MRP conducted above. For explanatory variables,[51] I use prefectural level measures for the Gini coefficient in 2000 (standardized), GDP per capita in 2000 (in log), the population in 2000 (in log), the population living in densely inhabited area (DID) in 2000 (in log), the land area (square kilometer, in log), and the vote share of the LDP (%) in the previous national election, which

[51]Summary statistics for prefectural level data are available in Table 3.5.

is the 2000 House of Representatives Election.[52] In the previous analysis I implemented to obtain the MRP, I did not have a measure of underestimation at the prefectural level. Thus, the prefectural-level estimates might have not been representative. By contrast, because we have the MRP estimates, this analysis should provide us with more representative estimates of the prefectural-level factors.

Figure 3.7 presents the result (see also Table 3.8). Panel (a) displays the coefficient estimates of this model. In this figure, the dots represent point estimates, and the horizontal lines show 95 percent confidence intervals. As we can see, the Gini is the only variable whose 95 percent confidence interval does not contain the value of zero. Although identification with the LDP has a negative effect on underestimation at the individual level, the support for the LDP at the prefectural level does not have a significant effect. Panel (b) shows the relationship between underestimation and inequality within the prefectures. The horizontal and vertical axes show the Gini coefficient and the proportion of underestimation (%). The solid line displays the predicted proportion, and the shaded area around the line shows a 95 percent confidence interval obtained by simulation. The dots are the proportion of underestimation estimated by the MRP.[53] From this figure, it is evident that the Gini has a negative effect on underestimation. Inequality within the prefecture causes residents to perceive rising inequality nationwide. For people living in an equal prefecture, it is more difficult to perceive increases in inequality at the national level.

Lastly, I examine a political consequence of underestimating inequality. As demonstrated in the previous chapter, underestimation of inequality could lower the demand for government redistribution. However, in a modern representative democracy, people usually do not vote for or against each policy. Rather, they cast a ballot for a political party that represents a bundle of policy positions.. When the first wave of JES III was conducted in 2001,

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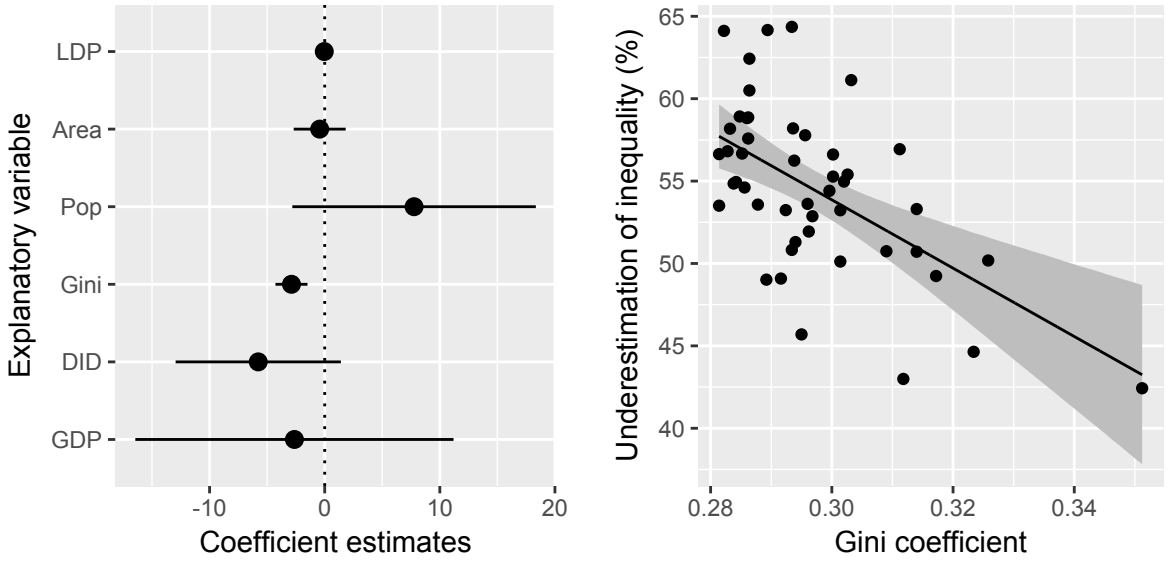
[52]Elections for the House of Representatives in Japan use a mixed member electoral system, which consists of two tiers. One tier uses plurality system with single-member districts; the other uses the proportional representation system with 11 regional electoral blocks. I use the vote share in the proportional representation tier in each prefecture.

[53]However, because I used the Gini coefficient in the MRP to obtain the prefectural level of underestimation, this result should be discounted to some degree.



(a) Coefficient Estimates

(b) Observed and Predicted Underestimation

Figure 3.7: Result of the Linear Regression with Underestimation as the Outcome. *The outcome variable is the proportion of people who underestimate inequality within each prefecture, which is the estimate obtained by the MRP. Panel (a) shows the point estimates and 95% confidence intervals of coefficients. The Gini coefficient is the only variable that has a statistically significant effect. Panel (b) shows the relationship between underestimation and inequality within each prefecture. The horizontal and vertical axes show the Gini coefficient within each prefecture and the proportion of people who underestimate inequality, respectively. The dots are the proportion of underestimation estimated by the MRP. The line represent the predicted proportion of underestimation, and the shaded area around the line show the 95 percent confidence interval. More detailed result is available in Table 3.8.*

the Japanese government was controlled by the coalition of the LDP and the CGP. Then the prime minister was the leader of the LDP, Junichiro Koizumi. Koizumi was trying to overthrow traditional LDP politics (see, e.g. Rosenbluth and Thies 2010). Before Koizumi, the LDP used to implement some welfare policies that are usually favored by social democratic parties in Europe, even though the LDP was a conservative party. However, Koizumi was transforming the LDP to a liberal party, which intervenes economy as little as possible. Thus, the LDP in 2001 must have been supported more by the people who were not in favor of government redistribution.

Taking this into account, I investigate if underestimation increased the LDP's vote share at the prefectural level. Underestimation of inequality should lower the demand for govern-

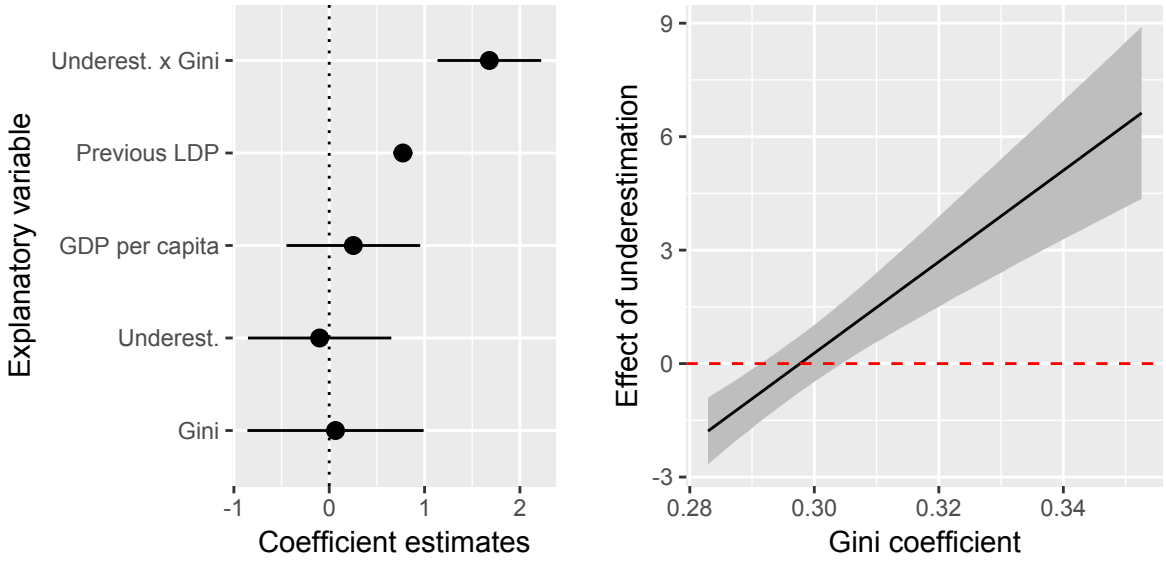
ment redistribution, and people should vote for Koizumi's LDP to decrease the demand. To test this hypothesis, I fit another linear regression. The outcome variable of this analysis is the LDP's vote share in the House of Councillors Election held in 2001.[54] Underestimation of inequality estimated by the MRP is the main explanatory variable. I use the standardized value of underestimation in the regression. I control for the LDP's prefectural vote share in the previous national election (the 2000 House of Representative Election, centered), GDP per capita in 2000 (logged and standardized), and the Gini coefficient in 2000 (standardized).[55] In Chapter 2, I showed that the Gini coefficient attenuates the effect of perception on the support for redistribution. In other words, the effect of perception is conditional on the Gini. This might also be true at the prefectural level. Thus, I include the interaction between underestimation and the Gini coefficient.

Figure 3.8 presents the result of the linear regression (see also Table 3.9). Panel (a) shows the coefficient estimates for each explanatory variable. Among the explanatory variables I examined, the vote share in the previous election has a statistically significant effect. The LDP's vote share is higher in the prefecture where it was higher in the previous election. Because these two elections were only about a year apart from each other,[56] this is a reasonable result, though it is also true that Koizumi was not yet the LDP leader in 2000. In addition, the interaction between underestimation and inequality has a significant effect. Panel (b) shows how the effect of underestimation on the LDP's vote share changes as inequality increases. In this figure, the solid line shows the mean estimates of the effect of underestimation, and the shaded area shows the 95 percent confidence interval. We can see that the effect of underestimation depends heavily on the level of inequality. In equal prefectures where the Gini is small, underestimation decreases the LDP's vote share. By contrast, it increases the LDP's vote share in relatively unequal prefectures with the Gini larger than

[54]The vote share in each prefectural district is used.

[55]Summary statistics for prefectural level data are available in Table 3.5.

[56]The HR election was held on 25 June 2000, and the HC election was on 29 July 2001.



(a) Coefficient Estimates

(b) Effect of Underestimation Conditional on Gini

Figure 3.8: Result of the Linear Regression with Underestimation as an Explanatory Variable. *Outcome is the LDP's vote share (%) in the 2001 House of Councillors Election within each prefecture. Panel (a) shows the point estimates and 95% confidence intervals of coefficients. The Gini coefficient is the only variable that has a statistically significant effect. Panel (b) shows the effect of underestimation of the LDP's votes share conditional on the degree of inequality measured by the Gini coefficient. The effect of underestimation heavily depends on the Gini. It is negative when the Gini is below 0.3, but it is positive when the Gini is above 0.3. More detailed result is available in Table 3.9.*

0.3, which is the mean of the Japanese prefectural Ginis in 2000.[57]

Figure 3.9 displays how the vote share of LDP changes as underestimation increases. In this figure, the horizontal and vertical axes show the proportion of people who underestimate inequality and the vote share of LDP predicted by the linear regression, respectively. To calculate the predicted vote share, I plug the mean values into the values of GDP and the vote share in the previous election. For the Gini coefficient, I use three different values: the mean (0.297) in black, the mean minus a standard deviation ($0.297 - 0.014 = 0.283$) in red, and the mean plus a standard deviation ($0.297 + 0.014 = 0.311$) in blue. This figure suggests that underestimation does not affect the LDP's vote share in an average prefecture, as shown by almost flat black line. However, whether underestimation matters depends on the level of

[57]In 2000, the Gini coefficient was larger than 0.3 in 16 prefectures.

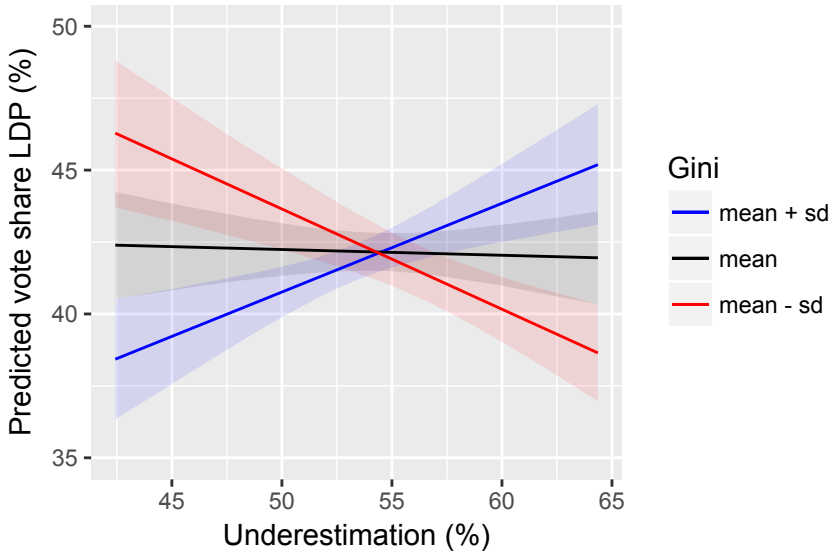


Figure 3.9: Predicted Vote Shares of the LDP (%) by Underestimation (%) and the Gini Coefficient. *The horizontal and vertical axes show the proportion of people who underestimate inequality (the MRP estimates) and the vote share of LDP predicted by the linear regression, respectively. Three different values of the Gini are distinguished by color. The other explanatory variables are fixed at the mean values. The lines represent the predicted values, and the shaded areas around the line show the 95 percent confidence intervals.*

inequality in each prefecture. In relatively equal prefectures, underestimation decreases the support for the LDP, as shown by the red line. Underestimation could lower the support as much as 7 points, from 46 percent to 39 percent. In contrast, it increases the LDP's vote share in relatively unequal prefectures, as displayed by the blue line. It could raise the vote share as much as 6 points from 39 percent to 45 percent.

Why does perceived inequality help the incumbent party in equal prefectures but damage it in unequal prefectures? Poor people in an unequal prefecture (one with a large Gini) might believe not only that they are relatively poor in the prefecture but also that they are relatively poor in Japan. Then, they might accuse the government of providing less than enough amount of income transfers. For them, the incumbent government (both the old and new LDPs) is incompetent in reducing income inequality. In addition, they should have expected the Koizumi administration to shrink welfare policies further. As a result, the government becomes less popular as people perceive more inequality. That is, underestimations of inequality helps the government. Given that the LDP supporters—and the

CGP supporters—are more likely to underestimate inequality, as we found in the multilevel regression conducted above, it is not hard to accept this association.

In contrast, in an equal prefecture (one with a small Gini), people might not be concerned about inequality because their society looks equal to them. They might believe that the government policies have been effective to keep the level of income inequality low. For them, underestimation of inequality strengthens their degree of satisfaction with the status quo (the old LDP, but not Koizumi's new LDP). In such a circumstance, people who underestimated inequality were less likely to support the new LDP, because Koizumi was trying to deviate from the status quo. That is, underestimation damaged the LDP by making people long for the traditional LDP. This implies that Koizumi was considered as an opposition force within the government by those who supported the old LDP (Rosenbluth and Thies 2010).

Table 3.2 summarizes these relationships. In this table, the new LDP means the LDP at the time of the election, which was led by Junichiro Koizumi. The old LDP can be though as a part of opposition. In an equal prefecture with a small Gini, underestimation moves votes away from the new LDP (and opposition parties other than the old LDP). This is because people who underestimate inequality are more likely to support the status quo. In contrast, in an unequal prefecture with a large Gini, underestimation moves votes from an opposition party to the LDP, old or new. Some people who underestimate inequality are more willing to accept Koizumi. At the same time, underestimation also benefits the old LDP, because other people who underestimate inequality are more likely to support the status quo, like those in an equal prefecture.

3.4 Conclusion

In this chapter, I have investigated citizen underestimation of inequality. Even in an era of rising inequality, many people misperceive the level of inequality. In Japan, there are more people who underestimate inequality than people who overestimate it. Underestimating inequality has political consequences. People who underestimate inequality are less likely to support government redistribution. If there are many who underestimate inequality, the

Table 3.2: Popular Vote Choice by Perception and Ineuality

	Gini coefficient	
Perception	small	large
Accurate perception	new LDP or opposition	opposition
Underestimation	old LDP	LDP (old or new)

demand for redistribution could become lower. In turn, the government might reduce the amount of income transfers to the poor. Consequently, inequality might become larger. Better or worse, it is not how we expect (or, at least, want) democracy to work because the policies might be biased toward the relatively small group of wealthy people. To fully understand the connection between politics and income inequality, we need to know more about underestimation or misperception of inequality.

To understand the causes and consequence of underestimating inequality, I implemented a multilevel regression and poststratification using a survey data at the individual level and some aggregate data at the prefectural level. The statistical analysis has revealed three things. First, some demographic and political factors affect the probability of underestimation at the individual level. Education lowers the probability of underestimation. This is probably because education helps people observe the facts beyond their familiar reference groups. In addition, the unemployed are more likely to underestimate inequality, perhaps they have less information about incomes. Furthermore, I found that people who supported the Liberal Democratic Party or the Clean Government Party, which constituted a coalition government at the time of the survey, tended to underestimate inequality more. Similarly, the respondents who gave a high evaluation for overall government performance were more likely to underestimate inequality. Of course the evidence shown in this study merely demonstrates that these factors are correlated with underestimation. It is plausible that the support for the LDP *causes* underestimation of inequality, but it is also possible that underestimation *causes* the support for the LDP.

Second, the degree of underestimation varies across prefectures in Japan. Even after

controlling for the relevant demographic factors (education level and employment status), we can see prefectural differences in underestimation of inequality. Relatively equal prefectures tend to have a higher proportion of people who underestimate inequality, which supports my argument that prefectural equality has a positive effect on underestimation. While people in an unequal prefecture have opportunities to observe unequal situations, residents in an equal prefecture do not. As a result, differences in prefectural inequality creates differences in the perceived level of national inequality. We can consider this as an example of bias, if we assume that people should form attitudes toward national politics based on nationally accurate information.

Lastly, underestimation of inequality affects electoral outcomes. The LDP's vote shares within the prefectures vary depending on the proportion of underestimation. However, the effect of underestimation is not simply positive or negative. Intriguingly, the sign of this effect depends on the level of inequality within a prefecture. Underestimation boosts the support for the Liberal Democratic Party, which was the incumbent party at the time of the survey, in relatively unequal prefectures. In contrast, underestimation does harm to the LDP in relatively equal prefectures. Even though I provided a plausible interpretation of these effects, we should study further the mechanism on how underestimation changes electoral outcomes.

