

Intertemporal Choice and Democracy

by

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Dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy in the Department of Political Science
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ABSTRACT

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Abstract

Intertemporal choice refers to how people weigh different outcomes happening at different times. It is called delay discounting in economics, future orientation in psychology, and patience in everyday life. In political science, the concept of intertemporal choice is widely discussed by political theorists and is formalized as a discounting factor in game theoretical models. Despite its theoretical importance, empirical examinations linking intertemporal choice and political behavior are scarce. Through representative surveys and survey experiments in the United States, Taiwan, and Ukraine, this dissertation first shows that intertemporal choice explains the rationality behind sociotropic voting; future-oriented people are much more likely to take into account the future impacts of current national economic changes. Second, patience reduces polarization between rich and poor people on redistributive policy by accounting for future social mobility. Third, patience can increase turnout only if voters perceived enough ideological difference between the candidates; otherwise, higher patience will decrease the willingness to vote. Fourth, intertemporal choice is key to understanding the mobilization in the risky mass protests. In the 2004 Ukraine Orange Revolution, future-oriented citizens were much likely to join the protest in the early stages. Finally, a country-level analysis shows that the average level of patience among citizens correlates with democratic consolidation. These results point to the importance of including the time dimension in the study of political behavior and show that democracy can be improved by extending patience among citizens.

To Yu-Ping, Rong, and Elaina

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Intertemporal choice everywhere

“One of the characteristics of democratic times is that all men have a taste for easy successes and immediate pleasures...men do not want to think beyond tomorrow.” (De Tocqueville, 1835)

1.1 Introduction

Intertemporal choice refers to the calculation of payoffs occurring at different times. Individuals face daily choices between short-term consumption and long-term investment. People invest in a resource because it is expected to yield a stream of payoffs over a single period or a delayed payoff that is altogether greater than the payoff received from the single period alone. To attain the distant but (accumulated) greater outcome, people must place greater importance on future returns, overriding temporary impulses and outside perturbations. In other words, people who discount the future payoff more tend to give up on investment and choose the quicker but smaller alternative.

Individuals experience intertemporal choices everyday and everywhere. Examples of such choices include deciding whether to buy a new car or save money to purchase a better one next year and whether to smoke now or quit smoking to be healthier

in the long run. Individuals may also be faced with choices of different health care and pension plans. Intertemporal choice is widely considered to be both a personal characteristic and a skill (Frederick, Loewenstein and O'donoghue, 2002), which is pivotal in the determination of human behaviors in the field of economics, finance, psychology, education, and public health (Karoly, 1993; Chabris et al., 2008; de Ridder et al., 2012; Urminsky and Zauberman, 2016; Blaga, Vasilescu and Chereches, 2017).

In economics, intertemporal choice is also called temporal discounting, time preference, or time horizon. Economists usually model and measure intertemporal choice as a *discount factor* in game theoretical models. Behavioral economists study its relation to cooperation games (Andreoni and Miller, 1993; Cooper et al., 1996) or to preferences over pension plans (Brown, Ivković and Weisbenner, 2015). In psychology, the concept of intertemporal choice is related to self-control, self-regulation, or future orientation.¹ Numerous psychometric scales have been established to capture individual time preferences (e.g. Strathman et al., 1994; Zimbardo and Boyd, 2008), accompanied by series of behavioral measurements (e.g. Baumeister et al., 1998). Even though economists and psychologists developed these measures for different purposes and with different descriptions, Daly, Harmon and Delaney (2009) show that the discount factor used by economists (and in this dissertation) strongly correlates with psychological measures such as the Self-control Scale (Tangney, Baumeister and Boone, 2004) and the Consideration of Future Consequences Scale (Strathman et al., 1994). I will discuss the measurement of intertemporal choice in detail in Chapter 3.

Bodies of literature in different fields have shown the importance of intertemporal choice in the determination of human behaviors. Intertemporal choice is related to drug use (Kirby, Petry and Bickel, 1999), smoking (Hardisty et al., 2013), academic performance (Funder, Block and Block, 1983; Tangney, Baumeister and Boone, 2004), risky driving (Zimbardo, Keough and Boyd, 1997), weight control (Chabris et al.,

¹ For the difference between self-control and self-regulation, see VanDellen, Hoyle and Miller (2012).

2008; Stoklosa et al., 2017), poverty (Haushofer and Fehr, 2014), unsafe sex (Hershfield, Cohen and Thompson, 2012), employment type (Wolfe and Patel, 2017), and even social media use (Shenhav, Rand and Greene, 2016).

1.2 Intertemporal choice and political science

Unsurprisingly, intertemporal choice should also play a crucial role in how people act in politics and in how democracy works. In fact, democratic theorists have long emphasized the importance of patience in the functioning of democracy.