3.5 Appendix

3.5.1 Data

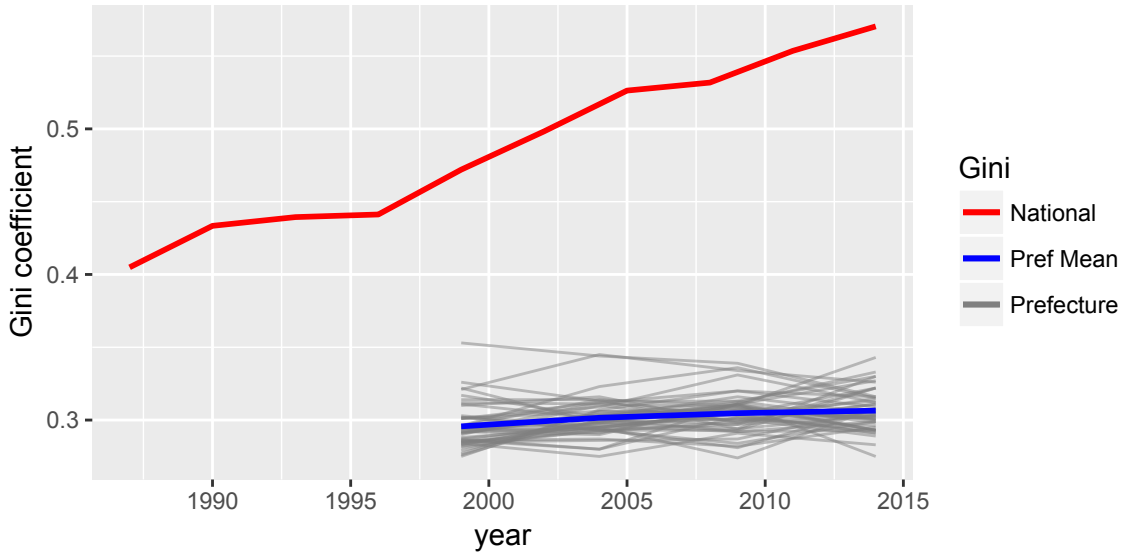


Figure 3.10: Change of the Gini Coefficients over Time for Each Prefecture and Japan, 1999–2014. *The gray lines represent the Gini coefficients of 47 prefectures in Japan. The blue line is the mean of prefectural Ginis. The red line is the Gini measure by a different survey at the national level. The Gini coefficients for prefectures are measured in 1999, 2004, 2009, and 2014 (Statistics Bureau of Japan 1999, 2004, 2009, 2014). The Gini for the national level is measured every three years between 1987 and 2014 (Counsellor Office for Policy Evaluation, Ministry of Health, Loabour and Welfare, Japan 1999, 2014).*

Table 3.3: Summary Statistics of Individual Level Variables of JES III

Variable	Type	Missing Obs.	Mean	Std. Dev.
Perceived inequality[a]	ordered categorical	216	3.24	0.97
Party ID[b]	unordered categorical	82		
Unemployment dummy[c]	binary	4	0.40	0.49
Self-employment dummy	binary	4	0.19	0.39
Education[c]	ordered categorical	13	2.23	0.98
Household income[d]	ordered categorical	665	3.63	1.88
House ownership	binary	4	0.79	0.41
Evaluation of economic policy[e]	ordered categorical	225	3.13	0.78
Evaluation of government[e]	ordered categorical	182	2.55	0.74
Gender[f]	binary	0	1.52	0.50
Age	continuous	0	48.68	14.29
Prefecture	unordered categorical	0		
Total observations	2,053			
Complete observations	1,141			
At least one missing	912			

* The means and standard deviations for variables with missing values are calculated by excluding the missing values. *Source*: Japanese Electoral Study III.

[a] Five-category variable. 1 = Japan is becoming much more equal, 2 = more equal, 3 = about the same, 4 = more unequal, and 5 = much more unequal.

[b] Political party that a respondent supports.

[c] Four-category variable of highest degree earned. 1 = less than high school, 2 = completed high school, 3 = some college, and 4 = college degree or higher.

[d] Nine-point scale of house hold income. 1 = less than 2 million yen, 2 = 2–4 million, 3 = 4–6 million, 4 = 6–8 million, 5 = 8–10 million, 6 = 10–12 million, 7 = 12–14 million, 8 = 14–20 million, and 9 = 20 million or larger.

[e] Five-point scale of evaluation for government performances. 1 = very good, 2 = good, 3 = neither good nor bad, 4 = bad, and 5 = very bad.

[f] Binary categorical variable: 1 for male, and 2 for female.

Table 3.4: Multiple Imputation of Missing Values for JES III

Variable	Missing Obs.	Chain 1	Chain 2	Chain 3	Chain 4	$\hat{R}$
Perceived inequality	216	3.25	3.24	3.23	3.24	1.0
Party ID	82	4.14	4.09	4.12	4.13	1.0
Unemployment dummy	4	1.40	1.40	1.40	1.40	1.0
Self-employment dummy	4	1.19	1.19	1.19	1.19	1.0
Education	13	2.23	2.23	2.23	2.23	1.0
Household income	665	3.61	3.55	3.63	3.63	1.0
House ownership	4	1.79	1.79	1.79	1.79	1.0
Evaluation of economic policy	225	3.16	3.17	3.15	3.15	1.0
Evaluation of government	182	2.57	2.58	2.57	2.59	1.0
Gender	0					
Age (standardized)	0					
Prefecture	0					

* The mean value for each variable for each chain of multiple imputation is shown. $\hat{R}$ or Gelman-Rubin statistics are smaller than 1.1 for all variables. I implemented multiple imputation of missing values with `mi` package (Su et al. 2011) in R (R Core Team 2016).

Table 3.5: Summry Statistics for Prefectural-level Variables

Variable	Mean	Std. Dev.	Min	Max
Underestimation (%)[a]	54.50	5.12	42.43	64.36
Gini 2000[b]	0.30	0.01	0.28	0.35
GDP per capita 2000[c]	2,863.47	410.10	2,098	4,619
DID population 2000[d]	1,761,908.00	2,457,693.00	189,049	11,821,158
Voting age population[d]	2,141,896.00	2,034,367.00	482,156	9,956,239
Area (km^2)[e]	7,768.91	11,704.47	1,863	83,424
LDP's vote share 2000 (%)[f]	32.15	6.45	19.49	45.04
LDP's vote share 2001 (%)[g]	41.16	5.70	23.23	51.33
Observations	47			

[a] Estimates by the MRP.
[b] Interpolated assuming the linear trand between 1999 and 2004. Source: Statistics Bureau of Japan (1999, 2004).
[c] Source: Cabinet Office of Japan: `http://www.esri.cao.go.jp/jp/sna/sonota/kenmin/kenmin_top.html`.
[d] Source: Japanese Census.
[e] Source: Geospatial Information Authority of Japan: `http://www.gsi.go.jp/KOKUJYOHO/MENCHO-title.htm`.
[f] Vote share of the LDP for each prefecture in the proportional representation tier of the 2000 House of Representatives Election. Source: Ministry of Internal Affairs and Communications of Japan: `http://www.soumu.go.jp/senkyo/senkyo_s/data/`.
[g] Vote share of the LDP for each prefecture in the prefectural district of the 2001 House of Councillors Election. Source: Ministry of Internal Affairs and Communications of Japan: `http://www.soumu.go.jp/senkyo/senkyo_s/data/`.

3.5.2 Result of the Individual-level Analysis

Table 3.6: Results of Logit Models for Underestimation Including Income

Variable	Coefficient	S.E.	95% Confidence Interval Lower	Upper
High school[a]	−0.333	0.129	−0.588	−0.078
Some college[a]	−0.582	0.169	−0.916	−0.249
College+[a]	−0.483	0.173	−0.824	−0.143
Unemployed	0.206	0.099	0.011	0.400
Economic policy[b]	−0.095	0.069	−0.232	0.041
Overall performance[b]	−0.207	0.081	−0.369	−0.044
LDP[c]	0.295	0.098	0.104	0.487
CGP[c]	0.636	0.245	0.154	1.118
Income (in million yen)				
reference: < 2				
2–4	0.086	0.239	−0.413	0.585
4–6	0.186	0.192	−0.191	0.562
6–8	0.105	0.205	−0.298	0.507
8–10	0.215	0.250	−0.286	0.716
10–12	0.118	0.258	−0.388	0.624
12–14	0.123	0.394	−0.689	0.935
14–20	0.135	0.331	−0.517	0.787
> 20	0.591	0.395	−0.201	1.382
Intercept	0.992	0.309	0.380	1.603
Observations	2,053			
AIC	2,777			

* A categorical variable of household income is added to Model 5 reporeted in Table 3.1. Results obtained by five imputed datasets are combined, following the Rubin's rule. See Footnote 32.

[a] The category of less than high school is excluded as reference.

[b] Evaluation of government performance. A smaller value means a higher evaluation; a larger value means a lower evaluation.

[c] Dummy for party identification of a respondent. LDP: Liberal Democratic Party. CGP: Clean Government Party or *Kōmeitō*.

3.5.3 Result of the Multilevel Regression and Poststratification

Table 3.7: Results of the Multilevel Regression for the MRP

Effect	Variable	Category	Coefficient	Std. Error
Random	Education	Less than HS	0.347	
		HS	0.019	
		Some college	−0.212	
		College+	−0.160	
Random	Employment	Employed	−0.761	
		Unemployed	0.075	
Random	Prefecture	47 prefectures	omitted	
Fixed	Gini		−2.835	1.812
Fixed	Intercept		−3.236	2.211
	Observations	2,053		
	AIC	2,810		

* Standard errors are only available for fixed effects. Random effects for prefectures are omitted. Results obtained by five imputed datasets are combined following the Rubin's rule. See footnote 32.

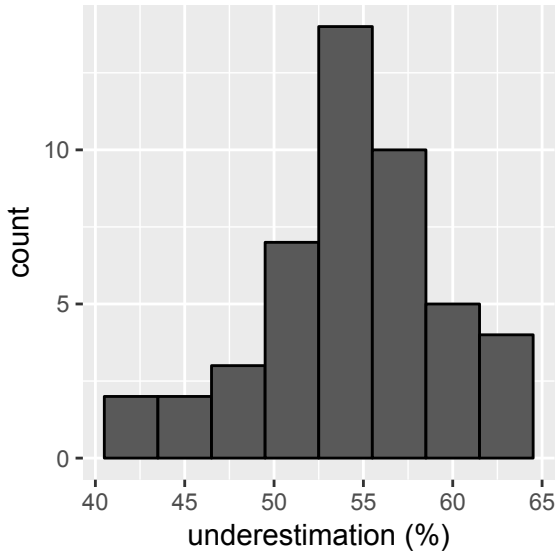


Figure 3.11: Distribution of Inequality Underestimation Estimated by the MRP for Each Prefecture.

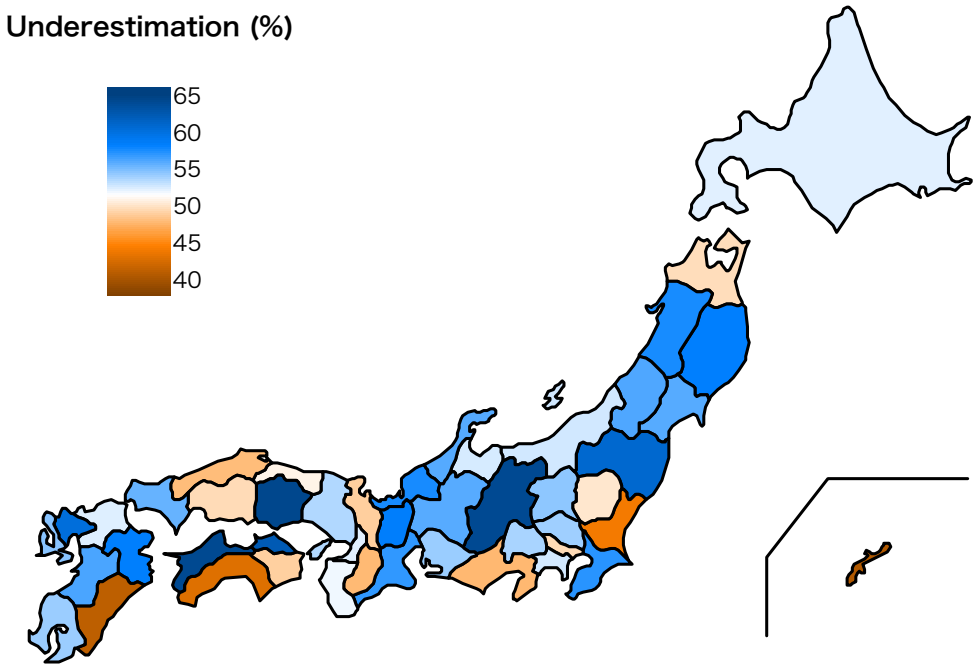


Figure 3.12: Underestimation of Inequality Estimated by the MRP for Each Prefecture in Japan. *A colder color (dark blue) shows stronger underestimation, and a warmer color (orange) shows less severe underestimation. The map is drawn in R by modifying a code provided by Shigenobu Aoki (`http://aoki2.si.gunma-u.ac.jp/R/src/map.R`).*

3.5.4 Result of the Linear Regressions with the MRP Estimates

Table 3.8: Result of Linear Regression (1): Outcome Variable = Underestimation (%)

Variable	Coef.	Std. Error	95% Conf. Int. Lower	Upper	p Value
Gini[a]	−2.89	0.69	−4.28	−1.49	0.00
GDP per capita[b]	−2.63	6.84	−16.45	11.19	0.70
DID Pop.[b]	−5.77	3.55	−12.95	1.40	0.11
Area (km^2)[b]	−0.44	1.12	−2.69	1.82	0.70
Population[b]	7.76	5.23	−2.81	18.34	0.15
LDP's vote share 2000	−0.04	0.13	−0.31	0.23	0.79
Intercept	49.03	50.16	−52.35	150.42	0.33
Observations	47				
Adjusted R^2	0.32				
F-statistic	4.63				
df = (6, 40)					

[a] Standardized.
[b] In log.

Table 3.9: Result of Linear Regression (2): Outcome = LDP's Vote Share (%)

Variable	Coef.	Std. Error	95% Conf. Int. Lower	Upper	p Value
Underestimation[a]	−0.10	0.37	−0.85	0.65	0.79
Gini[a]	0.07	0.46	−0.86	0.99	0.89
Underest. × Gini	1.68	0.27	1.14	2.22	0.00
Previous Vote Share of LDP[b]	0.77	0.05	0.67	0.87	0.00
GDP per capita[a,c]	0.25	0.35	−0.45	0.95	0.47
Intercept	42.15	0.33	41.48	42.83	0.00
Observations	47				
Adjusted R^2	0.88				
F-statistic	66.11				
df = (5, 41)					

[a] Standardized.
[b] Centered.
[c] In log.

CHAPTER 4

Income Inequality and Unequal Electoral Participation: An Analysis of Voter Turnout in OECD Countries

4.1 Introduction

Economic inequality has been rising in most industrialized countries (see, e.g., OECD 2011), and it has become a more salient issue than before. Yet, what political consequences does increase of economic inequality have? As the APSA Task Force on Inequality and American Democracy (2004) states, "we know little about the connections between changing economic inequality and changes in political behavior" (p. 661).

In this chapter, I examine the connection between economic inequality and electoral participation. If economic inequality causes unequal political participation, economic inequality can be harmful to our democratic societies. For the wealthy exercise stronger influence on politics than the poor. As a result of unequal political participation, policies, which includes redistributive policies, would be biased for the rich. That is, we would observe smaller amount of redistribution by the government as economic inequality increases. This is opposite to the theoretical expectation implied by Meltzer and Richard (1981). As redistribution declines, inequality might increase further. Given such a possibility, it is fruitful to understand the relationship between economic inequality and electoral participation, which is arguably the most important form of political participation.

Assuming that unequal electoral participation produces redistributive consequences, I will show the indirect effect of economic inequality on redistribution by demonstrating the effect of inequality on electoral participation. To understand how inequality affects an indi-

vidual's decision on turnout, I will focus on two factors—income (resources) and motivation (incentives)—at the individual level. By analyzing the data collected by the World Values Survey (WVS) with multilevel regression models, I will demonstrate that turnout rises as income increases, as shown by some previous studies (e.g., Anderson and Beramendi 2008; Solt 2008, 2010). This implies that income inequality causes differences in turnout between the wealthy and the poor.

In addition, I will show that an individual's motivation to turn out has an positive effect on electoral participation as well. Anderson and Beramendi (2008) point out that income can be an incentive to participate or abstain as well as a resource. However, because they do not use separate measures for resources and incentives, we cannot judge if both factors really affect turnout. By constructing a measure of an incentive or motivation, which does not rely on an income measure, I will demonstrate that motivation, in addition to income or a resource, has a positive effect on turnout. This effect of motivation on electoral participation is stronger among the rich than among the poor. Thus, motivation can further widen the gap in turnout between haves and have-nots. Inequality does not make a difference in turnout across different income groups if most people are demotivated to turn out, where the participation rates are predicted to be low for all income groups.

The rest of the chapter proceeds as follows. In the next section, I will discuss the mechanism that would explain the relationship between economic inequality or relative income and individuals' voting participation. I will argue that both motivation and income affect an individual's decision on turnout. Section 3 analyzes data to test my argument. I will demonstrate that both motivation and income have positive effects on electoral participation. Then, Section 4 discusses the problem of the data analysis. Section 5 concludes.

4.2 Resource and Motivation for Electoral Participation

What determines voter turnout? This is one of the main concerns in the study of elections, and a lot of research has been conducted both at the aggregate level (see, e.g., Blais 2006; Geys 2006, for a review and a meta-analysis, respectively) and at the individual level (for

reviews, see, e.g., Aldrich 1993; Dhillon and Peralta 2002). Because I am interested in an individual's decision on turnout, I limit the scope to the individual level.

At the individual level, the basic model of turnout predicts that a person will vote if he expects a positive reward $R = PB - C > 0$, where P is the probability that his vote will affect the election outcome, B is his expected party differential, and C is cost of voting—time, energy, and financial cost (Downs 1957*b*; Tullock 1967). C is usually positive, and P is practically zero in a national election. Thus, R is negative for anybody, and nobody should turn out to vote. However, many people do vote. To explain non-zero turnout, Riker and Ordeshook (1968) add D, which is civic duty to keep an electoral democracy work,[1] to the right-hand side of the equation. With this new term, the equation becomes $R = PB - C + D$, and R stays positive as long as D is larger than C or $k = D - C > 0$. Because we observe non-zero turnout in every national election in democracies, we can assume that there exists a positive k for many people in many different countries. Given that P is practically 0 (and hence $PB = 0$), one will gain a larger reward as k increases, which heightens one's probability of turnout (Elster 1989; Knack 1992; Ledyard 1984; Palfrey and Rosenthal 1983, 1985; Riker and Ordeshook 1968, 1973).[2] Inequality can be a factor that shifts k.

The individual-level relationship between income inequality and electoral participation has attracted a great deal of scholarly attention (e.g. Anderson and Beramendi 2008; Jensen and Jespersen 2017; Kasara and Suryanarayan 2015; Solt 2008, 2010; Smets and van Ham 2013). Why does economic inequality matter to an individual's decision on turnout? According to the resource theory of turnout, it is because people who have greater resources can use them to participate in politics more, and because economic resources represent or can be exchanged for political resources necessary for participation (Ansolabehere, de Figueiredo, and Snyder 2003; Boix 2003; Brady, Verba, and Schlozman 1995; Solt 2008; Verba and Nie 1972;

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[1] D contains, but is not limited to, the satisfaction "from compliance with the ethic of voting," "from affirming allegiance to the political system," "from affirming a partisan preference," "of going to the polls," and "of affirming one's efficacy in the political system" (Riker and Ordeshook 1968, p. 28).

[2] Some studies argue that closeness of an election, which is a proxy for P at an aggregate level, affects turnout (e.g., Blais and Dobrzynska 1998; Blais 2000; Simonovits 2012).

Verba, Schlozman, and Brady 1995). In other words, income marginally heightens one's probability of turnout by increasing k. It is predicted that people who are wealthy, and hence who have the great amount of resources, should have higher probability of turnout than the poor, who suffers scarcity of resources, other things equal. Therefore, economic inequality as inequality in political resources leads to unequal electoral participation.[3]

Anderson and Beramendi (2008), however, argue that "income can and should be viewed as *both* a resource and an incentive to participate (p.285, italics in original)." In their view, relative income is a mixture of two factors: resources and motivation. As resources, income monotonically increases turnout; a higher income always means a larger amount of resources. By contrast, income as an incentive can heighten or lower turnout. If the tension between the poor and the wealthy is intensified by income gap, income as motivation increases turnout among the rich but decreases it among the poor, because stakes are highest at both ends of the income distribution. Alternatively, it is possible that a certain amount of time is more precious for the rich than for the poor because the former has a higher wage. In such a case, income decreases k by raising the time cost of voting and lowers turnout (Filer, Kenny, and Morton 1993), other things equal. Therefore, if we can distinguish incentives from resources, we should expect resources and incentives to affect an individual's turnout decision in different ways, at least marginally.

Although their argument is convincing, we cannot fully accept the empirical result provided by Anderson and Beramendi (2008). Because they let relative income represent both resources and incentives, we cannot see the magnitudes of the effects of these two factors separately. Without knowing the effect of each variable separately, we cannot know if it is the case that *both* are important factors. Their statistical analyses show that higher relative income is associated with lower abstention in an election. Based on the results of statistical

[3]There are other explanations of the relationship between economic inequality and turnout. The power theory, on the one hand, argues that economic inequality decreases turnout in general (Bachrach and Baratz 1970; Goodin and Dryzek 1980; Lukes 2005; Schattschneider 1960). On the other, the conflict theory predicts that it increases the turnout (Brady 2004; Meltzer and Richard 1981; Oliver 2001). In this chapter, I focus on the resource theory because I am interested in how inequality affects turnout through individuals' relative levels of income as well as motivation. See Solt (2008) for a comprehensive study of these three theories, for example.

analyses, they infer that the positive relationship between relative income and electoral participation is driven by the scarcity of resources in the low and middle income levels, but that it is caused by stronger incentives in the high income level. Although this inference seems plausible, it is arbitrary that Anderson and Beramendi (2008) change the interpretations of the meaning of slope of regressions depending on the value of the explanatory variable. It is still possible that either resources or incentives does not matter at all. Their result allows us to know only that relative income matters.

Instead of using relative income to proxy for both resources and motivation, I use one variable for each factor in this chapter. I let relative income simply represent resources, as it is usually treated in the literature. Then, I introduce another variable to represent the motivational factor that is separable from relative income or resources.[4] By so doing, we will be able to see the effects of these factors separately. Then, we should expect that each factor stimulates electoral participation. The probability of turnout should be highest for people with a large amount of resource and a high level of motivation, and it should be lowest for people with a small amount of resource and a low level of motivation. When one of two is high and the other is low, the turnout should be in between.

Therefore, I propose the following hypotheses.

Hypothesis 1: The probability of turnout increases with the relative income, other things equal.

Hypothesis 2: The probability of a voter takes part in an election will be higher with strong motivation than without, at the same income level.

In the next section, I will test these hypotheses by analyzing survey data.

[4]I discuss the operationalization of the variables in the next section.

4.3 Data Analysis

To get empirical evidence on the relationship between economic resource, voting motivation, and electoral participation, I focus on the following questions. First, what is the impact of individual income on the probability of turnout? Second, does the motivation, in addition to resources, have an impact on electoral participation?

In order to answer these questions, I analyze the data of the World Values Surveys (WVS) from 1990 to 2014, which correspond to the second through sixth waves of the WVS (World Values Survey 2014*a*,*b*,*c*,*d*, 2015).[5] The following 25 Organisation for Economic Co-operation and Development (OECD) countries are included: Australia, Canada, Chile, Estonia, Finland, France, Germany, Hungary, Israel, Italy, Japan, Latvia, Mexico, the Netherlands, New Zealand, Norway, Poland, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. To analyze individuals across many different countries at once, I conduct multilevel analysis, where the first level is individual and the second is county-year.

4.3.1 Operationalization of Variables and Method

4.3.1.1 Outcome Variable

The outcome variable used for individual-level analysis is self-reported vote intention (turnout). I construct this variable based on three different questions in the surveys. For Waves 2 through 4 of the WVS, I create a dummy variable indicating turnout relying on the exactly same survey question as Anderson and Beramendi (2008) used, in a way similar to theirs.[6] The turnout variable is coded 0 if a respondent reports that he would not vote in the next

[5]These waves are respectively 1990–1994, 1995–1998, 1999–2004, 2005–2009, and 2010–2014. The first wave, 1981–1984, is not included because the outcome variable described below cannot be constructed.

[6]I reversed the variable so that it shows turnout intention instead of abstention intention used by Anderson and Beramendi (2008).

election, and 1 otherwise.[7] For the fifth wave, I use the question asking respondents if they voted in the last national parliamentary election. I assign the value of 1 to turnout if a respondent answered "yes" and 0 otherwise. For the sixth wave, I rely on the answer for the question asking if one votes "always," "usually," or "never" in national parliamentary elections. I assign the value of 1 only to the answer "always" in order to mitigate over-reporting of turnout. Figure 4.1 shows the reported turnout by country-year. As we can see, the reported turnout tends to be higher than actual turnouts. We can observe some variation in the dataset. Waves 5 and 6 show lower turnout than the other waves probably because I use the different questions to construct the variable.[8]

In sum, I create a dichotomous variable of turnout indicating voting participation as a success and abstention as a failure. Because all countries in the first wave and some countries in other waves reports 100-percent turnout intention, these country-years are omitted, assuming that the question was not appropriately asked in these country-years.[9]

4.3.1.2 Explanatory Variables

I use two main explanatory variables in this chapter. One is the relative income of individuals. This variable is measured with a ten-point scale that places each respondent in a decile. Each respondent is asked to tell their household income, including wages, salaries, pensions, and other income. Then, within each country, the respondents are sorted from the poorest to the wealthiest along the reported household income, and an income decile is assigned to each respondent. I expect that income increase has a positive effect on turnout, because the amount of resources that can be used to political activity should increase with income.

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[7]Note that the question did *not* ask if a respondent would vote or not in the next election. Instead, it reads, "If there were a [COUNTRY] election tomorrow, for which party on this list would you vote?" I treated the answer "No right to vote" as missing. For the remaining observations, I coded 0 if the response is "I would not vote" and 1 for other answers, following the practice of Anderson and Beramendi (2008).

[8]Thus, I control for the effect of waves in statistical analyses.

[9]The country-wave that are omitted for this reason are Chile, the Czech Republic, Mexico, Poland, and Switzerland for Wave 2, Australia, the Czech Republic, Estonia, Hungary, New Zealand, Slovenia, Switzerland, Turkey, and the U.S. for Wave 3, the U.S. for Wave 4, and Mexico for Wave 5.

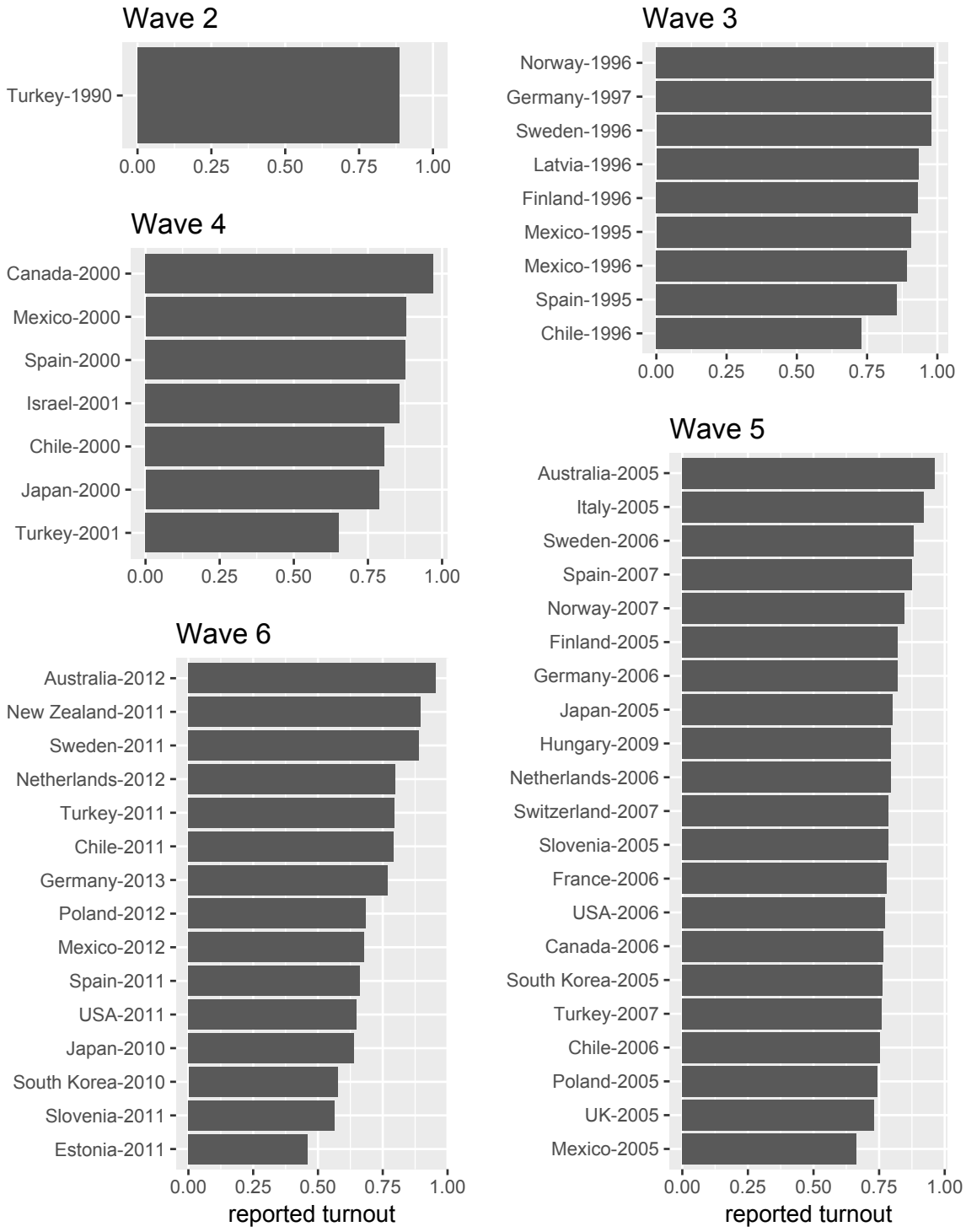

Figure 4.1: Reported Turnout by Country-Year. *The horizontal bars present the proportion of respondents who have intention to vote in a future election (Waves 2 through 4), who voted in the previous election (Wave 5), or who always vote in national elections (Wave 6).*

The other main explanatory variable is voting motivation. I construct this variable using two survey questions: attitude toward income inequality and the political ideology of respondents. The attitude toward income inequality is measured with a ten-point scale. It takes the value of 1 if a respondent strongly agrees with the idea that "income should be made more equal"; it takes 10 if he strongly agrees to the opinion that "we need larger income differences as incentives for individual effort." Each respondent is allowed to choose an integer value between 1 and 10, depending on how much they agree or disagree with these ideas. Political ideology is also measured with a ten-point scale. It is a self-reported positioning in a left-right political spectrum, and each respondent chooses an integer value between 1 (extreme left) and 10 (extreme right).

Of course, there are so many policy dimensions other than inequality or redistribution that could affect turnout decisions. For instance, attitudes to defense policies might matter as well. For a person, attitude toward inequality is only one of many attitudes that can affect his turnout decision. However, I focus on attitude toward inequality in this chapter for three reasons. First, I would like to know the effect of motivation that can affect redistributive outcomes. If a person abstains because of some attitudes other than inequality, his abstention should not have a systematic effect on redistribution. However, if a person abstains based on his attitude toward inequality, it could have redistributive consequences, because it might lower the salience of inequality or redistribution (Andersen, Burgoon, and van de Werfhorst 2014), which could enable governments to ignore redistributive issues.[10] Second, the rise of inequality might change attitudes toward inequality. Because I care about the political causes and consequence of inequality, I would like to investigate motivational factors that connect inequality with electoral participation. Attitude toward inequality is the strongest candidate for such a factor. Third, income plays a potential double role in one's turnout decision, both as a resource and as a shaper of one's motivations relative to issues of inequality, as Anderson

[10]Some might argue that inequality or redistribution is not a salient issue anyway. Although it might be true, it is possible that redistribution is not a salient issue because of the motivational factor I discuss here. If a larger number of citizens were strongly motivated, redistribution might be more salient. Thus, I believe that it is worth examining motivation based on attitudes toward inequality, even if redistribution is currently not a salient issue.

and Beramendi (2008) point out. If income can be considered as motivations, the effect should appear in attitudes related to income, such as attitudes toward income inequality. Some might criticize that I only look at the marginal effects of inequality and fail to explain turnout itself. That is true, but it is what I would like to know. I would like to find effect of cause more than cause of effect.

Table 4.1 shows the cross tabulation of answers to these two survey questions. In this table, all waves and countries of the WVS used in this chapter[11] are pooled. It can be seen that more people take the central positions (5 or 6) in the left-right spectrum, and that the reasonable number of people take either the extreme left position or the extreme right. By contrast, people are more evenly distributed along egalitarian-competitive attitudes. It seems that more people with left ideology prefer an egalitarian society than a competitive one, while people on the right prefer larger income inequality compared to people on the left.

An often-cited, standard model of redistribution assumes that voters who are located to the left of the median voter should prefer larger redistribution—and hence more equal society, and that voter located to the right of the median (or mean) voter should prefer less redistribution—and hence more unequal society (Meltzer and Richard 1981). In one dimensional political space, below-the-median voters are supposed to have egalitarian attitudes *and* left ideology, and above-the-median voters should have competitive attitudes *and* right ideology. If so, we should find the vast majority of the respondents along the main diagonal—from the top-left to the bottom-right—in the table. However, it does not seem to be the case here. Although there exists a statistically significant pattern expected by that model,[12] it is not clear if it is substantively significant.[13] Table 4.1 shows that many left people prefer larger inequality, and that many right people prefer higher equality. Especially,

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[11]That is, the second to sixth waves for 25 OECD countries mentioned above.

[12]The expected diagonal pattern is statistically significant. Pearson's χ^2 is 8,022.9 ($p < 0.001$), and the Student's t for Spearman's rank correlation is 1.9×10^{13} ($p < 0.001$). However, it is likely that the large number of observations makes it statistically significant.

[13]Figure 4.9 shows this relationship visually. In the figure, we can see that association between two variables is not strong.

Table 4.1: Left-Right Ideology and Attitudes toward Income Inequality

	left				Ideology					right	
Attitudes	1	2	3	4	5	6	7	8	9	10	total
1 egalitarian	909	373	654	527	2200	729	386	398	184	808	7168
2	238	357	483	378	905	438	257	269	129	165	3619
3	189	317	924	727	1399	670	508	374	129	135	5372
4	131	187	632	829	1393	729	493	368	114	106	4982
5	217	217	646	760	2718	980	642	523	194	289	7186
6	121	99	408	581	1524	1148	701	505	151	135	5373
7	94	151	538	683	1661	1053	1075	755	188	192	6390
8	144	183	467	538	1481	881	920	1035	342	278	6269
9	69	72	141	147	510	286	259	401	210	165	2260
10 competitive	318	72	185	157	1046	405	278	352	184	779	3776
total	2430	2028	5078	5327	14837	7319	5519	4980	1825	3052	52395

* Source: World Values Survey (2014*a*,*b*,*c*,*d*, 2015).

at the right extreme, the number of people who have the most egalitarian attitudes (808) is larger than that of those who have the most competitive attitudes (779).[14] This shows that the assumption made by the standard model is not fully supported. At least, it is better to doubt the assumption as I discussed in Chapter 2.

In Table 4.1, there exist mismatches between attitudes toward inequality and left-right ideologies. If the standard assumption of the literature on redistribution is correct, left-wing voters should prefer a more equal society, and right-wing respondents should prefer a more competitive society. Using the mismatches found in Table 4.1, I construct the variables representing this ideal relationship, which shows if a voter has a profile that conforms to the assumption. In an election, voters have to choose a party[15] they vote for,[16] if they decide to turn out. For people whose profile conforms to the assumption, it is relatively easy to choose a party to support in an election. Generally speaking, left-wing political parties propose

[14]One might think that this is because I pool observations from 25 different countries. However, Figure 4.10 shows that we can see a similar pattern in every country, though the degree of association is different across countries.

[15]Or a candidate who belongs to a political party. Let me ignore independent candidates for simplicity.

[16]People are usually allowed to cast a blank vote, but I ignore that possibility in this chapter.

policy packages that are more redistributive than right-wing parties; a society is likely to be more equal when the left wins than when the right wins. Thus, left-wing egalitarians cast a ballot for a left-wing party, and right-wing utilitarians (or competition ideologists) for a right-wing party.

By contrast, it is more difficult for the others—people who do not have a profile conforming to the assumption—to choose a party to vote for. Left-wing utilitarians would like a more unequal society *and* a left-wing government. However, they should realize that left-wing parties are aiming for a more equal society during election time. After learning that they cannot get both, they have to choose either a left-wing party, which might cause low inequality, or high inequality, which requires a right-wing party. Similarly, right-wing egalitarians would like a more equal society *and* a right-wing government. They face a similar dilemma: they have to choose either a right-wing party, which might lead to higher inequality, or lower inequality, which means a left-wing party. Accordingly, left-wing utilitarians and right-wing egalitarians are less confident about their vote choices, which lowers their probability of voting (Matsusaka 1995). Being afraid of making a wrong decision, they are more likely to stay home.

I do not contend that all the left utilitarians and right egalitarians realize their contradictory preferences in an election. It is possible that some voters simply do not know what left-right ideology means. Among such people, some left utilitarians might vote for the Republican Party, believing that the Republicans represent the interests of left people. However, there is room for left utilitarians and right egalitarians to notice that they have contradictory preferences, while there is no such contradiction among left egalitarians and right utilitarians. Relatively speaking, left utilitarians and right egalitarians should turn out less than left egalitarians and right utilitarians.

Therefore, I argue that voters are relatively strongly motivated to turn out if their attitudes toward inequality and left-right ideologies do not mismatch compared to people with mismatches. To make a variable of motivation, I re-scale the variables of left–right position

and attitudes toward inequality so that they range between -1 and 1.[17] Now, the value of -1 represents the extreme left or the most egalitarian attitude; 1 means the extreme right or the most competitive attitude. Then, I multiply these variables to obtain the variable of motivation ranging from -1 to 1; a larger value represents stronger motivation to turn out because the variable takes a large positive value when a respondent is either a left-wing person who has egalitarian attitude or a right-wing who has competitive attitude. A small value is given to people who place themselves in the left and have competitive attitude or those who place themselves in the right and have egalitarian attitude. In other words, people who have mismatch between their ideology and attitude to inequality have weaker motivation to participate in elections. Figure 4.2 shows the distribution of this variable.[18] The mean of this variable is 0.05, the median is 0.04, and the standard deviation is 0.33. Most people are placed near the center of distribution, which is about zero. This means that most people have a middling motivation to vote; they are neither strongly confident or unconfident about their choice of political party.

4.3.1.3 Control Variables

I control for several factors that may affect turnout at the individual level. First, I control the respondents' level of education. I expect that the level of individuals' political participation depends on the amount of resources that they can use for political purposes. I use the income level as the main proxy for such resources, as described above. However, the resources used for political activities are not limited to financial ones, such as income. Verba, Schlozman, and Brady (1995) argue that resources, which are necessary for political participation, are most prominently reflected in the socioeconomic resource level. Therefore, I control for the level of education as socioeconomic resource of individuals in addition to income. Specifically, I use the survey question in the WVS that asks each respondent their highest educational

[17]Originally, each variable takes an integer value between 1 and 10. To re-scale the variables, I subtract 5.5 from the variables and then divide them by 4.5.

[18]Figure 4.11 shows the distributions of motivation by country.

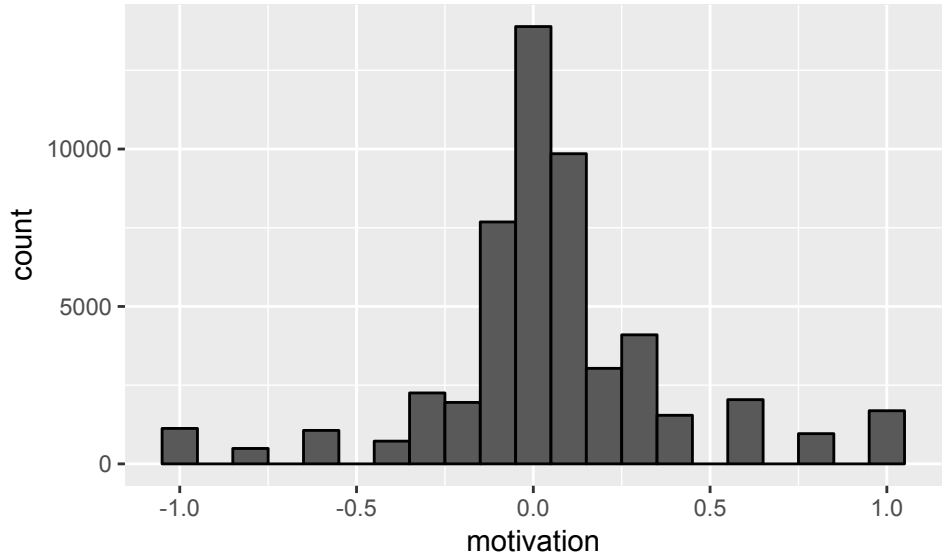

Figure 4.2: Distribution of the Motivation Variable. *All observations included in the dataset are pooled. A larger value shows stronger motivation to turn out.*

level attained. It is originally a categorical variable with nine different categories. Based on this question, I construct a variable with four ordered categories: (1) less than high school, (2) high school, (3) some college education without bachelor's degree, and (4) college degree or higher. I expect that higher level of education is associated with higher level of political participation.[19]

Demographic factors may affect turnout as well. In the literature on political participation, it is widely known that turnout increases with age up to around the age of 70. Therefore, I also control for age. I use the standardized age instead of age itself.[20] Because it is hard for very old people to go physically to the polling station, as some argue, the effect of age on turnout is reversed near the upper end of age. Thus, the models include the variable of age-squared to capture that curvilinear effect.[21]

In addition, a variable indicating employment status—employment dummy—is included.