Two hundred years ago, Alexis de Tocqueville noticed that people in “democratic social states” like America are, generally speaking, myopic; this tendency may endanger the democratic system itself (see Loewenstein and Elster, 1992, Chp.2). He believed that this myopia is caused by economic and social equality and high rates of mobility. Alternatively, Mill (1861) and Diamond (1999) believed that when citizens are educated to look beyond their immediate interests, they are likely to recognize the just demands of others and to act and think on behalf of the public interest. While the concepts of civic community (Putnam, Leonardi and Nanetti, 1994), as well as the ability to self-organize (Ostrom, 1997), are crucial to sustaining and deepening democracy in the long run, citizens have to spend their time and resources participating in the political process at the beginning.

To the contrary, Galston (1988) and Hoppe (2001) address concerns that democracy might fall into a process of “decivilization” if elections make voters myopic and indifferent about the future. When people cannot see beyond the upcoming Election Day, vote-seeking candidates have an incentive to align themselves with myopic policies and extract as many resources as possible once elected. Wagschal (1997) even argues that voters are much more myopic than the political elites, so direct democracy may foreshadow the malfunctioning of democracy. In the eyes of political theorists, how citizens discount the future plays a vital role in the democratic system in which

they live.

In the formal models that political scientists developed, the concept of intertemporal choice is usually captured as a *discount factor*, which is influenced by the economists (Samuelson, 1937; Loewenstein and Elster, 1992; Wilson, 2011). In classic works on cooperation and negotiation in social choice dilemmas, Taylor (1976), Axelrod (1981), and Acemoglu (2006) argued that people with larger discount factors (lower discounting rates) may jump out of the tragedy of the commons and reach Pareto-optimal outcomes, such as the emergence of the rule of law, sufficient public goods provision, and revolting against the dictator. People who have higher discount factors are believed to place more importance on utility received in the future, which enables them to treasure the future benefits they will receive from a stable, democratic government operating under rule of law. Hence, they are more willing to invest their time and resources in cooperating with other players and less willing to defect. To summarize, intertemporal choices influence how people think about politics, how people engage in the political process, and how democracy will evolve.

Despite its theoretical importance, until recently, few empirical studies had explored the relationship between patience and political behavior in the real world (Loewenstein and Elster, 1992, Chapter 2). The keywords related to patience, including discount factor, time horizon, intertemporal choice, self-regulation, and myopia, appear nowhere in the *Oxford Handbook of Political Behavior* (Dalton and Klingemann, 2007). As noted by Wilson (2011) in his exhaustive literature review of behavioral economics and political science, even though the discount factor is widely used in the models theorizing political behavior and preferences, the nature and content of the discount factor remain mostly unexplored, not to mention the empirical examination of its relationship to political behavior.

Indeed, previous studies on economic voting and democratic accountability usually assume that voters are, in general, myopic (e.g. Stokes, 1996; Healy and Malho-

tra, 2009; Achen and Bartels, 2017), but the word “myopic” is used to describe the phenomenon that voters tend to respond to recent economic changes rather than to long-term performance (see Lewis-Beck and Paldam (2000) for a review). Moreover, findings that voters do not care about long-term economic performance or preventive spending are challenged by recent studies (e.g. Bechtel and Hainmueller, 2011; Hellwig and Marinova, 2015; Wlezien, 2015). The concept of intertemporal choice used in this dissertation focuses on how people evaluate outcomes happening now and in the future, which is different from the short-term performance evaluation context of those works.

1.3 How much do political scientists know?

Six years ago, I took my first introductory game theory course at Duke University. In one week, I was deeply inspired by the concept of the discount factor, δ . In game-theoretical models, δ refers to how much one player discounts the payoff that he will receive in the next round of the game. This single parameter entirely changed how I think of politics and political behavior. First, the discount factor makes game theoretical models much more plausible. Indeed, interactions in everyday life, especially in the political domain, are rarely one-shot games. An individual may see the same neighbor every week. A defeated politician may run for election next time. Advances in medicine and technology keep prolonging human life, which theoretically, extend the repeated games of the whole society.

Second, as is mentioned earlier, δ provides the first possible solution to the notorious prisoners’ dilemma (PD) game. In a one-shot PD game, players are too rational to cooperate with each other. Mutual defect cannot help but is the only dominant strategy. However, if people thought of future rounds and did not discount the future payoff too much, cooperation eventually becomes a possible equilibrium. Since the PD game efficiently captures so many tragedies caused by rational men around the

world, δ looks like a solution that will bring love and peace to Earth.

If the discount factor is so important, why do people discount, or not discount, the future? Unfortunately, I did not find a plausible explanation in the introductory game theory textbooks. The only sentence introducing the discount factor is that *people discount the future because they may die tomorrow, so they cannot get the future payoff*. I do not believe that people take into account the possibility of being hit by a car every second, but people indeed make seemingly myopic choices now and then.

Most of the formal models I learned in political science assume that the discount factor is constant for all players. What happens if the players' discount factors changed? What if different people have different discount factors? What if can we change the equilibrium in the game and in society by changing (increasing) people's discount factors?

When I decided to put these questions into my dissertation prospectus in early 2014, very few political scientists had empirically tested the relationship between intertemporal choice and political behavior. Two exceptions, to my knowledge, are Fowler and Kam (2006)'s study of the relationship between patience and turnout rate and Jacobs and Matthews (2012)'s work linking patience and policy preferences. The former article is titled "*Patience as a Political Virtue*," because it reveals a positive correlation between the discount factor and turnout. The authors argue that the cost of time of showing up to the voting booth on Election Day is immediate, but the policy outcome may not be realized in the near future. Therefore, patient voters who discount the future policy outcome less are much more likely to get out and vote. Fowler and Kam analyze responses from 235 undergraduate students taking an introductory political science course in California and reveal that patience has a significant impact on turnout even after controlling for civic duty, political interest, church attendance, and sociodemographic background.

In the latter study, Jacobs and Matthews found that patience does not correlate with respondents' preferences for financial reform of the Social Security program. Instead, respondents' level of trust and uncertainty (measured by the treatment in the survey experiment that included expert endorsements of certain policy outcomes) can help explain respondents' attitudes toward financial reform.

I set intertemporal choice as my dissertation topic and started data collection and experimental design in late 2014. Coincidentally, this topic then began to draw the attention by many political scientists. Inspired by Fowler's exploration, Schafer (2016) and Hill (2016) (both are currently working papers) found a positive correlation between voters' discount factors and turnout based on the 2014 Cooperative Congressional Election Survey (*CCES2014*). Schafer also found a positive correlation between the discount factors and political donations. Hill suggests that the mechanism linking patience and turnout is a social norm (the virtue of voting); people with higher levels of patience are much more likely to vote because they foresee negative consequences of disobeying this norm.

In recent years, one of the most essential findings linking intertemporal choice and political behavior is a piece by Shefer et al. (2017) in which political elites are much much more future-oriented than ordinary people. They invited legislators in Belgium, Canada, and Israel to answer a series of questions including a discount factor scale. Meanwhile, they conducted representative surveys among citizens in these countries. On average, citizens in these three countries discount the future more steeply than do legislators. The finding is evidence that voters are much more myopic than politicians. The results speak directly to political theorists' concerns about the pitfalls of direct democracy (e.g. Wagschal, 1997).

1.4 Intertemporal choice and democracy: what this dissertation is about

As discussed by political theorists, the relationship between intertemporal choice and politics can be about more than turnout and elite-citizen differences. All humans are mortal, but life is a long journey. The tendency of individuals to discount the future influences how they think, calculate, and behave in everyday life. Hence, the concept of intertemporal choice should also help political scientists explain political behavior and participation.

That is what this dissertation aims to achieve – to link intertemporal choice to political behavior. In Chapter 2, I will summarize the three major approaches to explaining intertemporal choice. A rational economic man should not discount the future payoff if he aims to maximize his lifespan welfare. However, humans still discount the future because of the weak future-self connectedness, future risk, and the balance between the “hot” and “cold” parts of the brain.

In Chapter 3, I will discuss how this dissertation measures intertemporal choice and how other researchers measure the concept of intertemporal choice. This chapter will also provide evidence of the internal and external validity of the discount factor measures used in the United States, Taiwan, and Ukraine datasets presented in this dissertation. After providing evidence that people’s levels of patience can hardly be influenced by the changing political context, I will provide my stance on whether the discount factor is a personality trait based on the available evidence.

In the fourth, fifth, sixth, and seventh chapters, I will examine how intertemporal choice on the individual level may influence (4) preference formation, (5) vote choice, (6) turnout, and (7) protesting. These four interrelated subjects are the most critical topics in the study of political behavior. I will argue that intertemporal choice can contribute to our understanding of all of them. Previous studies, including many formal models, explicitly or implicitly suggest that people with different

time preferences will behave differently in these four domains, but to my knowledge, few empirical works have validated these relationships in the real world. Indeed, in formal models, the discount factor is usually considered only as a constant representing how an individual discounts the payoff in the next round. Yet, a change in the discount factor usually influences how players act and which equilibrium will be reached. Moreover, studies in psychology and public health suggest that an individual's time preference can be lengthened by proper training (Karoly, 1993; Witte, 1992; Dignath, Buettner and Langfeldt, 2008; Mullainathan and Shafir, 2014). Therefore, focusing on the relationship between intertemporal choice and political participation may create the possibility of reaching the desired equilibrium in the real world by changing/improving people's time preferences.

Chapter 4 shows that time discounting will impact people's preferences over redistribution. Most importantly, intertemporal choice has opposite effects for poor as compared to rich people. Previous studies on class voting have yielded mixed results linking income to demand for redistribution. Why do some poor people oppose redistribution while some rich people support it? In a one-shot game, redistribution between the rich and the poor is zero sum. In such scenarios, poor and rich people are polarized in their demand for redistribution. When people extend their time horizons, however, the poor see the possibility of upward mobility, while the rich emphasize future losses, such as unemployment and economic instability. As a result, patient poor and rich voters should be less polarized in their preferences for redistributive policies. Consistent with this hypothesis, analyses of the 2014 Cooperative Congressional Election Study (*CCES2014*) and a representative 2016 Taiwanese dataset reveal evident class cleavages in demand for redistribution among impatient poor and rich respondents, but the cleavages between their patient counterparts were smaller. This pattern of convergence extends previous studies on upward mobility and risk perception theory.