[19]Anderson and Beramendi (2008) also shows a positive effect of education on turnout.

[20]That is, I subtract the mean of age from age, and then divide it by the standard deviation of age. The standardized variable has the mean of zero and the standard deviation of one.

[21]To be precise, the squared values of the standardized age is included in the models.

From the viewpoint of resources, the unemployed are disadvantaged. Unemployed individuals would like to use their scarce resources to find a job, which should be much more important and have heavier impact on their lives than to cast a ballot at an election. Therefore, the employed—including the self-employed and employers—should have higher probability of voting than the unemployed.

Another demographic factor that may be important is gender. It is argued that men have more political resources than women (Dalton 2002), and that men are more likely to be active in politics than women because of gender stereotypes, such as an idea that a man is generally more competent as a political leader than a woman (Hansen 1997; Jennings 1983). However, because inclusion of gender variable does not change the outcome and the effect of gender is not statistically different from zero, I will show the results without gender variable for simplicity.

Furthermore, I control for some factors at the country-year level. First, to control for the level of economic development, I include GDP per capita measured in terms of purchasing power parity.[22] In addition, a measure of economic growth (annual GDP growth [%]) is included. People would like to voice more when a country's economic performance is not good than when it prospers. When a country is experiencing a rapid economic growth, more people would trust the incumbent government. Accordingly, the people who should vote for the opposition parties would be more likely to abstain. Therefore, these variables might have a negative effect on turnout.[23]

Next, I control for the level of income inequality by adding the Gini coefficient to the models.[24] Although I mainly focus on the effect of inequality at the individual level in this chapter, the effect of inequality on turnout at the country level is also important. At the individual level, inequality benefits the rich and damages the poor if the proposed hypothesis

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[22]I use the standardized values of GDP per capita.

[23]However, Radcliff (1992) shows that economy has a curvilinear effect on turnout depending on the level of welfare development.

[24]I use the standardized values of Gini coefficients.

about the effect of income on turnout is correct. At the national level, if inequality decreases turnout, it could be harmful to democracy. In an era of rising inequality, it might lead to even lower turnout than now, and the legitimacy of representative democracy could be in danger. In contrast, if inequality increases turnout, it could also affect the quality of democracy. Higher turnout could mitigate income inequality in a given country. Alternatively, too high level of participation might bring an unstable political situation. In addition, the nationwide inequality might change how income affects turnout. The poor in an equal country might act differently than the poor in an unequal country. As a result, nationwide inequality might strengthen or weaken the effect of resource inequality on turnout (Jensen and Jespersen 2017).

Moreover, I control for two factors related to electoral systems. One is the disproportionality of elections (Carey and Hix 2011; Gallagher 1991). Generally speaking, an increase of the number of political parties should mean that a person is more likely to find a party close to his or her own political position. For example, in a two-party system with polarized left and right parties, voters in the middle of the left-right spectrum would more likely to abstain from elections than those who stand in the right or left, because the center-positioned voters are not close to either party. In this circumstance, if a third party were to enter and take a central position, the center-positioned voters, who abstained before, would more likely to vote, because now they have a party that represents the political position similar to theirs. Thus, the number of political parties is expected to have a positive effect on turnout. As a proxy for the number of parties, I use disproportionality of elections, because the electoral system that proportionally allocates the seats to the political parties is thought to increase the number of parties. In addition, such electoral systems decrease the number of wasted votes and are expected to increase the turnout. This relationship between the number of parties or the electoral system and the level of political participation is consistent with the findings of previous studies (see, e.g., Blais and Carty 1990; Blais and Dobrzynska 1998; Powell 2000). Because the distribution of disproportionality among the countries in the dataset is skewed to the right, I use the logarithm of disproportionality in statistical analyses.

The other factor concerning electoral systems is compulsory voting. If a law of the country

requires citizens to go to the polling station and cast a ballot, it would be natural that more people vote (Franklin 1999; Jackman 1987). But if there is no penalty for abstention, such an effect should not be expected to exist. Thus, the dummy takes the value of 1 only for countries that have the compulsory voting rules with strict law enforcement. According to the Voter Turnout Database of the International Institute for Democracy and Electoral Assistance (IDEA),[25] these countries are Australia, Chile,[26] Mexico, and Turkey among our 25 OECD nations.[27]

Lastly, I control for the effect of waves by including dummy variables indicating each wave except for the second wave,[28] because the survey questions used to construct the outcome variable are different across waves of the WVS.[29] These dummies are expected to control any differences that exist between waves but are not explained by the other explanatory variables. For instance,, if there exists a time trend in turnout, these dummy variables should capture the effect of the trend.

Descriptive statistics and data sources of these variables are shown in Appendix.

4.3.1.4 Statistical Models

Using the variables described above, I analyze the effects of income and voters' motivation on turnout. Because the outcome variable is dichotomous and I am interested in the individuals' probability of voting, I employ a logit model, assuming the logit can be expressed in some linear forms. That is, with the outcome V_i, which equals 1 if a person i votes and 0 if i

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[25] `http://www.idea.int`.

[26] Only up to 2010. Chile does not have a compulsory voting rule for its parliamentary elections now.

[27] Switzerland also have strictly enforced rules of compulsory voting in the Canton of Schaffhausen, but it is assigned the value of zero, because it is the rule for only one of 20 cantons.

[28] Model 1 does not have the wave dummies. This is for simplicity. Inclusion of these dummies does not change the results of the model.

[29] As I mentioned above, I used three different questions. One is for Waves 2, 3, and 4, another is for Wave 5, and yet another is for Wave 6.

abstains, I suppose that

$$V_i \sim \text{Bernoulli}(\theta_i),^{30}$$

and

$$\theta_i = \text{logit}^{-1}(\alpha_{j[i]} + \boldsymbol{x}_i\boldsymbol{\beta}),^{31}$$

where θ_i is i's probability of voting, α_j is the intercept varying across country-years, $\boldsymbol{x}_i$ is a vector of explanatory and control variables, and $\boldsymbol{\beta}$ is a vector of coefficients for these variables. At country-year level, I assume the following model:

$$\alpha_j \sim \text{Normal}(\mu_j, \sigma^2),$$
$$\mu_j = \boldsymbol{z}_j\boldsymbol{\gamma},$$

where $\boldsymbol{z}_j$ is the vector of control variables at country-year level, and $\boldsymbol{\gamma}$ is the vector of coefficients for these variables.

I estimate $\boldsymbol{\alpha}$, $\boldsymbol{\beta}$, $\boldsymbol{\gamma}$, and σ by Bayesian simulation using RStan (R Core Team 2016; Stan Development Team 2016*a*,*b*). For each model, I simulate four chains of samples. Each chain simulates 2,000 samples, and the first 1,000 samples in each chain are discarded as warm-ups. As a result, 4,000 samples are left in total for each model.[32] Full specifications of the statistical models are provided in Appendix.

4.3.2 Results

Table 4.2 shows the main results of the statistical analyses using the logit model. First, let us look at the results of the first column, Model 1. This is a simple model to look at the

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[30]I assume that the outcome is generated by the Bernoulli distribution because the outcome is either 0 or 1 for each observation.

[31]$\text{logit}^{-1}(t) = 1/(1 + \exp(-t))$.

[32]Convergence of simulations are examined by the Gelman-Rubin statistic or $\hat{R}$ and traceplots of simulated values. For all parameters in all models, $\hat{R}$ is smaller than 1.05, which mean there is no clear evidence of non-convergence. Traceplots does not show any clear warnings about non-convergence, either.

effect of income without the motivational variable. It includes only the variables of income, age, age-squared, employment, and education at the individual level. As Anderson and Beramendi (2008) argue, the result shows that the probability of turnout increases with the relative income level. That is, a rich voter is more likely to participate in an election than a poor voter, other things equal. In this model, the effect of country-level inequality (Gini) is not statistically different from zero.

However, we should not fully accept this result because this model excludes the motivational variable. It is possible that motivation is more important than resources for the turnout decision, and hence that the income level only matters for voters who do not have clear motivation. I examine this possibility next in Models 2 through 4.

In Model 2, I add the variables of motivation, left–right position, and attitude toward inequality to Model 1. The dummy variables for the waves of the survey are included as well. The result shows that motivation has a positive effect on turnout; people are more likely to vote when their ideology and attitude toward inequality do not conflict with each other. Even with the motivation variable, income has a positive effect on turnout. This result shows that both resource (income) and motivation increase the probability of turnout. At the country-year level, the effect of inequality (Gini) has a negative effect on turnout. That is, the turnout rate is expected to be lower in a country with high inequality than in one with low inequality. In Model 3, I add the interaction between income and motivation to Model 2. However, the effect of the interaction cannot be distinguished from zero.[33]

Lastly, in Model 4, I let the slopes for income and motivation vary across country-years. I use the Gini index as a predictor of the slopes to examine if the level of inequality affects the impact of income and motivation on turnout. Figures 4.3 and 4.4 present the main result. Figure 4.3 shows the effect of income on turnout by country-year. We can see that income increases turnout in most countries in the dataset. However, there are some county-years where income does not increase turnout (e.g., Chile, Japan in 2000, and Mexico) or decrease turnout (Turkey). That is, the effect of income on turnout varies a lot across countries. One

[33]I do not discuss this model any further, because the result is similar to Model 2.

Table 4.2: Effects of Individual Income and Motivation on Turnout

Variables	Model 1	Model 2	Model 3	Model 4
Individual level				
Income	0.073	0.071	0.070	Varies[a]
	(0.006)	(0.006)	(0.006)	
Motivation		0.159	0.126	Varies[a]
		(0.033)	(0.066)	
Income × Motivation			0.008	
			(0.014)	
Left-Right		0.184	0.183	0.177
		(0.025)	(0.025)	(0.025)
Attitude toward Inequality		0.024	0.025	0.026
		(0.020)	(0.020)	(0.020)
Age	0.630	0.625	0.625	0.629
	(0.014)	(0.013)	(0.013)	(0.014)
Age-squared	−0.139	−0.140	−0.140	−0.135
	(0.012)	(0.012)	(0.012)	(0.012)
Employed	0.308	0.312	0.312	0.285
	(0.043)	(0.043)	(0.044)	(0.042)
Education	0.178	0.182	0.182	0.186
	(0.012)	(0.013)	(0.013)	(0.013)
Country-year level				
Intercept	1.147	1.610	1.586	1.632
	(0.382)	(0.881)	(0.901)	(0.907)
GDP per capita	−0.348	0.216	0.210	0.072
	(0.172)	(0.159)	(0.159)	(0.165)
GDP growth	0.020	0.024	0.024	0.033
	(0.046)	(0.036)	(0.037)	(0.037)
Gini coefficient	−0.393	−0.366	−0.361	−0.355
	(0.205)	(0.157)	(0.155)	(0.163)
Disproportionality	−0.293	−0.075	−0.076	−0.024
	(0.191)	(0.156)	(0.156)	(0.160)
Compulsory	0.725	0.919	0.906	0.902
	(0.475)	(0.363)	(0.349)	(0.378)
Wave dummies	No	Yes	Yes	Yes
Varying slopes	No	No	No	Yes
WAIC	46,739	46,671	46,673	46,492
Observations	52,395	52,395	52,395	52,395
Country-years	53	53	53	53

* Standard deviations are in parentheses. Because I estimated coefficients by a Bayesian method, I have distributions of coefficients, which are called posterior distributions. Therefore, I report the standard deviations of those distributions, which are equivalent to standard errors in frequentist statisitcs.

[a] Varying slopes are presented in Figures 4.3 and 4.4, and Tables 4.15 and 4.16.

possible cause of this variation is the level of inequality. Panel (a) of Figure 4.5 displays the posterior distribution of the effect of inequality on the varying slope of income. More than 95 percent of the distribution is below zero, which means that the Gini has a negative effect on the income slope. In other words, income as resource is more important in an equal country than in an unequal one.[34]

Figure 4.4 shows the effect of motivation on turnout by country-year. Motivation increases turnout in some counties such as Germany, the Netherlands, and the U.S., but the effect is not clear in other countries. Unlike the slopes for income, the slope for motivation is not varied by the level of inequality. Panel (b) of Figure 4.5 displays the posterior distribution of the effect of inequality on the varying slope of income. As we can see from the figure, although the effect tends to be negative, the distribution is around zero: only 82 percent of the distribution is below zero. Therefore, the model does not tell us what is the cause of the difference across country-years.

Now let us examine the effect sizes of income and motivation on turnout. Figure 4.6 presents the predicted probabilities of turnout obtained by Bayesian simulations.[35] In the figure, the vertical axis represents the predicted probability of turnout for each voter; the horizontal axis shows motivation. The three lines presents the smoothed predicted probabilities[36] of three different income deciles: the first (red), fifth (green), and tenth (blue) deciles. In other words, the three lines are for the poor, the middle-class, and the rich, respectively. The shaded area around each line displays the 95 percent confidence interval of the smoothers. As can be seen in the figure, income has a huge impact on turnout. At the motivation value of zero, increase of income from the first decile to the fifth decile boosts the turnout probability by about 4 percentage points from 73 percent to 77 percent. If we com-

[34]Jensen and Jespersen (2017) show that income increases turnout when the Gini is small but decreases it when the Gini is large, using European data. Regarding the effect of the Gini on the effect of income, my result is similar to theirs.

[35]I use the simulated samples of Model 2 instead of Model 4 here to show the general pattern across OECD countries.

[36]I obtained the smoothed lines by fitting a generalized additive models to the predicted probabilities of turnout for all observations in the dataset, to average over the factors other than motivation.

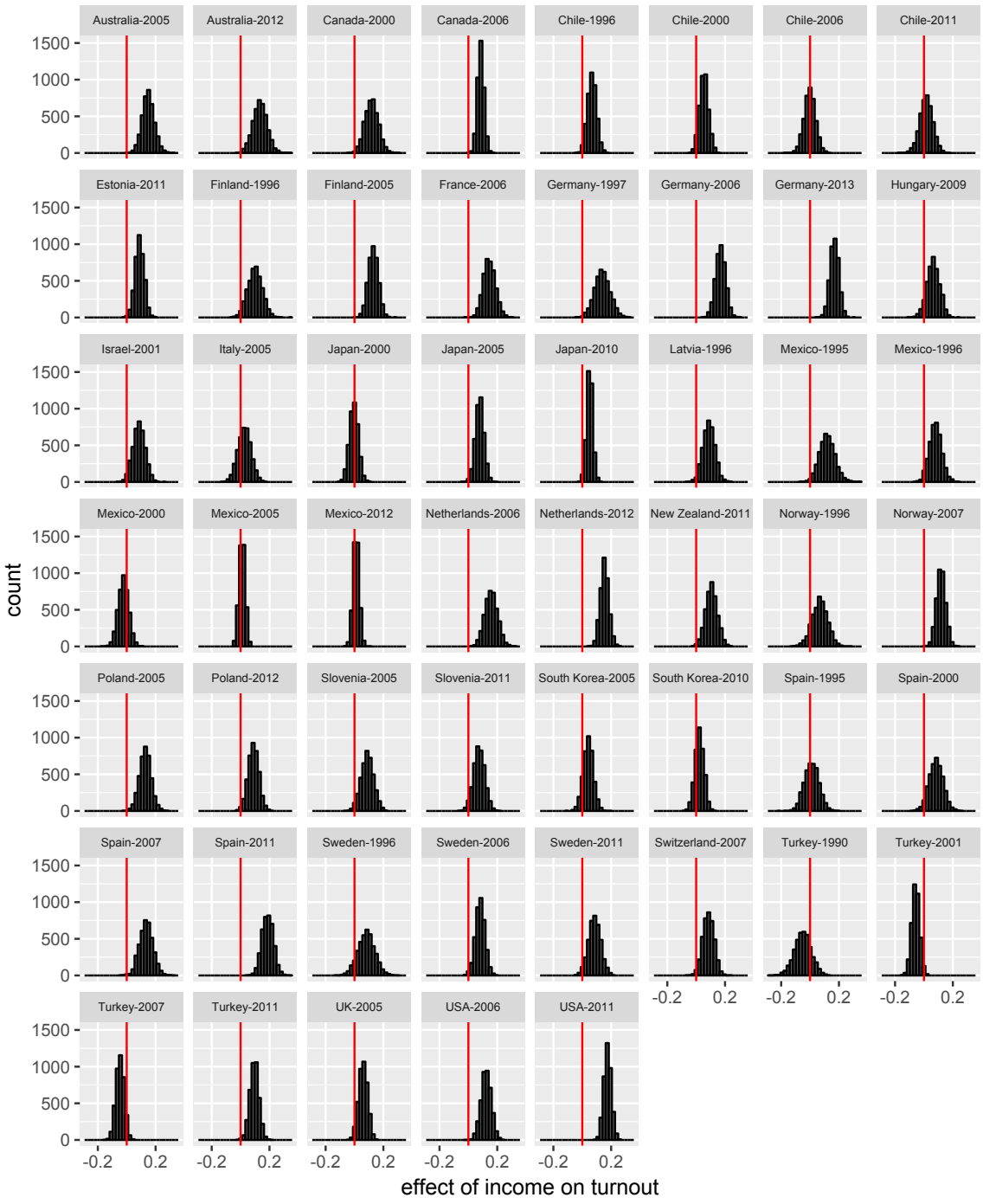


Figure 4.3: Varying Slopes of Income by Country-Year in Model 4. *The Gini coefficient of each country-year is the predictor. The red vertical line is drawn at zero.*

pare the poorest to the wealthiest, the difference is about 14 percentage points. As shown above, motivation also increases turnout. For people in the fifth income decile, increase in motivation heightens the probability of turnout by about 7 percentage points at most. The