In Chapter 5, intertemporal choice helps explain how voters evaluate the incumbent and enriches our understanding of sociotropic voting. Economic voting is one of the most critical mechanisms for explaining voting behavior and for establishing democratic accountability. However, people tend to use perceived national economic conditions in evaluating the incumbent, which is known as sociotropic voting, instead of their pocketbook record. Previous studies suggest that both altruism and self-interested future expectations explain this seemingly irrational behavior. However, empirical works have not yet found convincing evidence proving or disproving self-interested motivations. This chapter suggests that patience makes people discount the influence of current national economic changes on the future less. If self-interest drives sociotropic voting, patient voters would be more sociotropic. Consistent with this hypothesis, individual-level *CCES2014* data show that patient voters are more reliant on perceived national economic change to evaluate the incumbent in order to make their vote choice. Moreover, an empirical analysis of a representative Ukraine survey (*Ukraine2007*) yields evidence of a linkage between impatience and pocketbook voting. Evidence against a rival theory, which associating sociotropic voting with altruism, is also provided.

Chapter 6 revisits the linkage between intertemporal choice and turnout. Why do people vote? Once her mind is made up, a rational voter must absorb her immediate cost of voting, while the expected policy outcome will not be realized in the near future, as shown in recent studies. However, I argue that the effect of patience on turnout should be contingent on the political opportunity structure. Patience will increase turnout only if the voter perceived that future policy outcomes would be very different depending on the election result. If the voter sees no differences in policy commitments among the candidates on the ballot, her future orientation will dissuade her from voting. This hypothesis is supported by cross-sectional *CCES2014* data. Furthermore, a survey experiment conducted through Amazon MTurk, including a

newly proposed treatment, was implemented to manipulate the level of patience and to examine the causal relationship between patience and turnout. The experimental results show that a voter who received a treatment designed to increase her patience will decrease her intention to vote if she sees no difference between the two major candidates. But she will increase turnout if the perceived ideological difference between the candidates is large enough. Hence, patience is a *political virtue* not simply because it linearly increases turnout but because it enhances people's responsiveness to a changing political opportunity structure.

In Chapter 7, intertemporal choice also provides some insight into protest – an extreme and costly form of political participation. Protests may last weeks or even months on the street. Why do some people join protests against government wrongdoing on the first day while others wait until weeks later? This chapter suggests that patience determines when an individual joins a protest. An analysis of the 2007 Ukrainian Longitudinal Monitoring Survey (*Ukraine2007*) reveals that Ukrainians who discounted the future less were much more likely to join the Orange Revolution right after the electoral irregularities of the 2004 runoff election. They waited for weeks on snowy days until the Supreme Court required a re-election. In contrast, impatient citizens joined the protest several days after the scandal broke. In short, this chapter provides a psychological mechanism explaining the development of protest.

In Chapter 8, thanks to a 53-country dataset on undergraduate students' discount factors collected by Wang, Rieger and Hens (2009), I provide preliminary evidence of a relationship between the level of patience among citizens and the functioning of democracy. In the previous four chapters, people who discount the future less are less polarized on redistribution, more likely to hold the incumbent accountable, more susceptible to the political opportunity structure, and tend to protest immediately against the governments' wrongdoing. On aggregate, the average discount factor among the citizens should impact the functioning of democracy in that country. The

evidence shows that the average discount factor among people of a country is positively correlated with the level of democracy and negatively correlated with the level of clientelism in the country. Additional evidence shows that high levels of patience help explain the consolidation of democracy over time. This evidence supports the concept of self-enforcing democracy (Weingast, 1997; Przeworski, 2005; Fearon, 2011) and help us understand the conditions under which a democracy may be in peril.

In the last chapter, I summarize the findings and identify several potential future research projects related to intertemporal choice and politics. Specifically, I believe that intertemporal choice can help explain how religion and education enhance political participation. I argue that content related to patience and intertemporal choice in religion and education drive people to participate in politics. In other words, patience is the mediator linking education and religion to political participation. This theory may help explain why some religions fail to promote political participation, as well as why education can have heterogeneous effects on turnout and vote choice. It also yields policy implications for improving the functioning of democracy, especially in an era of democratic decline.

Why do people discount the future?

In the introduction, I enumerate several examples linking intertemporal choice and everyday behaviors, and this dissertation will extend the link to politics. Before going further, one may stop and ask: how does intertemporal choice even exist? Why do people discount the future? Why do people usually put more weight on the immediate outcome while discounting the distant one?

In academia, this question was first studied by *political* economists over one hundred and fifty years ago. As cited in Loewenstein and Elster (1992), political economists Senior (1836) and Jevons (1871) argued that people *should* view the equal treatment of the present and future as a behavioral norm. If the goal of a rational man is to maximize accumulated utility over the lifespan, it seems irrational to consider the utility of a future event as less important than the immediate alternative.

Unfortunately, humans do not treat current and future outcomes equally. Humans tend to discount the delayed payoff, and this tendency has existed throughout history. In Proverbs 20:4, the Bible warns, “*Sluggards do not plow in season, so at harvest time they look but find nothing.*” A famous Chinese proverb recorded during the Han Dynasty (206 BC–220 AD) holds, “idle young, needy old.” Both sayings direct young

people to think about their futures and to invest more for tomorrow. Once the individual acknowledges the importance of a future payoff, he or she will change their view of what should be done immediately. Many religions even extend believers' time horizons into an afterlife – the ideas of heaven and hell imply that humans should not discount what will happen after they physically leave the Earth.

Humans are not the only doomed animal on the planet. Rather, humans are one of the few species *capable of* thinking beyond tomorrow. Stevens and Hauser (2004) found that rats and pigeons discount future outcomes much more steeply than human subjects do. Meanwhile, Rosati et al. (2007) show that chimpanzees and bonobos have a certain level of patience but that marmosets and tamarins do not. Surprisingly, Rosati and colleagues found that chimpanzees have greater tolerance for delayed food rewards than humans.

Since the goal of this dissertation is not to jump into evolutionary biology and trace the origins of temporal discounting, I focus on human behaviors. In the existing literature, three major mechanisms are generally cited to explain why people discount future payoffs. These three mechanisms emerge from philosophy, economics, and psychology, but they are all interrelated.

2.1 Future-self connectedness

The first potential explanation for the discount factor comes from philosophical debates. According to Loewenstein, Read and Baumeister (2003) (see Chapter 2), there are two views of personal identity: simple and complex. The simple view is that there is an irreducible entity “I” that remains unchanged over time. Since the “I” remains the same, the individual has no reason to discount the future self.

The complex view assumes that personal identity over time is based on reducible characteristics (Parfit, 1984). One may forget previous experiences. The cells of the body are continuously renewed, and every seven years, most of the cells in our body

are replaced with new ones. Therefore, people discount future events because the future-self and the current-self are different.

Based on the complex view, the value of an individual's discount factor is therefore decided by an individual's subjective *future-self connectedness*. The more an individual is able to cognitively connect her current condition to an imagined future one, the more she will discount the future payoff. If the future scene is always blurry to the individual, she will put more weight on current affairs. In other words, an individual may still feel a ten dollar reward in a distant future as ten dollar now, but he discount the future reward because the future-self is only a proportion of the current-self.

Bartels and Rips (2010) conducted five surveys to empirically show that individuals with strong future-self connectedness are less likely to discount future outcomes. They asked undergraduate respondents to rate the similarity between their current self and what they will be in the future and then correlated this subjective similarity to the individual's discount factor. A positive and strong correlation was found.

Beyond these correlations, a recent series of experiments revealed a causal relationship between episodic future thinking and a reduction in temporal discounting. When people are asked to imagine what they will be in the distant future, they are significantly less likely to discount the future outcome (Cheng, Shein and Chiou, 2012; Wu, Cheng and Chiou, 2017; O'Donnell, Daniel and Epstein, 2017). When people cannot imagine what they will be in the future, they discount the future more and are much more likely to engage in unethical and risky behaviors such as cheating and pursuing one-night stands (Hershfield, Cohen and Thompson, 2012; Wu, Cheng and Chiou, 2017). The effectiveness of episodic future thinking is related to episodic memory capacity, as suggested by fMRI studies (Hu et al., 2017).

Furthermore, Hershfield et al. (2011) designed interesting experiments that did not require participants to execute episodic future thinking. Instead, they invited participants to visit a lab, took a photo of each participant, and altered the photo.

When the participants returned to the lab weeks later to answer items on the discount factor scale, those who were shown their altered photos showed higher levels of patience. Indeed, because they “see” their future-self, their level of future-self connectedness increases, which reduces the tendency to discount the future.

The above logic linking intertemporal choice and future-self connectedness is reasonable, but it might also be tautological. If you are imagining, or have the capacity to imagine, your future-self, you do not do so for no reason. You must imagine what your future-self is doing and feeling, but that is exactly what the discount factor is about. Where does the ability to engage in episodic future thinking come from? The theory of future-self connectedness can indeed provide useful policy suggestions to change people’s behavior by lowering their temporal discounting.

2.2 Risk

When I started my dissertation work, the question that I was asked numerous times after my presentations was “what is the difference between intertemporal choice and risk attitude/aversion/perception?”

Indeed, risk and intertemporal choice overlap, theoretically and empirically. The future outcome has not happened yet and is subject to change. Hence, risk-averse people would prefer certainty, that is, the immediate outcome. If an individual dies unexpectedly due to an accident or sickness, he/she can never receive the payoff from the future outcome. For example, after a natural disaster or violent conflict, people update their perceived uncertainty of the future and, as a result, discount the future more (e.g. Li, Li and Liu, 2011; Voors et al., 2012; Bchir, Willinger et al., 2013). In both scenarios, risk aversion is part of temporal discounting.