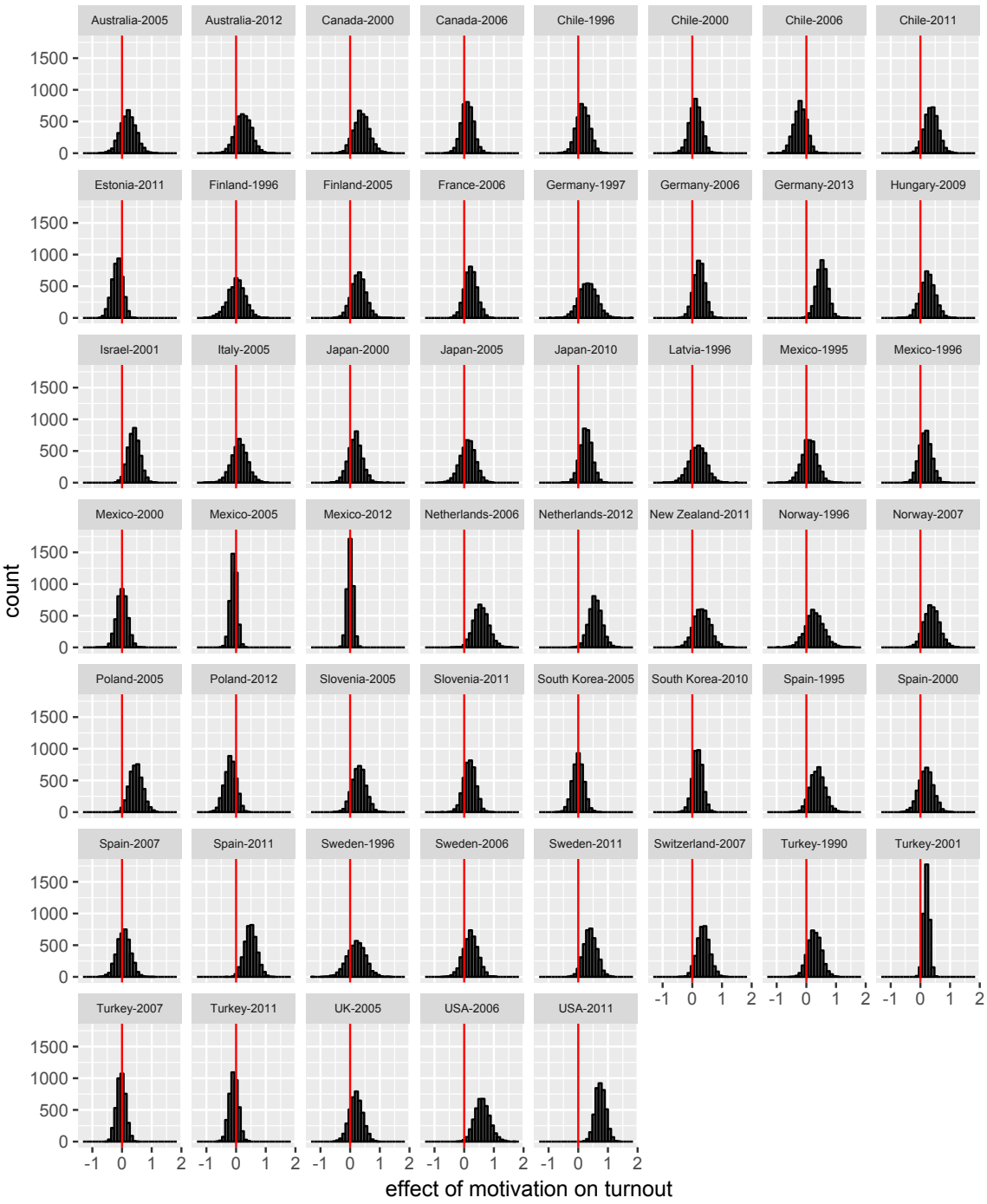
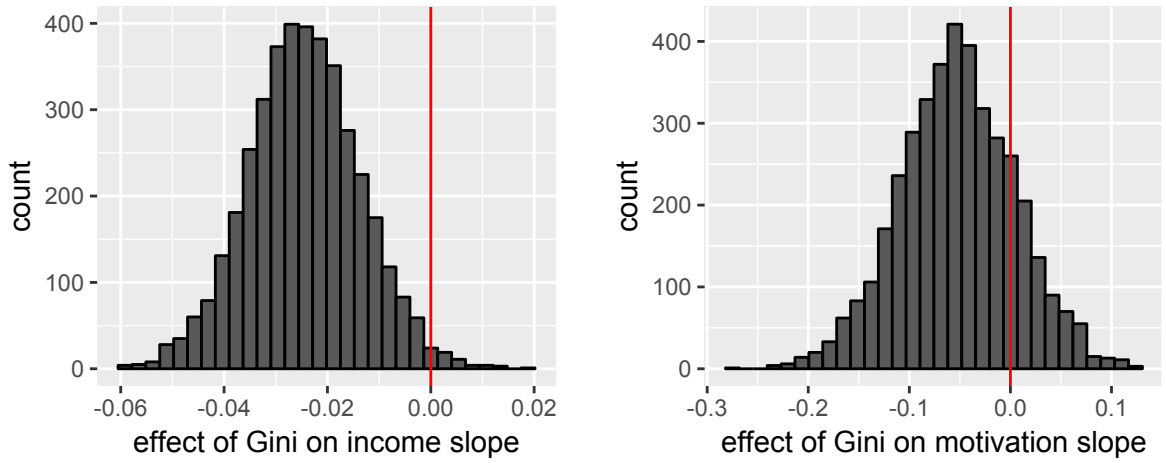


Figure 4.4: Varying Slopes of Motivation by Country-Year in Model 4. *The Gini coefficient of each country-year is the predictor. The red vertical line is drawn at zero.*

effect of motivation seems slightly stronger for the richer group and weaker for the poorer



(a) Effect on Income Slope

(b) Effect on Motivation Slope

Figure 4.5: The Posterior Distributions of the Effect of the Gini Index on Slopes in Model 4

people.[37] This implies that motivation cannot compensate fully for scarcity of resources. If a person lacks the financial resources for political participation, stronger motivation does not encourage him to cast a ballot. By contrast, stronger motivation increases the voting probability of rich people, who are more likely to vote even without motivation. The figure shows that the rich with the weakest motivation have a 8-percentage-point higher probability of turnout than the poor with the strongest motivation. Strong motivation widens the gap in electoral participation between the poor and the wealthy.

Finally, let us examine the effect of inequality measured by the Gini coefficient on the level of turnout. Figure 4.7 presents the result. Panel (a) of the figure displays the posterior distribution of the effect. As we can see, most (98 percent) of the distribution is below 0, which implies a negative effect of inequality on turnout.[38] That is, inequality discourages people from participating in elections. Because it is hard to understand the effect size by looking at the posterior distribution, Panel (b) shows the relationship between inequality and turnout. In this panel, the points represent the reported turnout rate for each country-year,

[37]However, as Model 3 shows, the interaction effect of income and motivation is not statistically significant.

[38]As Table 4.2 shows, the mean of the distribution is -0.355 in Model 4.

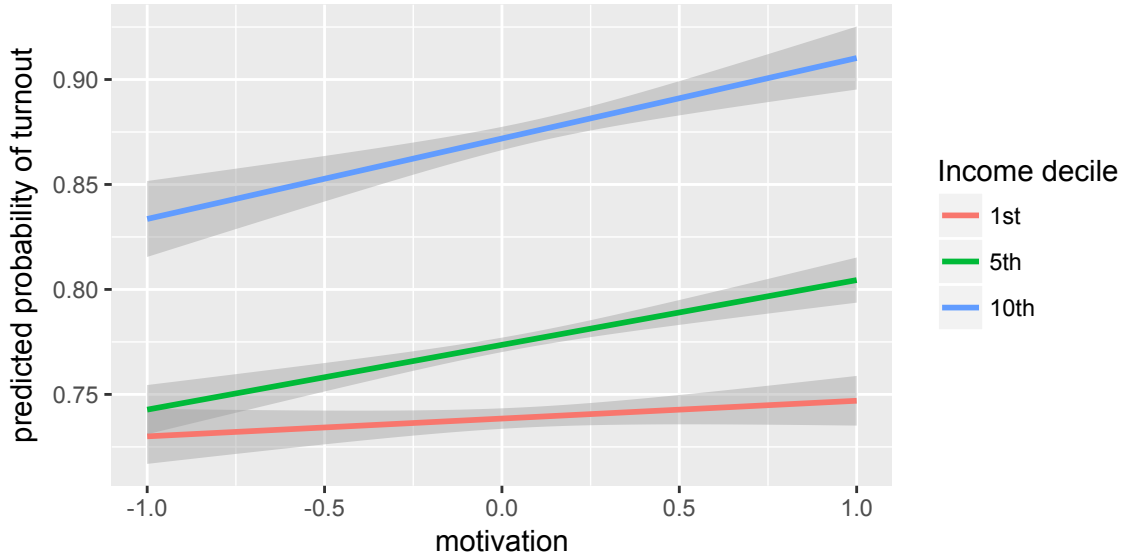


Figure 4.6: Predicted Probabilities of Turnout in Model 4. *The vertical axis shows the predicted probability of turnout. The horizontal axis represents the motivation variable. The predicted probabilities for three different income deciles are displayed. The lines are the smoothed prediction where the factors other than income and motivation are averaged by fitting a generalized additive model. The shaded areas around the lines show the 95 percent confidence intervals.*

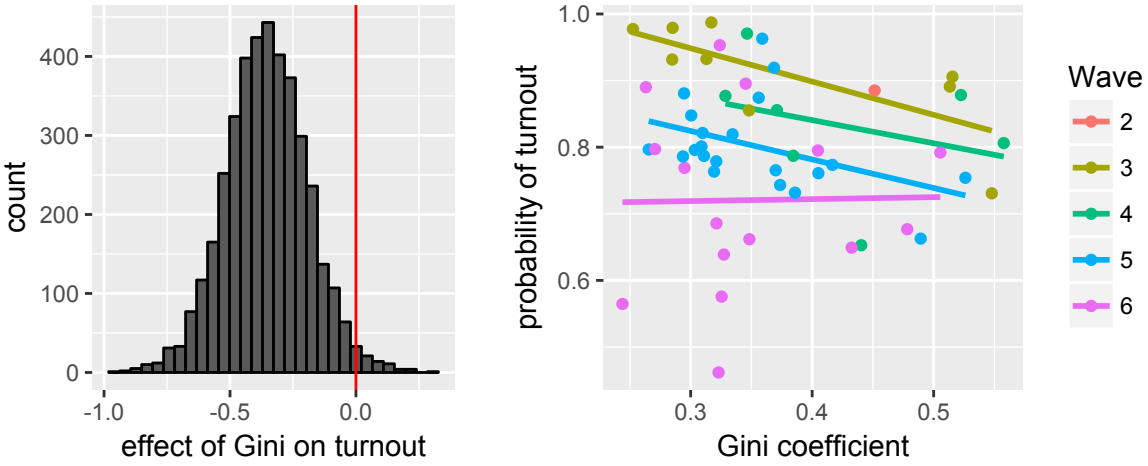
and the lines show the smoothed means[39] of the predicted probabilities of turnout obtained by a Bayesian simulation.[40] The points and lines are assigned five different colors based on the wave of the WVS.[41] The effect of inequality is strongest in Wave 3 of the survey. In this subset of data, the Gini can decrease the turnout rate by about 15 percentage points at most. Waves 4 and 5 show a similar pattern. However, if we look at the line for Wave 6, it seems that inequality does not matter to turnout. Within this subset of data, we can observe a large variation in the reported turnout rates for relatively equal countries with small Gini coefficients.

This difference between Wave 6 and the other waves might be caused by the way I construct the outcome variables. As I explained above, the outcome variable is the self-

[39]I created the smoothers by fitting a generalized additive model to the simulated samples of predicted probabilities of turnout.

[40]I use the result of Model 4 to draw this figure.

[41]Because the dataset contains only one country-year in Wave 2, the figure does not have a line for Wave 2.



(a) Posterior Distribution of the Effect

(b) Probability of Turnout and the Gini Index

Figure 4.7: The Effect of the Gini Coefficient on Turnout. *Panel (a) shows the posterior distribution of the effect of the Gini coefficient on the probability of turnout. The red vertical line is placed at the zero effect. Ninety-eight percent of the distribution is below zero, which implies that inequality decreases turnout. Panel (b) displays the relationship between turnout and inequality by country-year. The points show the reported turnout, and the lines show the means of the predicted probabilities of turnout obtained by simulation. The points and lines are colored by wave of the surveys. There is no line for Wave 2 because the dataset contains only one country-year for that wave.*

reported turnout. I assigned the value of 1 to the variable if a respondent tells that they would vote in the next election or voted in the last election for Waves 2 through 5. But I used a different question to measure turnout for Wave 6; I assigned the value of 1 only to the respondents who answer they *always* vote in national elections. This is because the turnout rate would be too high if I gave 1 to the respondents who vote "sometimes" as well. As a result, the turnout rate for Wave 6 is lower and more similar to the reality than those for Waves 2 through 5. Therefore, it is possible the negative effect of inequality on turnout is detected because of over-reporting of turnout. The WVS did not ask the question I used for Wave 6 in the previous waves, so we cannot know if this is the case. The models I estimate tell that country-level inequality measured by the Gini coefficients, does not affect turnout in Wave 6, but that it decreases turnout on average.

4.4 Discussion

In the previous section, I demonstrated that both income and motivation are driving factors of individuals' turnout decision. In addition, I found that motivation does not compensate for a lack of resources. Rather, it widens the gap in electoral participation between the poor and the rich. However, my statistical analyses have a weakness due to the operationalization of the outcome variable.

The outcome variable, turnout, has an unignorable problem of over-reporting. The outcome variable of turnout in this study is "self-reported" intention. Some previous studies have revealed that people over-report voting (Holbrook and Krosnick 2010), and that over-reporting rate is not random but has a systematic relationship with some personal characteristics (see, e.g., Burden 2000; Silver, Anderson, and Abramson 1986). Thus, if we use self-reported variables both as outcome and explanatory or control variables, it will exaggerate the effects (Vavreck 2007).

Table 4.3 shows summary statistics for the variables of voting intention and actual turnout by country-year.[42] As shown in the table, turnout is over-reported. The minimum and maximum values of turnout intention are both higher than those of the actual turnout. It is clear that the survey respondents over-report their intention to turnout in Waves 2 through 5. For Waves 2 and 3, the minimum of the intention exceeds the observed mean of turnout. However, in Wave 6, the statistics calculated for intention is similar to the actual turnout. This table tells that the outcome variable might fail to capture the real voting behavior, and we must keep in mind that the effects obtained in the logit models might be exaggerated.

Despite the problem, the use of turnout intention as surveyed by the WVS can be justified to some degree. Because we are interested in individual behavior, the aggregated data of turnout cannot be used in a simple way.[43] We need to know individual voting behavior, but in general, we cannot know if a person voted or not without asking him. Thus, we cannot

[42]Intention here is the proportion of observations with the value 1 for the turnout variable.

[43]It would be possible to use it with help of ecological inference.

Table 4.3: Self-reported Turnout and Actual Turnout by Country-Year

Variable	Mean	Median	Std. Dev.	Min.	Max.
Actual Turnout	0.69	0.68	0.13	0.41	0.95
Intention to Turnout	0.80	0.80	0.11	0.46	0.99
Wave 2[a]	0.89				
Wave 3	0.91	0.93	0.08	0.73	0.99
Wave 4	0.83	0.86	0.10	0.65	0.97
Wave 5	0.80	0.80	0.07	0.66	0.96
Wave 6	0.72	0.67	0.14	0.46	0.95

* Source: World Values Survey (2014*a*,*b*,*c*,*d*, 2015) and the Voter Turnout Database of International IDEA (`http://www.idea.int`.)
[a] Wave 2 has only one country-year.

help relying on the survey data, even if survey respondents tend to over-report turnout. In addition, for the purpose of comparing the results to those by Anderson and Beramendi (2008), it is even necessary to use the operationalization this study employs. As I explained, this variable is constructed in the same way that Anderson and Beramendi (2008) used in their study[44] for Waves 2 through 4. Therefore, at least, it is useful to counter-argue or complement their results with using intention to vote as the outcome variable, assuming our operationalization of turnout is acceptable.

Because the outcome variable seems similar to the reality at the country-year level for Wave 6 of the WVS, let us extract the simulated values for Wave 6 and examine the result, again. As we saw in Figure 4.7, we cannot find an effect of inequality on turnout for Wave 6. Figure 4.8 displays the effect of income and motivation on turnout for Wave 6. This figure shows that both income and motivation have a positive effect on turnout even if we use a better measure of turnout intention. For voters with the motivation value of zero, income can increase the probability of turnout by about 16 percentage points from 64 percent to 80 percent. For the poorest voters, motivation does not matter much. However, it increases the probability of turnout by about 20 percentage points at most for the richest voters. Again, motivation widens the gap in electoral participation between the poor and the wealthy.

[44]The only difference is the fact that 0 and 1 are reversed.

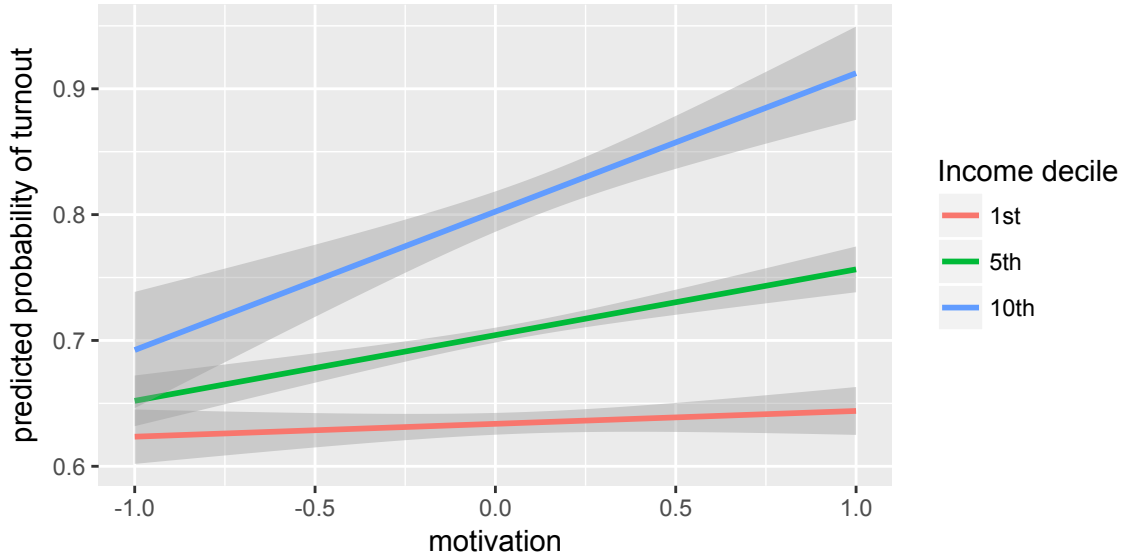


Figure 4.8: Predicted Probabilities of Turnout for Wave 6 of the WVS in Model 4. *The vertical axis shows the predicted probability of turnout. The horizontal axis represents the motivation variable. The predicted probabilities for three different income deciles are displayed. The lines are the smoothed prediction where the factors other than income and motivation are averaged by fitting a generalized additive model. The shaded areas around the lines show the 95 percent confidence intervals.*

4.5 Conclusion

In this chapter, I have examined the impact of economic inequality on individuals' turnout decision. As the previous studies of the resource theory on turnout predicts, I have found that an individual's probability of turnout increases with their relative income. In addition, I have demonstrated that motivation also plays an important role in turnout decision; stronger motivation leads to a higher probability of turnout. That is, both resource and motivation changes the probability of turnout.

These findings imply that it is hard to mitigate participatory inequality caused by economic inequality. Because of differences in resources, the poor are less likely to vote than the rich. Even though motivation has a separate effect on turnout, it cannot compensate for resource scarcity among poor voters. The strongly motivated poor are still less likely to vote than even the weakly or negatively motivated rich. However, motivation can enable middle-class people to vote more than rich people. If the redistributive preference of the middle

class is closer to that of the poor than to the rich, motivation might induce the government to reduce income inequality (see, e.g., Lupu and Pontusson 2011).

In sum, income inequality causes unequal electoral participation. The wealthy vote more than the poor, and motivational factors boosts turnout of the wealthy more than that of the poor. Now we need to study what consequences unequal participation have for policy outcomes. In this paper, I have assumed that the government policy will be biased for the wealthy if the wealthy are more likely to turn out to vote than the poor. This assumption seems natural if we think the politicians are accountable to their median voters. As the median *voter* becomes richer as a result of unequal electoral participation, it is likely that the politician representing the median voter implements the policies that are more favorable to the wealthy than otherwise. We need to verify if this is the case. In addition, we must conduct research on how large the effect of unequal participation on the amount of government redistribution is, in order to understand better the mechanism connecting economic inequality with political behavior and government redistribution.