However, risk cannot fully explain why people discount the future. To be specific, people still discount the future even without uncertainty. Besides, if the risky event occurs in the future, their discount factor determines whether people take the future

risk into account. People seek insurance if the potential damage from the future risk is massive but they will do nothing when there is (1) no risk or when (2) the risk is enormous but could be discounted to zero. Although many studies have found a robust correlation between risk and time preferences (e.g. Gafni and Torrance, 1984; Andersen et al., 2008; Bchir, Willinger et al., 2013), the correlation is not strong.

Moreover, participants in many laboratory experiments continue to discount the future even when a future payoff was ensured by the experimenters. In the famous Marshmallow Test, some kids could not help but eat the first marshmallow even though they could get another one, if they waited for 20 minutes (Mischel, 2014). The second marshmallow is guaranteed, and no risk event is likely to occur during this 20-minute period. Among studies of time preferences that utilize a choice battery (which will be discussed in Chapter 3), some respondents always chose the smaller and immediate reward even when researchers guarantee greater, delayed rewards (Chapman and Weber, 2006).

For instance, Dohmen et al. (2017) worked with a well-known agency that was trusted by the public, and interviewers from that agency even left their contact details at the end of each survey and visit. In some cases, the surveyors and the interviewees built long-term friendships. In these studies, the subjects' rewards were based on their responses to options on the discount factor scale (such as \$100 today vs. \$150 next weekend), and the reward is guaranteed by friendship and by a trustworthy agency. In such safe case, approximately 60% of respondents still discount the future outcome and prefer the immediate but smaller option.

Luhmann et al. (2008) show that some patterns of brain activity are unique to intertemporal choice. They designed a series of experiments that incorporate and manipulate the level of uncertainty in the rewards as well as in the waiting period. Through functional imaging, they revealed activity in a set of brain regions, including the posterior cingulate cortex, parahippocampal gyri, and frontal pole, uniquely

associated with the temporal aspect.

Therefore, risk and intertemporal choice are related, but they are not at all the same. People discount the future for several reasons, and future risk is just one of them.

2.3 Neuro-psychological explanations

To some extent, risk and future-self connectedness influence an individual's temporal discounting through limit of the cognitive resources. In the two previous explanations, people must imagine and calculate the future risk or future-self, each of which expends mental energy (Baumeister and Newman, 1994; Hofmann et al., 2008; Kruglanski et al., 2012). This may cause ego-depletion (Baumeister et al., 1998) and reduce blood sugar levels (Gailliot et al., 2007*a*). Even if the future outcome provides the same utility as the current one, an individual can receive an immediate reward after choosing the nearer alternative but must expend extra energy to imagine the future reward. For example, Hofmann et al. (2008) showed that an individual's working memory capacity influences their self-regulation behavior. Therefore, the ability to account for future risks and the strength of the future-self connection may be explained by one's cognitive resources.

Recent studies in neuroscience suggest that the choice to delay a reward is a deliberative cognitive process: an individual *automatically* prefers an immediate reward, but consciousness will control that impulse and compare the immediate reward with the delayed one. McClure et al. (2004) and McClure et al. (2007) use fMRI to show that different neural systems value immediate and delayed monetary rewards. Therefore, even if the future outcome provides the same utility as the current one, an individual can receive an immediate reward by choosing the nearer alternative but must expend extra energy to imagine the feeling of receiving future rewards. This theory also helps explain hyperbolic discounting, which means that people discount

more between two near events than between two distant ones. The reason is that the difference in energy expended on imagining two distant events is less than that expended on imagining two near events.

However, there is still no consensus on which part of the brain defines the tendency or ability to discount the future. Białaszek, Swebodziński and Ostaszewski (2017) studied 177 patients with brain injury and found that those with focal damage to the frontal lobes discount the future more. Meanwhile, Cohen and his colleagues (Cohen, 2005; McClure et al., 2007) suggest that the tendency to discount the future depends on the balance between the limbic structure and the prefrontal cortex.¹

2.4 Intertemporal choice as a personality trait, a skill, or a capacity?

Based on the existing literature, intertemporal choice is assumed to be a personality trait (which is closer to the trait of self-control than to the state of self-control) in this dissertation for the following reasons. I assume that intertemporal choice is an unmoved mover.

First, studies on the discount factor scale (which will be discussed further in the next chapter) show excellent test-retest stability across one-year and even three-year spans (Kirby, 2009; Urminsky and Zauberman, 2016; Martínez-Loredo et al., 2017). Since one's tendency to discount the future is decided by interactions among different parts of the brain, it may not be changed dramatically. Since the tendency to discount the future is quite stable over time, it should be treated as an unmoved mover that drives other preferences and behaviors.

Second, Bartholomew, Meck and Cirulli (2015) found some evidence that people's time preferences are partly decided by genetic factors by examining a large genetic dataset. Clearly, genes are assumed to be the same across one's lifespan. Furthermore, Ishii et al. (2018) found that individuals with the AA genotype of the 5-HT_{2A}R A-

¹ For an opposing view, see Greene (2009).

1438G polymorphism discount the future more, which serves as additional evidence of an in-born discounting tendency.

Third, intertemporal choice can be seen as a capacity, where the discount factor scale captures that capacity under normal conditions. I wholeheartedly agree with the pioneering works of Baumeister et al. (1998) and Baumeister, Vohs and Tice (2007) on ego-depletion and believe that people may change their tendency toward self-control and future discounting under certain circumstances. Previous studies of how natural hazards and civil wars change discount factors also support the external validity of the capacity theory. However, such extreme conditions usually do not exist when people are answering questions on the discount factor scale or when people are making political decisions in the everyday life. For example, VanDellen, Hoyle and Miller (2012) suggest that an easy task below the “self-control threshold” does not consume cognitive resources. Other studies show that future discounting can be seen as a habit (Aarts and Dijksterhuis, 2000), where the tendency can continue even when one’s brain is damaged (King et al., 2016). I believe that the respondents to the surveys and experiments used in this dissertation did not answer the items while starving or while surrounded by cookies.

Fourth, a major problem for the capacity model is its inability to explain why participants sometimes respond to treatments designed to make them more patient. Many studies show that people’s tendency toward future discounting cannot only be “refilled” but can even be enhanced. For example, people discount the future less after group deliberation (Calluso et al., 2017), thinking of others with good self-control (VanDellen and Hoyle, 2010), or merely thinking of something happy (Ifcher and Zarghamee, 2011) or feeling thankful (DeSteno et al., 2014).

This dissertation treats intertemporal choice as an individual trait-like characteristic. Individuals have a stable and general tendency to discount the future payoff, the level of which is decided by how different parts of the brain account for previous

experience, future-self, and perceived risk. This general tendency can be a pivotal determinant of a range of personal behaviors, and this dissertation will extend its scope to explaining people's political preferences and behaviors.

One problem with this simplified assumption is that people's temporal discounting may be domain specific (For example, see Tsukayama and Duckworth, 2010). That is, people may discount the future heavily in the political domain but not in the personal domain. Moreover, people may indeed experience ego-depletion when thinking of politics. I have two responses to such critiques. First, I will provide evidence that the discount factors recorded in datasets from the United States, Taiwan, and Ukraine are all correlated with personal behaviors identified by previous studies, such as BMI, weight control, and smoking. Even if respondents are primed by other political items in the questionnaire, if their discount factors correlate with personal behaviors in the expected direction, the measured discount factor is valid.

Second, I provide evidence that people's level of patience can hardly be manipulated by political factors. In previous work, I have tried to manipulate respondents' patience through nationalism and racial identity, but both treatments failed. The Taiwanese dataset shows that levels of patience did not change among partisans before and after the critical presidential turnover in 2016. These two pieces of evidence imply that people reflect their normal intertemporal choice tendencies in the political domain rather than being influenced by it.

Measuring intertemporal choice

Chapter 2 reviews the philosophical, economic, and neuro-psychological explanations of intertemporal choice. Individuals have good reasons to discount the future, but the actual discount factors differ across individuals. It is unreasonable to assume a constant discount factor (including zero) when studying human behavior and interaction. However, how do we measure both the concept of intertemporal choice and individual-level differences?

The existing literature in various disciplines suggests three categories of intertemporal choice measurement: (1) discount factor scales, (2) psychological scales, and (3) behavioral measures. This chapter will briefly review the development of these three categories. I will then justify the use of the discount factor scale to study political behaviors in this dissertation. I will also provide evidence of the stability and validity of the measures.

3.1 Discount factor scale

The discount factor scale asks respondents to compare smaller and earlier rewards against larger and later ones. The concept comes from studies of discount rates

by economists (Samuelson, 1937; Loewenstein and Elster, 1992). In economics and related fields, the discount factor is also called temporal discounting, time discounting, or a time preference.¹ With the development of survey technology and empirical analysis, researchers started to measure the discount factor at the individual level. The aim is to estimate a discount factor (two, for hyperbolic discounting) for every respondent and then use that number to predict other behaviors, such as addiction, risk driving, and impulsive consumption (Urminsky and Zauberman, 2016).

There are two major subcategories of discount factor scales: (1) choice tasks and (2) matching tasks. In Frederick, Loewenstein and O’donoghue (2002)’s comprehensive literature review, 52% of studies applied choice tasks, while 31% used matching tasks. In recent years, however, Cohen et al. (2016) found that choice tasks have dominated studies.

3.1.1 *Choice tasks*

Choice tasks ask the respondents to choose between a smaller and immediate reward, such as \$100 today, and a larger but delayed one, such as \$200 in two weeks. In some studies, this is also called a Money-Early-or-Later (MEL) experiment (Cohen et al., 2016). You cannot calculate the exact discount factor for each respondent by their responses to choice tasks; rather, you obtain an upper or lower bound based on the respondents’ answers to each item. For example, if a respondent prefers \$100 now rather than \$110 in one month, we know that the respondent’s discount factor $\delta < 0.9$. Therefore, researchers usually include several items in a choice task battery in order to identify a narrower range representing each respondent’s discount factor.