4.6 Appendix

4.6.1 Data

Table 4.4: Number of Observations by Country and Wave

Country	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Total
Australia				1,187	981	2,168
Canada			1,189	1,364		2,553
Chile		713	846	671	649	2,879
Estonia					1,243	1,243
Finland		717		834		1,551
France				800		800
Germany		1,295		1,578	1,766	4,639
Hungary				826		826
Israel			845			845
Italy				508		508
Japan			742	734	1,368	2,844
Latvia		800				800
Mexico		1,520	797	1,186	1,832	5,335
Netherlands				676	1,430	2,106
New Zealand					516	516
Norway		939		919		1,858
Poland				662	722	1,384
Slovenia				617	650	1,267
South Korea				1,192	1,176	2,368
Spain		525	618	835	905	2,883
Sweden		707		906	1,037	2,650
Switzerland				896		896
Turkey	688		2,448	1,096	1,386	5,618
UK				682		682
USA				1,121	2,055	3,176
Total	688	7,216	7,485	19,290	17,716	52,395

Table 4.5: Summary Statistics of Individual Level Variables

variables	mean	meadian	sd
Income[a]	4.724	5.000	2.374
Motivation	0.054	0.037	0.335
L-R position[b]	−0.007	−0.111	0.486
Attitude to inequality[b]	−0.070	−0.111	0.606
Age[c]	0.001	−0.056	0.978
Age-squared[d]	0.956	0.657	1.035
Employed[e]	0.935	1.000	0.247
Education[f]	2.149	2.000	1.106

* Source: World Values Survey (2014*a*,*b*,*c*,*d*, 2015). The number of ovservations is 52,395.
[a] 10-point scales between 1 and 10.
[b] Rescaled to range from −1 to 1.
[c] Standardized variable.
[d] Square of the standardized age.
[e] Dummy variable.
[f] Ordered categorical variable with four categories 1 through 4.

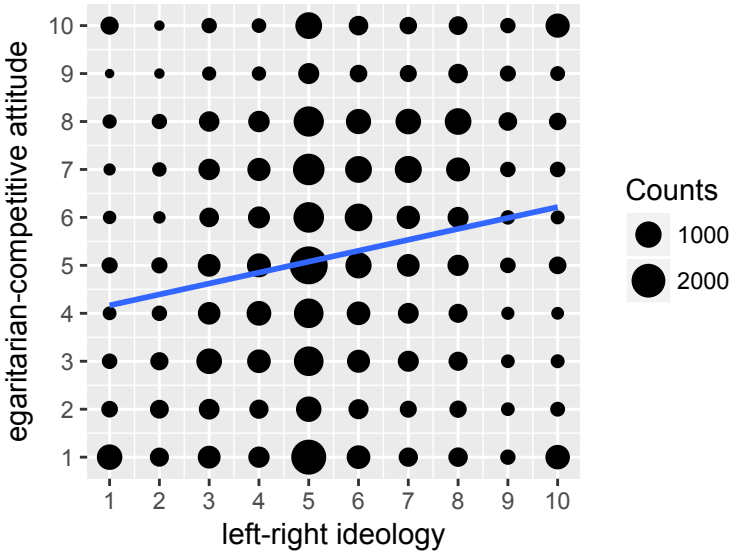


Figure 4.9: Relationship between the Attitudes toward Inequality and the Left-Right Ideologies. *This is a graphic version of Table 4.1. The size of the circles is proportional to the number of respondents in the cell. The regression line is added to show the linear relationship between the two variables. We can see a positive but weak relationship.*

Table 4.6: Summary Statistics of Country-Year Level Variables

variables	mean	meadian	sd
GDP per capita (PPP)[a]	0.064	0.064	1.032
GDP growth (annual %)[b]	2.990	3.207	3.069
Gini index[c]	0.057	−0.202	1.044
Disproportionality[d]	1.729	1.902	0.787
Compulsory voting[e]	0.264	0.000	0.445

[*] The number of country-years is 53.

[a] Standardized varialbles. Source: World Bank Open Data (`http://data.worldbank.org/`).

[b] Source: World Bank Open Data (`http://data.worldbank.org/`).

[c] Standardized variable. Source: UNU-WIDER (2017)

[d] Natural log of Gallagher's electoral disproportinality (Gallagher 1991; Carey and Hix 2011). Source: Disproportionality Data by Christopher Gandrud (`http://christophergandrud.github.io/Disproportionality_Data/`)

[e] Dummy variable. Source: Voter Turnout Database of International IDEA (`http://www.idea.int/`). The values for Latvia and Switzerland are collected by the author.

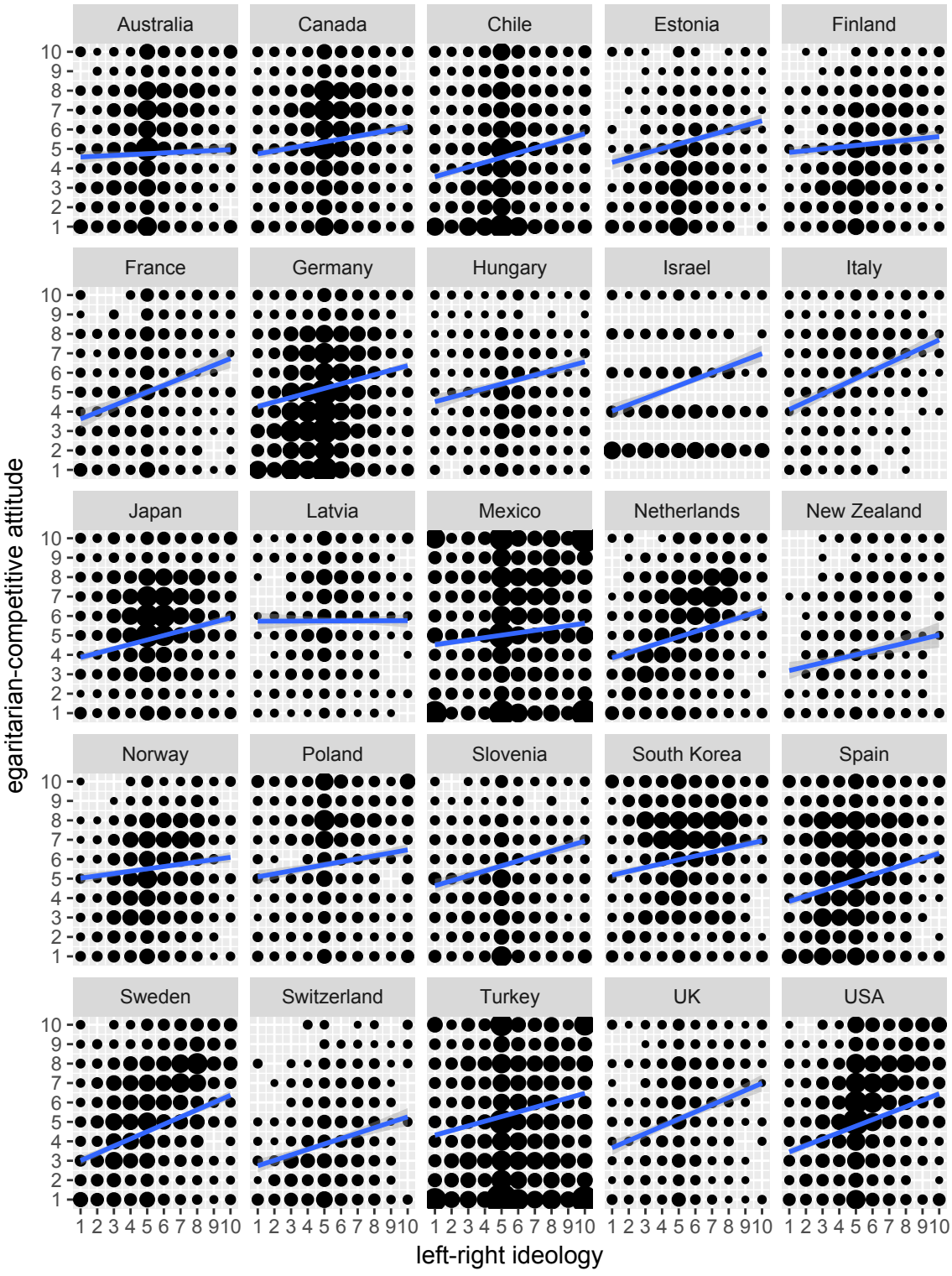


Figure 4.10: Relationship between the Attitudes toward Inequality and the Left-Right Ideologies by Country. *The size of the circles is proportional to the number of respondents in the cell. The regression line is added to show the linear relationship between the two variables. We can see a positive relationship in every country.*

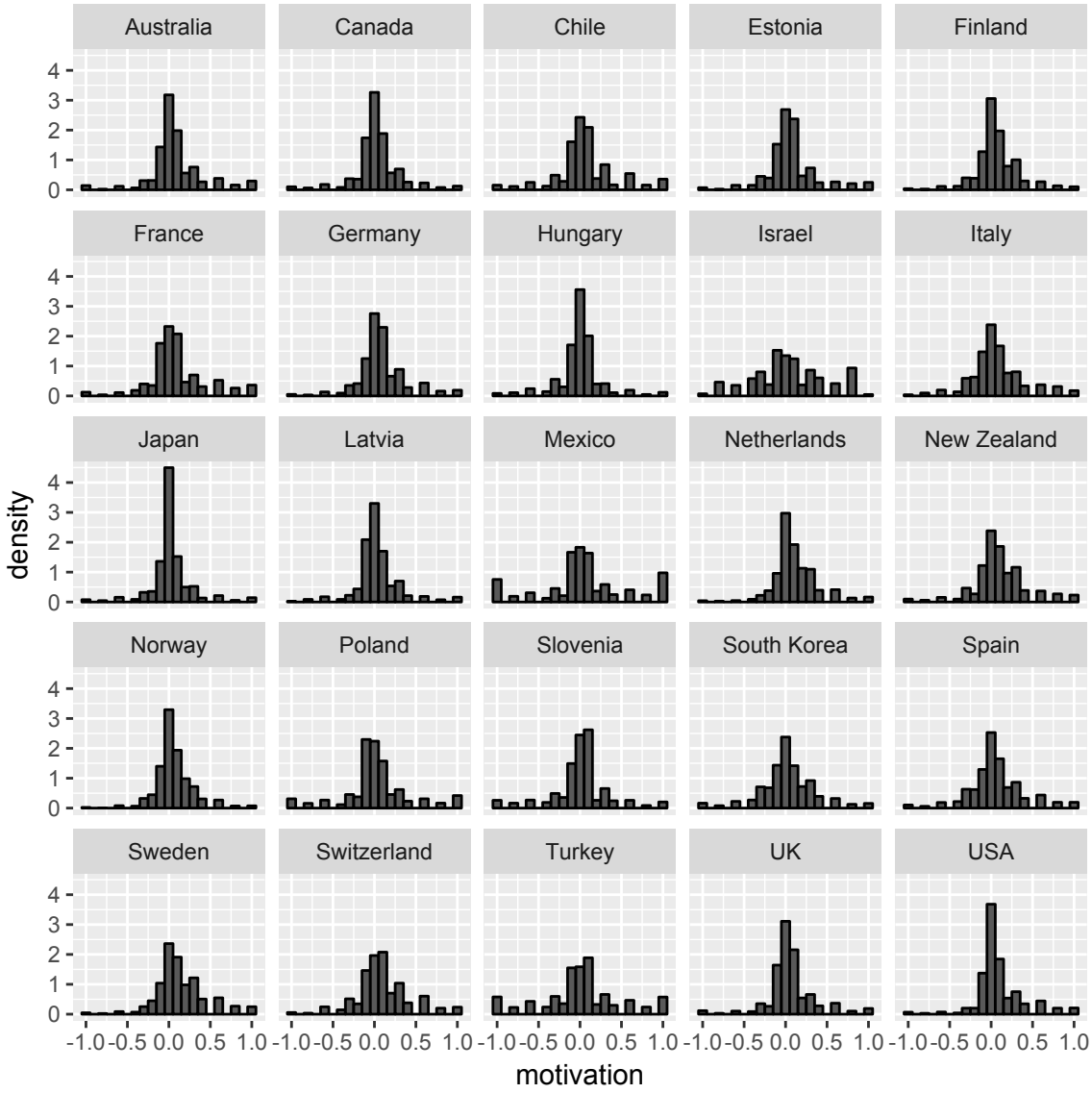


Figure 4.11: Distribution of the Motivation Variable by Country. *All waves included in the dataset are pooled. As a result, the number of observations varies a lot across countries; countries included in multiple waves have the larger number of observations. Thus, the density is shown. A larger value represents stronger motivation to turn out.*

4.6.2 Models and Results of Statistical Analyses

I use subscript i to index individual respondents in the dataset. Let V_i denote the turnout of individual i. V_i takes the value of one if i participates in an election, and 0 otherwise. I use subscript j to index country-year included in the dataset: j takes an integer value between 1 and 53. I fit four different statistical models to explain the turnout outcome by income and motivation. All the models are estimated by Bayesian simulations using RStan, which implements Monte Carlo simulations in R (R Core Team 2016; Stan Development Team 2016*a*,*b*).

4.6.2.1 Model 1

The first statistical model, Model 1, is written as follows.

$$
\begin{aligned}
V_i \sim & \text{Bernoulli}(\theta_i), \\
\text{logit}(\theta_i) = & \alpha_{\text{country-year}_i} + \beta_{\text{inc}}\text{Income}_i + \beta_{\text{age}}\text{Age}_i + \beta_{\text{age-sq}}\text{Age}_i^2 \\
& + \beta_{\text{emp}}\text{Employed}_i + \beta_{\text{edu}}\text{Education}_i, \\
\alpha_j \sim & \text{Normal}(\mu_j, \sigma^2), \\
\mu_j = & \gamma_0 + \gamma_{\text{gdp}}\text{GDP}_j + \gamma_{\text{growth}}\text{Growth}_j + \gamma_{\text{gini}}\text{Gini}_j \\
& + \gamma_{\text{disp}}\text{Disproportionality}_j + \gamma_{\text{comp}}\text{Compulsory}_j, \\
\beta_k \sim & \text{Normal}(0, 100), \\
\gamma_l \sim & \text{Normal}(0, 100), \\
\sigma \sim & \text{Half-Cauchy}^{+}(0, 100),
\end{aligned}
$$

where country-year$_i$ is j for i, $k \in \{$inc, age, age-sq, emp, edu$\}$, and $l \in \{0$, gdp, growth, gini, disp, comp$\}$.

Tables 4.7 and 4.8 show the result of Model 1.

Table 4.7: Result of Model 1

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Individual level						
Income	0.073	0.006	0.063	0.085	2164	1.00
Age	0.630	0.014	0.603	0.657	4000	1.00
Age-squared	−0.139	0.012	−0.163	−0.115	4000	1.00
Employed	0.308	0.043	0.223	0.389	520	1.01
Education	0.178	0.012	0.154	0.203	1404	1.00
Country-year level						
Intercept	1.147	0.382	0.395	1.922	1547	1.00
GDP per cepita	−0.348	0.172	−0.676	−0.012	2503	1.00
GDP growth (%)	0.020	0.046	−0.072	0.112	3501	1.00
Gini index	−0.393	0.205	−0.819	0.000	2112	1.00
Disproportionality	−0.293	0.191	−0.672	0.076	1974	1.00
Compulsory voting	0.725	0.475	−0.223	1.670	2272	1.00
σ	0.974	0.105	0.797	1.198	4000	1.00

Table 4.8: Varying Intecepts of Model 1

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Australia-2005	2.192	0.162	1.886	2.516	1785	1.00
Australia-2012	1.926	0.157	1.625	2.243	1912	1.00
Canada-2000	2.671	0.175	2.339	3.025	2251	1.00
Canada-2006	0.218	0.084	0.059	0.382	728	1.00
Chile-1996	0.391	0.098	0.200	0.576	1202	1.00
Chile-2000	0.834	0.098	0.648	1.029	871	1.00
Chile-2006	0.490	0.103	0.292	0.693	1132	1.00
Chile-2011	0.518	0.111	0.299	0.740	1162	1.00
Estonia-2011	−1.176	0.079	−1.329	−1.016	639	1.00
Finland-1996	2.139	0.149	1.857	2.438	4000	1.00
Finland-2005	0.721	0.105	0.525	0.925	1401	1.00
France-2006	0.547	0.098	0.353	0.737	1094	1.00
Germany-1997	3.069	0.192	2.704	3.468	2307	1.00
Germany-2006	0.653	0.081	0.500	0.816	778	1.00
Germany-2013	0.273	0.076	0.124	0.423	695	1.01
Hungary-2009	0.676	0.101	0.483	0.880	1375	1.00
Israel-2001	1.218	0.112	1.004	1.437	1388	1.00
Italy-2005	1.606	0.168	1.300	1.953	4000	1.00
Japan-2000	0.254	0.104	0.054	0.463	1032	1.00
Japan-2005	0.342	0.109	0.128	0.552	1194	1.00
Japan-2010	−0.537	0.078	−0.687	−0.385	590	1.01
Latvia-1996	1.869	0.151	1.589	2.178	1746	1.00
Mexico-1995	1.959	0.152	1.670	2.264	4000	1.00
Mexico-1996	1.832	0.114	1.617	2.056	4000	1.00
Mexico-2000	1.533	0.121	1.299	1.774	1218	1.00
Mexico-2005	0.121	0.081	−0.040	0.283	756	1.01
Mexico-2012	0.377	0.067	0.243	0.509	628	1.00
Netherlands-2006	0.703	0.110	0.491	0.920	1347	1.00
Netherlands-2012	0.226	0.086	0.057	0.394	783	1.00
New Zealand-2011	0.931	0.157	0.626	1.245	1570	1.00
Norway-1996	3.431	0.267	2.932	3.980	4000	1.00
Norway-2007	0.774	0.107	0.566	0.987	1120	1.00
Poland-2005	0.439	0.102	0.239	0.645	1123	1.00
Poland-2012	−0.117	0.095	−0.302	0.069	1031	1.00
Slovenia-2005	0.443	0.115	0.230	0.677	1424	1.00
Slovenia-2011	−0.771	0.093	−0.950	−0.584	918	1.00
South Korea-2005	0.310	0.085	0.146	0.483	676	1.01
South Korea-2010	−0.682	0.080	−0.832	−0.521	633	1.00
Spain-1995	1.238	0.135	0.981	1.509	2117	1.00
Spain-2000	1.234	0.134	0.977	1.500	1829	1.00

Table 4.8: Varying Intecepts of Model 1 (continued)

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Spain-2007	1.251	0.115	1.023	1.483	1248	1.00
Spain-2011	−0.064	0.084	−0.226	0.101	962	1.01
Sweden-1996	2.968	0.249	2.512	3.498	2711	1.00
Sweden-2006	1.000	0.116	0.779	1.231	1132	1.00
Sweden-2011	1.179	0.118	0.957	1.413	1050	1.00
Switzerland-2007	0.076	0.101	−0.123	0.273	874	1.00
Turkey-1990	1.778	0.127	1.531	2.030	1588	1.00
Turkey-2001	0.265	0.060	0.151	0.387	556	1.01
Turkey-2007	0.836	0.086	0.673	1.009	796	1.00
Turkey-2011	0.757	0.088	0.584	0.929	755	1.00
UK-2005	−0.034	0.104	−0.231	0.181	896	1.00
USA-2006	0.363	0.087	0.196	0.539	848	1.00
USA-2011	−0.525	0.072	−0.667	−0.384	512	1.01

4.6.2.2 Model 2

In Model 2, I add the motivation variable to Model 1. Because the motivation variable is constructed from two other variables, L-R positioning (partisanship) and attitudes toward equality and inequality, I also add these two variables. To control for the difference across waves of the World Values Survey, I include the dummy variables for waves as well. The dataset includes five waves—Waves 2 through 6, and hence four dummies are added to the model leaving one out as the reference category. The statistical model can be written as follows.

$$
\begin{aligned}
V_i \sim & \text{Bernoulli}(\theta_i), \\
\text{logit}(\theta_i) = & \alpha_{\text{country-year}_i} + \beta_{\text{inc}}\text{Income}_i + \beta_{\text{moti}}\text{Motivation}_i \\
& + \beta_{\text{part}}\text{Partisanship}_i + \beta_{\text{att}}\text{InequalityAttitudes}_i + \beta_{\text{age}}\text{Age}_i + \beta_{\text{age-sq}}\text{Age}_i^2 \\
& + \beta_{\text{emp}}\text{Employed}_i + \beta_{\text{edu}}\text{Education}_i \\
& + \beta_{\text{w3}}\text{Wave3}_i + \beta_{\text{w4}}\text{Wave4}_i + \beta_{\text{w5}}\text{Wave5}_i + \beta_{\text{w6}}\text{Wave6}_i \\
\alpha_j \sim & \text{Normal}(\mu_j, \sigma^2), \\
\mu_j = & \gamma_0 + \gamma_{\text{gdp}}\text{GDP}_j + \gamma_{\text{growth}}\text{Growth}_j + \gamma_{\text{gini}}\text{Gini}_j \\
& + \gamma_{\text{disp}}\text{Disproportionality}_j + \gamma_{\text{comp}}\text{Compulsory}_j, \\
\beta_k \sim & \text{Normal}(0, 100), \\
\gamma_l \sim & \text{Normal}(0, 100), \\
\sigma \sim & \text{Half-Cauchy}^+(0, 100),
\end{aligned}
$$

where country-year$_i$ is j for i, $k \in$ {inc, moti, part, att, age, age-sq, emp, edu}, and $l \in$ {0, gdp, growth, gini, disp, comp}.

Tables 4.9 and 4.10 show the result of Model 2.

Table 4.9: Result of Model 2

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Individual level						
Income	0.071	0.006	0.060	0.082	4000	1.00
Motivation	0.159	0.033	0.095	0.225	4000	1.00
L-R Position	0.184	0.025	0.134	0.232	4000	1.00
Attitude to inequality	0.024	0.020	−0.016	0.063	4000	1.00
Age	0.625	0.013	0.599	0.650	4000	1.00
Age-squared	−0.140	0.012	−0.163	−0.117	4000	1.00
Employed	0.312	0.043	0.228	0.398	4000	1.00
Education	0.182	0.013	0.158	0.207	4000	1.00
Country-year level						
Intercept	1.610	0.881	−0.057	3.366	281	1.01
GDP per capita	0.216	0.159	−0.095	0.533	3198	1.00
GDP growth (%)	0.024	0.036	−0.045	0.093	4000	1.00
Gini index	−0.366	0.157	−0.669	−0.054	4000	1.00
Disproportionality	−0.075	0.156	−0.378	0.241	4000	1.00
Compulsory voting	0.919	0.363	0.223	1.636	2834	1.00
σ	0.722	0.084	0.578	0.913	4000	1.00
Wave dummies						
Wave 3	0.505	0.813	−1.080	2.092	284	1.01
Wave 4	−0.360	0.812	−1.955	1.232	284	1.01
Wave 5	−1.198	0.794	−2.720	0.381	257	1.01
Wave 6	−1.784	0.802	−3.392	−0.177	261	1.01

Table 4.10: Varying Intecepts of Model 2

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Australia-2005	3.379	0.806	1.797	4.972	262	1.01
Australia-2012	3.715	0.811	2.127	5.328	268	1.01
Canada-2000	3.026	0.824	1.422	4.635	289	1.01
Canada-2006	1.423	0.797	−0.175	2.959	258	1.01
Chile-1996	−0.088	0.818	−1.687	1.500	287	1.01
Chile-2000	1.213	0.816	−0.392	2.818	285	1.01
Chile-2006	1.686	0.800	0.100	3.265	260	1.01
Chile-2011	2.284	0.806	0.634	3.897	263	1.01
Estonia-2011	0.613	0.802	−0.998	2.189	261	1.01
Finland-1996	1.655	0.823	0.064	3.251	291	1.01
Finland-2005	1.907	0.802	0.322	3.493	259	1.01
France-2006	1.767	0.800	0.183	3.286	258	1.01
Germany-1997	2.609	0.833	0.960	4.224	292	1.01
Germany-2006	1.878	0.800	0.251	3.435	258	1.01
Germany-2013	2.078	0.805	0.465	3.702	258	1.01
Hungary-2009	1.862	0.800	0.263	3.427	261	1.01
Israel-2001	1.602	0.817	0.000	3.202	281	1.01
Italy-2005	2.791	0.816	1.167	4.397	260	1.01
Japan-2000	0.615	0.817	−0.980	2.208	285	1.01
Japan-2005	1.543	0.802	−0.046	3.110	259	1.01
Japan-2010	1.243	0.803	−0.385	2.860	258	1.01
Latvia-1996	1.370	0.822	−0.246	2.981	287	1.01
Mexico-1995	1.463	0.827	−0.130	3.083	290	1.01
Mexico-1996	1.318	0.820	−0.288	2.901	285	1.01
Mexico-2000	1.855	0.821	0.230	3.468	285	1.01
Mexico-2005	1.286	0.797	−0.305	2.838	258	1.01
Mexico-2012	2.116	0.803	0.508	3.748	259	1.01
Netherlands-2006	1.904	0.802	0.310	3.503	261	1.01
Netherlands-2012	1.994	0.805	0.375	3.593	261	1.01
New Zealand-2011	2.671	0.816	1.033	4.318	265	1.01
Norway-1996	2.963	0.849	1.331	4.670	292	1.01
Norway-2007	1.980	0.800	0.360	3.544	259	1.01
Poland-2005	1.605	0.798	0.021	3.181	257	1.01
Poland-2012	1.654	0.808	0.042	3.289	263	1.01
Slovenia-2005	1.646	0.799	0.045	3.224	258	1.01
Slovenia-2011	1.036	0.806	−0.575	2.651	259	1.01
South Korea-2005	1.498	0.799	−0.113	3.036	258	1.01
South Korea-2010	1.103	0.805	−0.525	2.723	261	1.01
Spain-1995	0.784	0.823	−0.852	2.389	290	1.01
Spain-2000	1.629	0.820	0.041	3.256	285	1.01

Table 4.10: Varying Intecepts of Model 2 (continued)

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Spain-2007	2.482	0.802	0.900	4.013	263	1.01
Spain-2011	1.745	0.805	0.126	3.358	261	1.01
Sweden-1996	2.513	0.844	0.862	4.194	308	1.01
Sweden-2006	2.182	0.804	0.585	3.754	259	1.01
Sweden-2011	2.948	0.811	1.314	4.549	262	1.01
Switzerland-2007	1.298	0.802	−0.306	2.877	258	1.01
Turkey-1990	1.788	0.130	1.543	2.049	4000	1.00
Turkey-2001	0.616	0.815	−0.974	2.239	282	1.01
Turkey-2007	2.007	0.799	0.424	3.558	260	1.01
Turkey-2011	2.521	0.806	0.885	4.140	260	1.01
UK-2005	1.176	0.801	−0.439	2.739	261	1.01
USA-2006	1.547	0.800	−0.063	3.098	258	1.01
USA-2011	1.235	0.806	−0.394	2.862	260	1.01

4.6.2.3 Model 3

In Model 3, I add the interaction term between income and motivation to Model 2. The statistical model can be written as follows.

$$
\begin{aligned}
V_i \sim & \text{Bernoulli}(\theta_i), \\
\text{logit}(\theta_i) = & \alpha_{\text{country-year}_i} \\
& + \beta_{\text{inc}}\text{Income}_i + \beta_{\text{moti}}\text{Motivation}_i + \beta_{\text{inc-moti}}\text{Income} \times \text{Motivation} \\
& + \beta_{\text{part}}\text{Partisanship}_i + \beta_{\text{att}}\text{InequalityAttitudes}_i + \beta_{\text{age}}\text{Age}_i + \beta_{\text{age-sq}}\text{Age}_i^2 \\
& + \beta_{\text{emp}}\text{Employed}_i + \beta_{\text{edu}}\text{Education}_i \\
& + \beta_{\text{w3}}\text{Wave3}_i + \beta_{\text{w4}}\text{Wave4}_i + \beta_{\text{w5}}\text{Wave5}_i + \beta_{\text{w6}}\text{Wave6}_i \\
\alpha_j \sim & \text{Normal}(\mu_j, \sigma^2), \\
\mu_j = & \gamma_0 + \gamma_{\text{gdp}}\text{GDP}_j + \gamma_{\text{growth}}\text{Growth}_j + \gamma_{\text{gini}}\text{Gini}_j \\
& + \gamma_{\text{disp}}\text{Disproportionality}_j + \gamma_{\text{comp}}\text{Compulsory}_j, \\
\beta_k \sim & \text{Normal}(0, 100), \\
\gamma_l \sim & \text{Normal}(0, 100), \\
\sigma \sim & \text{Half-Cauchy}^{+}(0, 100),
\end{aligned}
$$

where country-year$_i$ is j for i, $k \in$ {inc, moti, inc-moti, part, att, age, age-sq, emp, edu}, and $l \in$ {0, gdp, growth, gini, disp, comp}.

Tables 4.11 and 4.12 show the result of Model 3.

Table 4.11: Result of Model 3

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Individual level						
Income	0.070	0.006	0.059	0.082	4000	1.00
Motivation	0.126	0.066	−0.002	0.258	3347	1.00
Income Motivation	0.008	0.014	−0.019	0.036	3443	1.00
L-R position	0.183	0.025	0.136	0.233	4000	1.00
Attitude to inequality	0.025	0.020	−0.014	0.064	4000	1.00
Age	0.625	0.013	0.600	0.651	4000	1.00
Age-squared	−0.140	0.012	−0.164	−0.116	4000	1.00
Employed	0.312	0.044	0.223	0.400	4000	1.00
Education	0.182	0.013	0.157	0.207	4000	1.00
Country-year level						
Intercept	1.586	0.901	−0.234	3.347	301	1.02
GDP per capita	0.210	0.159	−0.098	0.528	3313	1.00
GDP growth (%)	0.024	0.037	−0.047	0.097	4000	1.00
Gini index	−0.361	0.155	−0.672	−0.059	3456	1.00
Disproportionality	−0.076	0.156	−0.376	0.232	4000	1.00
Compulsory voting	0.906	0.349	0.217	1.581	3546	1.00
σ	0.723	0.084	0.579	0.914	2774	1.00
Wave dummies						
Wave 3	0.530	0.840	−1.073	2.209	309	1.02
Wave 4	−0.342	0.839	−1.991	1.307	321	1.02
Wave 5	−1.160	0.826	−2.736	0.490	290	1.03
Wave 6	−1.747	0.834	−3.363	−0.057	294	1.03

Table 4.12: Varying Intercepts of Model 3

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Australia-2005	3.341	0.838	1.660	4.974	298	1.02
Australia-2012	3.679	0.847	1.992	5.317	296	1.03
Canada-2000	3.011	0.846	1.356	4.685	329	1.03
Canada-2006	1.387	0.829	−0.288	2.962	292	1.03
Chile-1996	−0.113	0.844	−1.821	1.494	309	1.02
Chile-2000	1.195	0.843	−0.471	2.875	318	1.02
Chile-2006	1.650	0.833	−0.040	3.252	291	1.03
Chile-2011	2.256	0.845	0.585	3.875	263	1.03
Estonia-2011	0.579	0.838	−1.108	2.191	292	1.03
Finland-1996	1.628	0.848	−0.069	3.247	312	1.02
Finland-2005	1.875	0.830	0.196	3.468	291	1.03
France-2006	1.733	0.830	0.072	3.326	292	1.03
Germany-1997	2.590	0.855	0.877	4.227	316	1.02
Germany-2006	1.843	0.830	0.191	3.411	289	1.03
Germany-2013	2.046	0.837	0.377	3.647	292	1.03
Hungary-2009	1.829	0.830	0.155	3.423	290	1.03
Israel-2001	1.585	0.845	−0.067	3.243	321	1.02
Italy-2005	2.752	0.838	1.077	4.377	299	1.02
Japan-2000	0.595	0.844	−1.064	2.264	320	1.02
Japan-2005	1.505	0.831	−0.164	3.091	289	1.03
Japan-2010	1.210	0.837	−0.466	2.816	294	1.03
Latvia-1996	1.346	0.852	−0.369	2.970	313	1.02
Mexico-1995	1.438	0.849	−0.267	3.072	308	1.02
Mexico-1996	1.296	0.844	−0.422	2.921	316	1.02
Mexico-2000	1.840	0.849	0.180	3.535	320	1.03
Mexico-2005	1.252	0.829	−0.396	2.871	291	1.03
Mexico-2012	2.083	0.838	0.405	3.692	293	1.03
Netherlands-2006	1.870	0.830	0.214	3.448	291	1.03
Netherlands-2012	1.959	0.840	0.280	3.573	292	1.03
New Zealand-2011	2.637	0.847	0.963	4.277	303	1.03
Norway-1996	2.934	0.864	1.203	4.627	301	1.02
Norway-2007	1.942	0.835	0.271	3.552	291	1.03
Poland-2005	1.569	0.832	−0.101	3.164	289	1.03
Poland-2012	1.623	0.839	−0.026	3.228	295	1.03
Slovenia-2005	1.612	0.830	−0.064	3.195	292	1.03
Slovenia-2011	1.005	0.839	−0.675	2.633	291	1.03
South Korea-2005	1.462	0.831	−0.194	3.071	291	1.03
South Korea-2010	1.070	0.839	−0.594	2.686	295	1.03
Spain-1995	0.765	0.844	−0.940	2.374	313	1.02
Spain-2000	1.617	0.846	−0.016	3.277	320	1.02

Table 4.12: Varying Intercepts of Model 3 (continued)

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Spain-2007	2.450	0.834	0.764	4.057	289	1.03
Spain-2011	1.712	0.839	0.023	3.323	292	1.03
Sweden-1996	2.482	0.877	0.731	4.162	333	1.02
Sweden-2006	2.149	0.832	0.493	3.761	292	1.03
Sweden-2011	2.913	0.841	1.250	4.539	298	1.03
Switzerland-2007	1.260	0.834	−0.425	2.866	289	1.03
Turkey-1990	1.791	0.130	1.534	2.054	4000	1.00
Turkey-2001	0.600	0.842	−1.052	2.265	319	1.03
Turkey-2007	1.969	0.831	0.305	3.571	290	1.03
Turkey-2011	2.488	0.839	0.801	4.098	293	1.03
UK-2005	1.142	0.831	−0.500	2.749	291	1.03
USA-2006	1.510	0.831	−0.164	3.095	288	1.03
USA-2011	1.201	0.835	−0.471	2.804	293	1.03

4.6.2.4 Model 4

In Model 4, I let the slopes for income and motivation vary across country-years. I use the Gini index to explain varying slopes at country-year level. Because the effect of the interaction between income and motivation is tiny and statistically insignificantly different from zero, this model does not have the interaction. The statistical model can be written as follows.

$$
\begin{aligned}
V_i \sim & \text{Bernoulli}(\theta_i), \\
\text{logit}(\theta_i) = & \alpha_{\text{country-year}_i} \\
& + \beta_{\text{inc,country-year}_i}\text{Income}_i + \beta_{\text{moti,country-year}_i}\text{Motivation}_i \\
& + \beta_{\text{part}}\text{Partisanship}_i + \beta_{\text{att}}\text{InequalityAttitudes}_i \\
& + \beta_{\text{age}}\text{Age}_i + \beta_{\text{age-sq}}\text{Age}_i^2 \\
& + \beta_{\text{emp}}\text{Employed}_i + \beta_{\text{edu}}\text{Education}_i \\
& + \beta_{\text{w3}}\text{Wave3}_i + \beta_{\text{w4}}\text{Wave4}_i + \beta_{\text{w5}}\text{Wave5}_i + \beta_{\text{w6}}\text{Wave6}_i \\
\alpha_j \sim & \text{Normal}(\mu_j, \sigma^2), \\
\mu_j = & \gamma_0 + \gamma_{\text{gdp}}\text{GDP}_j + \gamma_{\text{growth}}\text{Growth}_j + \gamma_{\text{gini}}\text{Gini}_j \\
& + \gamma_{\text{disp}}\text{Disproportionality}_j + \gamma_{\text{comp}}\text{Compulsory}_j, \\
\beta_{\text{inc},j} \sim & \text{Normal}(\mu_{\text{inc},j}, \sigma^2_{\text{inc}}), \\
\mu_{\text{inc},j} = & \lambda_0 + \lambda_1\text{Gini}_j, \\
\beta_{\text{moti},j} \sim & \text{Normal}(\mu_{\text{moti},j}, \sigma^2_{\text{moti}}), \\
\mu_{\text{moti},j} = & \xi_0 + \xi_1\text{Gini}_j, \\
\beta_k \sim & \text{Normal}(0, 100), \\
\gamma_l \sim & \text{Normal}(0, 100), \\
\lambda_s \sim & \text{Normal}(0, 100), \\
\xi_s \sim & \text{Normal}(0, 100), \\
\sigma \sim & \text{Half-Cauchy}^{+}(0, 100),
\end{aligned}
$$

$$\sigma_{\text{inc}} \sim \text{Half-Cauchy}^{+}(0, 100),$$
$$\sigma_{\text{moti}} \sim \text{Half-Cauchy}^{+}(0, 100),$$

where country-year$_i$ is j for i, $k \in \{\text{part, att, age, age-sq, emp, edu}\}$, $l \in \{0, \text{gdp, growth, gini, disp, comp}\}$, and $s \in \{0, 1\}$.

Tables 4.13, 4.14, 4.15, and 4.16 show the result of Model 4.

Table 4.13: Result of Model 4

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Individual level						
L-R position	0.177	0.025	0.127	0.225	4000	1.00
Attitude to inequality	0.026	0.020	−0.014	0.066	4000	1.00
Age	0.629	0.014	0.602	0.656	4000	1.00
Age-squared	−0.135	0.012	−0.160	−0.110	4000	1.00
Employed	0.285	0.042	0.202	0.368	4000	1.00
Education	0.186	0.013	0.161	0.212	4000	1.00
Country-year level						
Intercept	1.632	0.907	−0.231	3.337	145	1.03
GDP per capita	0.072	0.165	−0.253	0.394	4000	1.00
GDP growth (%)	0.033	0.037	−0.038	0.105	4000	1.00
Gini index	−0.355	0.163	−0.669	−0.033	4000	1.00
Disproportionality	−0.024	0.160	−0.335	0.295	4000	1.00
Compulsory voting	0.902	0.378	0.142	1.643	4000	1.00
σ	0.733	0.091	0.579	0.933	4000	1.00
Effect on income slope						
Intercept	0.082	0.012	0.058	0.105	4000	1.00
Gini index	−0.025	0.011	−0.046	−0.003	4000	1.00
σ_{inc}	0.068	0.010	0.050	0.090	2321	1.00
Effect on motivation slope						
Intercept	0.226	0.062	0.107	0.347	3178	1.00
Gini index	−0.052	0.057	−0.166	0.062	3713	1.00
σ_{moti}	0.300	0.058	0.196	0.423	1309	1.00
Wave dummies						
Wave 3	0.224	0.842	−1.397	1.940	146	1.03
Wave 4	−0.421	0.849	−2.045	1.276	142	1.03
Wave 5	−1.326	0.821	−2.901	0.353	134	1.03
Wave 6	−1.962	0.830	−3.509	−0.252	138	1.03

Table 4.14: Varying Intercepts of Model 4

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Australia-2005	3.184	0.842	1.471	4.785	146	1.03
Australia-2012	3.606	0.865	1.874	5.266	153	1.03
Canada-2000	2.913	0.878	1.150	4.603	148	1.03
Canada-2006	1.485	0.832	−0.200	3.050	138	1.03
Chile-1996	0.227	0.850	−1.486	1.826	146	1.03
Chile-2000	1.361	0.864	−0.362	3.019	145	1.03
Chile-2006	2.148	0.841	0.396	3.732	141	1.03
Chile-2011	2.722	0.860	0.989	4.371	142	1.03
Estonia-2011	0.738	0.840	−1.006	2.318	143	1.03
Finland-1996	1.862	0.859	0.120	3.515	152	1.03
Finland-2005	1.820	0.834	0.112	3.398	139	1.03
France-2006	1.662	0.837	−0.053	3.217	140	1.03
Germany-1997	2.583	0.878	0.839	4.272	158	1.03
Germany-2006	1.598	0.836	−0.070	3.174	140	1.03
Germany-2013	1.780	0.841	0.056	3.392	141	1.03
Hungary-2009	2.027	0.844	0.314	3.617	143	1.03
Israel-2001	1.619	0.862	−0.119	3.254	144	1.03
Italy-2005	3.108	0.854	1.382	4.722	144	1.03
Japan-2000	1.069	0.862	−0.650	2.729	147	1.03
Japan-2005	1.651	0.831	−0.064	3.219	138	1.03
Japan-2010	1.509	0.835	−0.224	3.071	140	1.03
Latvia-1996	1.590	0.874	−0.206	3.277	154	1.03
Mexico-1995	1.615	0.867	−0.137	3.284	153	1.03
Mexico-1996	1.588	0.856	−0.198	3.240	150	1.03
Mexico-2000	2.467	0.874	0.705	4.165	151	1.03
Mexico-2005	1.731	0.828	0.034	3.297	138	1.03
Mexico-2012	2.512	0.834	0.794	4.070	138	1.03
Netherlands-2006	1.752	0.835	0.056	3.345	140	1.03
Netherlands-2012	1.780	0.837	0.070	3.354	138	1.03
New Zealand-2011	2.660	0.860	0.946	4.325	140	1.03
Norway-1996	3.259	0.901	1.488	5.043	163	1.03
Norway-2007	1.884	0.841	0.186	3.473	139	1.03
Poland-2005	1.513	0.837	−0.178	3.101	136	1.03
Poland-2012	1.765	0.847	0.010	3.382	141	1.03
Slovenia-2005	1.701	0.846	−0.046	3.300	148	1.03
Slovenia-2011	1.204	0.853	−0.536	2.802	147	1.03
South Korea-2005	1.783	0.840	0.077	3.348	139	1.03
South Korea-2010	1.529	0.843	−0.236	3.140	143	1.03
Spain-1995	1.316	0.870	−0.444	2.984	152	1.03
Spain-2000	1.646	0.869	−0.129	3.273	143	1.03

Table 4.14: Varying Intecepts of Model 4 (continued)

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Spain-2007	2.343	0.843	0.637	3.977	145	1.03
Spain-2011	1.404	0.850	−0.340	2.981	143	1.03
Sweden-1996	2.729	0.898	0.980	4.462	162	1.03
Sweden-2006	2.259	0.841	0.575	3.867	139	1.03
Sweden-2011	3.024	0.860	1.289	4.643	147	1.03
Switzerland-2007	1.341	0.849	−0.402	2.897	143	1.03
Turkey-1990	2.282	0.270	1.761	2.817	4000	1.00
Turkey-2001	1.100	0.856	−0.599	2.744	143	1.03
Turkey-2007	2.552	0.828	0.882	4.134	137	1.03
Turkey-2011	2.581	0.839	0.888	4.146	146	1.03
UK-2005	1.384	0.848	−0.350	2.985	141	1.03
USA-2006	1.413	0.841	−0.308	3.001	138	1.03
USA-2011	0.848	0.844	−0.884	2.449	137	1.03

Table 4.15: Varying Slope of Income in Model 4

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Australia-2005	0.149	0.042	0.067	0.235	4000	1.00
Australia-2012	0.135	0.049	0.040	0.231	4000	1.00
Canada-2000	0.119	0.046	0.029	0.213	4000	1.00
Canada-2006	0.085	0.022	0.043	0.128	4000	1.00
Chile-1996	0.067	0.030	0.009	0.128	4000	1.00
Chile-2000	0.054	0.030	−0.004	0.116	4000	1.00
Chile-2006	−0.002	0.039	−0.080	0.075	4000	1.00
Chile-2011	0.016	0.045	−0.074	0.104	4000	1.00
Estonia-2011	0.089	0.031	0.029	0.148	4000	1.00
Finland-1996	0.100	0.050	0.004	0.201	4000	1.00
Finland-2005	0.130	0.034	0.063	0.196	4000	1.00
France-2006	0.146	0.042	0.067	0.230	4000	1.00
Germany-1997	0.139	0.054	0.035	0.247	4000	1.00
Germany-2006	0.169	0.034	0.102	0.236	4000	1.00
Germany-2013	0.169	0.030	0.110	0.227	4000	1.00
Hungary-2009	0.065	0.043	−0.023	0.146	4000	1.00
Israel-2001	0.085	0.041	0.005	0.166	4000	1.00
Italy-2005	0.027	0.045	−0.062	0.113	4000	1.00
Japan-2000	−0.004	0.031	−0.064	0.055	4000	1.00
Japan-2005	0.078	0.029	0.021	0.135	4000	1.00
Japan-2010	0.052	0.020	0.010	0.093	4000	1.00
Latvia-1996	0.088	0.041	0.011	0.168	4000	1.00
Mexico-1995	0.119	0.054	0.019	0.229	4000	1.00
Mexico-1996	0.080	0.042	0.000	0.165	4000	1.00
Mexico-2000	−0.023	0.036	−0.093	0.048	4000	1.00
Mexico-2005	0.010	0.021	−0.030	0.050	4000	1.00
Mexico-2012	0.011	0.021	−0.028	0.052	4000	1.00
Netherlands-2006	0.158	0.044	0.074	0.245	4000	1.00
Netherlands-2012	0.154	0.029	0.099	0.212	4000	1.00
New Zealand-2011	0.106	0.041	0.028	0.186	4000	1.00
Norway-1996	0.067	0.054	−0.042	0.171	4000	1.00
Norway-2007	0.118	0.031	0.059	0.179	4000	1.00
Poland-2005	0.129	0.040	0.050	0.209	4000	1.00
Poland-2012	0.089	0.037	0.015	0.161	4000	1.00
Slovenia-2005	0.089	0.043	0.005	0.174	4000	1.00
Slovenia-2011	0.075	0.038	−0.002	0.149	4000	1.00
South Korea-2005	0.041	0.034	−0.028	0.108	4000	1.00
South Korea-2010	0.023	0.030	−0.037	0.081	4000	1.00
Spain-1995	0.011	0.050	−0.084	0.106	4000	1.00
Spain-2000	0.084	0.048	−0.008	0.179	4000	1.00

Table 4.15: Varying Slopes of Income in Model 4 (continued)

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Spain-2007	0.135	0.046	0.049	0.227	4000	1.00
Spain-2011	0.188	0.039	0.113	0.263	4000	1.00
Sweden-1996	0.082	0.058	−0.032	0.196	4000	1.00
Sweden-2006	0.082	0.032	0.019	0.147	4000	1.00
Sweden-2011	0.085	0.042	0.003	0.168	4000	1.00
Switzerland-2007	0.085	0.038	0.012	0.158	4000	1.00
Turkey-1990	−0.050	0.058	−0.165	0.061	4000	1.00
Turkey-2001	−0.058	0.026	−0.109	−0.006	4000	1.00
Turkey-2007	−0.046	0.028	−0.101	0.008	4000	1.00
Turkey-2011	0.095	0.031	0.035	0.156	4000	1.00
UK-2005	0.060	0.030	0.002	0.117	4000	1.00
USA-2006	0.123	0.035	0.054	0.190	4000	1.00
USA-2011	0.175	0.026	0.125	0.226	4000	1.00

Table 4.16: Varying Slope of Motivation in Model 4

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Australia-2005	0.201	0.262	−0.310	0.713	4000	1.00
Australia-2012	0.246	0.263	−0.268	0.753	4000	1.00
Canada-2000	0.385	0.266	−0.123	0.933	4000	1.00
Canada-2006	0.107	0.200	−0.285	0.509	4000	1.00
Chile-1996	0.160	0.216	−0.262	0.579	4000	1.00
Chile-2000	0.109	0.201	−0.294	0.490	4000	1.00
Chile-2006	−0.209	0.210	−0.635	0.188	4000	1.00
Chile-2011	0.371	0.226	−0.067	0.825	4000	1.00
Estonia-2011	−0.161	0.176	−0.514	0.173	4000	1.00
Finland-1996	0.012	0.288	−0.599	0.561	4000	1.00
Finland-2005	0.286	0.241	−0.190	0.767	4000	1.00
France-2006	0.219	0.208	−0.188	0.627	4000	1.00
Germany-1997	0.329	0.295	−0.242	0.916	4000	1.00
Germany-2006	0.234	0.183	−0.128	0.592	4000	1.00
Germany-2013	0.529	0.186	0.167	0.894	4000	1.00
Hungary-2009	0.252	0.242	−0.223	0.729	4000	1.00
Israel-2001	0.402	0.196	0.031	0.801	4000	1.00
Italy-2005	0.114	0.267	−0.418	0.644	4000	1.00
Japan-2000	0.173	0.227	−0.274	0.625	4000	1.00
Japan-2005	0.123	0.252	−0.391	0.607	4000	1.00
Japan-2010	0.262	0.194	−0.124	0.645	4000	1.00
Latvia-1996	0.183	0.282	−0.383	0.738	4000	1.00
Mexico-1995	0.105	0.249	−0.390	0.596	4000	1.00
Mexico-1996	0.169	0.202	−0.220	0.570	4000	1.00
Mexico-2000	−0.001	0.177	−0.342	0.347	4000	1.00
Mexico-2005	−0.082	0.108	−0.298	0.134	4000	1.00
Mexico-2012	0.001	0.095	−0.189	0.188	4000	1.00
Netherlands-2006	0.575	0.254	0.109	1.111	4000	1.00
Netherlands-2012	0.579	0.214	0.168	1.013	4000	1.00
New Zealand-2011	0.324	0.265	−0.187	0.861	4000	1.00
Norway-1996	0.280	0.309	−0.316	0.906	4000	1.00
Norway-2007	0.380	0.252	−0.107	0.893	4000	1.00
Poland-2005	0.471	0.214	0.065	0.910	4000	1.00
Poland-2012	−0.193	0.193	−0.582	0.164	4000	1.00
Slovenia-2005	0.297	0.227	−0.145	0.744	4000	1.00
Slovenia-2011	0.184	0.198	−0.213	0.555	4000	1.00
South Korea-2005	−0.001	0.185	−0.371	0.360	4000	1.00
South Korea-2010	0.180	0.164	−0.156	0.496	4000	1.00
Spain-1995	0.379	0.240	−0.078	0.860	4000	1.00
Spain-2000	0.190	0.239	−0.279	0.657	4000	1.00

Table 4.16: Varying Slopes of Motivation in Model 4 (continued)

	Estimates					
country-year	mean	sd	2.5%	97.5%	effective n	$\hat{R}$
Spain-2007	0.056	0.226	−0.381	0.491	4000	1.00
Spain-2011	0.492	0.203	0.098	0.903	4000	1.00
Sweden-1996	0.208	0.305	−0.397	0.804	4000	1.00
Sweden-2006	0.213	0.244	−0.276	0.682	4000	1.00
Sweden-2011	0.409	0.219	−0.010	0.846	4000	1.00
Switzerland-2007	0.374	0.208	−0.031	0.800	4000	1.00
Turkey-1990	0.280	0.223	−0.145	0.731	4000	1.00
Turkey-2001	0.208	0.091	0.029	0.388	4000	1.00
Turkey-2007	−0.032	0.147	−0.325	0.263	4000	1.00
Turkey-2011	−0.080	0.148	−0.364	0.201	4000	1.00
UK-2005	0.200	0.218	−0.229	0.627	4000	1.00
USA-2006	0.613	0.248	0.155	1.134	4000	1.00
USA-2011	0.749	0.171	0.418	1.094	4000	1.00

CHAPTER 5

Conclusion

> *Thus, with the mightiest or the poorest regarding their powers or their needs as a kind of right to the belongings of others, equivalent, according to them, to the right of property, the loss of equality was succeeded by the most appalling disorder.*
>
> Jean-Jacques Rousseau, 1755[1]

Democracy is a political regime where people rule. In a modern representative democracy, people delegate authority to elected officials, but people still rule through elections with the principle of "one person, one vote." A poor person is one person; a rich person is one person. As a single person, either has same political power on paper. However, there are more poor people than rich people in every democracy. As a result, the poor should have more votes than the rich as groups. Thus, the poor should conquer the rich in political competitions, and eventually equalize the country. This is how democracy should work, or so most of our models tell us.

In reality, the poor do not control governments. The U.S. government is controlled by relatively rich people (Bartels 2016; Carnes 2013; Gilens 2012). The poor in other countries might have stronger influence on their governments than those in the U.S., but there is no tyranny of the poor in advanced industrial democracies. For ancient philosophers, this can be a good news, for they were concerned about the possibility that the poor would exploit the rich and ruin the government. However, for current political scientists, this is a puzzle. Why

[1]Rousseau (1994, p. 67).

do democratic governments not equalize more? Why do they not increase redistribution to alleviate inequality even when they are experiencing the rise of inequality?

One possible reason is that people do not know who they are or where they stand. A poor person might consider himself as rich, or a rich person might mistake herself as poor. Given a certain extent of inequality, some might overestimate it, and other might underestimate it. Without knowing their relative positions or surrounding environments, they might not be able to make meaningful decisions. Even worse, people would be able to make no decision.

How people perceive social phenomena can have political consequences. Misperception explains, at least partially, why governments, facing rising inequality, do not redistribute more.

5.1 Summary of the Dissertation

The basic political-economy models predict that inequality will lead to a greater amount of government redistribution, because inequality will increase individuals' demands for redistribution. This prediction, however, does not explain well the variations of redistribution across countries or over time. In this dissertation, I have provided a simple reason why government redistribution does not correspond to the rise of inequality. Facing high inequality, governments do not increase redistribution, because voters do not demand that governments redistribute more. Without voters who demand that governments spend more on income transfers, responsive and accountable governments do not have to, or even should not, redistribute more.

In an age of rising inequality, voters do not request governments to redistribute more to alleviate inequality for two reasons. First, some people do not accurately perceive inequality. In fact, many underestimate inequality. Inequality is not highly visible. We cannot expect people who do not perceive inequality to change their attitudes or behavior in order to fight inequality. In Chapter 2, I investigated if the individually perceived level of inequality affects one's support for redistribution. Conducting a multilevel analysis using the survey data collected by the International Social Survey Programme, I showed that the level of individ-

ually perceived inequality affects the extent of the support for government redistribution. As perceived inequality rises, the support is strengthened, though this result does not necessarily apply to all countries examined in this study. In addition, the strength of the effect varies across countries. Furthermore, I found that Japanese people severely underestimate inequality, which decreases the amount of demand for government redistribution. If the government responds to voters' demands, such underestimation might decrease the amount of redistribution by the government. This could be a reason why we do not necessarily observe expansion of redistributive policies in the era of rising inequality.

To deepen our understanding of misperceived inequality, I asked who within a country underestimates inequality in Chapter 3. By implementing a multilevel regression and post-stratification, I found three things. First, certain demographic and political factors affect the probability of underestimation at the individual level. A lower level of education and unemployment are associated with underestimation of inequality. Second, the degree of underestimation varies across prefectures in Japan. Even after controlling for the relevant demographic factors, prefectural differences persist. Relatively equal prefectures tend to have a higher proportion of people who underestimate inequality, which supports my argument that prefectural equality has a positive effect on underestimation. Lastly, underestimation of inequality affects electoral outcomes. Underestimation boosts the support for the governing parties in relatively unequal prefectures, but underestimation does harm to them in relatively equal prefectures.

Second, *voters* do not demand that governments spend more on redistributive policies, because *voters* are not as poor as assumed. The standard models assume that the median voter is pivotal for policy making, and the median voter is poorer than a person whose income is at the national average (mean). Under this assumption, the median voter demands that the government transfer income from the rich to him (and other poor people) to fill the income gap between the median and the mean. However, it is possible that the median *voter* in a given country has income higher than the mean, if rich people are more likely to turn out than poor people. If so, the median *voter* is expected to demand less or no redistribution. In Chapter 4, I examined the impact of economic inequality on individuals' turnout decision.

Income inequality affects turnout decisions through two different channels. I found that both relative income and motivation increases a person's probability of turnout. Although motivation has a separate effect on turnout, it cannot compensate for resource scarcity among poor voters. The strongly motivated poor are still less likely to vote than even the weakly or negatively motivated rich. Nevertheless, motivation can enable middle-class people to vote more than rich people.

Though much still remains poorly understood, I believe I have made a few contribution toward the connection between politics and economic inequality.

5.2 Implications and Directions for Future Research

People misperceive inequality. It is not only objective inequality but also *subjective* or *perceived* inequality that matters to political behavior. This is not necessarily bad or politically consequential. Even if some, or many, misperceive political, economic, or social facts, their collective knowledge can still be correct on average (Surowiecki 2004). Misperception could be consequential in some situations, however. If the direction of misperception is biased toward one way or the other, political outcomes might be systematically biased as well.

Underestimation of inequality causes a smaller amount of redistribution than predicted by Meltzer and Richard (1981), because voters do not demand that governments redistribute more. However, this does not necessarily mean that people are satisfied with the status quo. A poor person might underestimate inequality, while he suffers from poverty without noticing that he is poor. He might not want the government to transfer money from others to him, because he does not *think* inequality is high enough to be mitigated by the government. Nevertheless, he might dislike the government because he is suffering. As a result, he would try to vote against the governing party. Replacing the government with another party might or might not make his life better. The new government might boost the economy and reduce poverty. But it is also possible that the new government cut the welfare spending further.

The problem is that misperception prohibits people from choosing policies that they would choose were they fully informed. If the poor like redistribution and the rich do not,

as many models assume, the smaller amount of government redistribution is a bad policy outcome for the poor but a good outcome for the rich. Misperception has a bias in favor of the rich. However, if the rich also prefer an equal society to an unequal one (despite higher tax in the former), misperception would harm to the whole society. It impedes a potentially good relationship between the poor and the wealthy. As a result, inequality should grow further, political preferences could be polarized, and political disorder might result.

If people perceived inequality accurately, they would demand a greater extent of redistribution, and the society would be more equalized. In a relatively equal society, redistribution might satisfy the poor. However, in an unequal, polarized society, the poor might rebel, once they know how unequal their society is. How can we prevent such a tragedy from happening?

There still remain many things we need to know to understand the connection between politics and income inequality. To advance our knowledge of political behavior among misinformed citizens, I plan the following seven agenda items for future research. First, we need to know more about citizen misperception of inequality. In this study, I examined the causes of misperception only with Japanese data. Thus, the obvious next step is to extend my research to other countries. Second, I will ask if misperception persists or changes over time. Given that a person misperceives something, can he correct his perception? If so, how? If not, why not? Third, I will ask whether institutional differences affect misperception across countries. Fourth, I will ask if it is disadvantageous to misperceive things. It is possible that people do not try perceiving things accurately because it is costly to do so. If it is more costly to perceive things accurately than to suffer from misperception, it might be rational for people to misperceive things. Fifth, I will ask if misperception tends to harm certain groups of people more than others. If so, how should we design political institutions so that misperception is not in favor of any specific groups of people? Sixth, I will ask whether people really rely on governments should they perceive inequality accurately. It is still unclear whether people would like to reduce inequality by dint of government, even if they prefer low inequality. Lastly, I will consider causal mechanisms. The analyses conducted in this study showed a series of correlations between the outcomes and explanatory variables. For some relationships, causal interpretation is natural. However, reverse causality might exist

for some. Experiments (or randomized controlled trials), where we can manipulate people's perceptions, should be the most promising avenue for the future.

Democracy's built-in equalizer does not seem to be working. Income inequality is rising, and political preferences are diverging (Hopkins and Sides 2015; McCarty, Poole, and Rosenthal 2006; Pontusson and Rueda 2008). When the poor finally perceive inequality accurately, what will happen? Will the poor try to exploit the rich and the rich try to enslave the poor, in part by rolling back basic rights and freedoms? Living in an age of rising inequality *and* polarizing societies, we need to better understand the connection between citizen perception, political behavior, and their political consequences.

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