Unfortunately, but perhaps unsurprisingly, there is no consensus among researchers around how many items should be included in a choice task battery (Frederick,

¹ The major difference between the discount factor and the discounting rate, to my knowledge, is its relation to the future payoff. Specifically, if an individual discounts the future outcome with the discount factor δ , then he perceives the future outcome as $\delta \times Payoff$. In this scenario, the discounting rate refers to $1 - \delta$.

Loewenstein and O’donoghue, 2002; Hardisty et al., 2013). The most widely used battery in the fields of psychology and public health was developed by Kirby, Petry and Bickel (1999) and includes 27 items with different amounts and delays (e.g. Chabris et al., 2008; Daly, Harmon and Delaney, 2009; DeSteno et al., 2014). However, the number of choice tasks used to measure intertemporal choice ranges from one (Klochko and Ordeshook, 2005; Wang, Rieger and Hens, 2009), two (Schafer, 2016; Hill, 2016; Wang, 2018), or three (Wolfe and Patel, 2017; Stoklosa et al., 2017) to 40 (Calluso et al., 2017) or 50 (King et al., 2016). More items allow the researcher to more precisely estimate the discount factor for each respondent. Practically speaking, however, the number of items is usually decided by the characteristics of the respondents and the overall research design. In the literature, researchers tend to include more than 20 choice tasks when the respondents are undergraduate students or participants in a lab experiment. In nationally representative surveys or face-to-face fieldwork, such as when conducting choice tasks in a post-war area (Voors et al., 2012) or with busy politicians (Shefer et al., 2017), the number of items drops to less than 10.

Item ranking is another crucial issue in the design of choice tasks. Kirby, Petry and Bickel (1999) develops a 27-item design in which different amounts and delays appear randomly for each item. In many other studies, the amounts and delays are ranked from smallest to largest – \$101, \$105, \$110, and \$150. To explore the potential impact of ranking, Hardisty et al. (2013) recruited 516 online participants and randomly assigned them to answer ranked and non-ranked choice tasks. They found that intertemporal choice measured by the ranked choice task is easier to understand and is predictive of real-world behaviors such as smoking. Moreover, the ranked task is predictive of respondents’ decisions to take a real monetary reward. This is not the case for the unranked task. Additionally, respondents often provide contradictory responses in non-ranked tasks, making it impossible to narrow the range of his or her

discount factor.²

Meanwhile, ranked choice tasks may suffer from anchoring bias. A fixed delay or fixed reward may systematically impact respondents' answers (e.g. Faralla, Novarese and Ardizzone, 2017). As a result, although we can rely on a specific ranked choice task to identify future- and present-oriented subjects who took the same survey, we cannot compare discount factors measured by different ranked choice task batteries.

After I completed my data collection in late 2016, a computer-aided adaptive choice task was invented by Mahalingam et al. (2016) to solve the problems of traditional ranked tasks. When a respondent makes a choice on one choice task, the system will update the amount and the delay for the next item based accordingly. For example, if the system knows that the respondent's discount factor is below 0.8, the next item will determine whether the respondent's discount factor is below or over 0.4. If it is over 0.4, the next threshold is 0.6, and so on. As a result, the respondent will not make contradictory choices, and her discount factor can be easily located using four or five items. This method was quickly applied in many studies on intertemporal choice (e.g. Owens et al., 2017; Solway, Lohrenz and Montague, 2017). However, this method can only be applied through a computer-based survey, and the survey platform has to support such an interactive function.

3.1.2 Matching tasks

Matching tasks ask respondents to fill in a number for a given delayed period, which is comparable to the immediate reward. For example, the item might be "\$100 today = (---) in one month." In such a design, the researcher only needs one or few items to calculate the exact discount factor of the respondent. In the above case, if the respondent filled in \$110, then we know that his discount factor is about 0.9. Although the majority of discount factor scales use choice tasks, several recent studies

² I believe that the phenomenon of inconsistent responses is also important, but this problem is not within the scope of this project.

prefer matching tasks (e.g. Hoel, Schwab and Hoddinott, 2016; Bixter, Trimber and Luhmann, 2017).

Compared with choice tasks, matching tasks suffer from several weaknesses. First, respondents often have a hard time picking a number; they seem to choose a number out of thin air (Hardisty et al., 2013). These randomly generated answers are then transformed into a crazy discount factor, which is theoretically meaningless and not comparable (Frederick, Loewenstein and O'donoghue, 2002).

Second, it is harder for the respondents to type in a number rather than to clicking an option. Since the majority of online survey respondents complete questionnaires through their smartphones, they are less willing to complete one or more questions that require typing.

Third, because the respondent's discount factor can be calculated using one matching task, it is difficult to reconcile contradictory answers from different items.

3.2 Psychological scale

Since the first marshmallow test was conducted in the 1960s, the study of self-control has become one of the most important topics in psychology.³ It is amazing that a child's tendency to choose between one marshmallow now and two marshmallows after twenty minutes is predictive to his or her academic performance, income, and even career achievement decades later. Since the marshmallow tests cannot be applied to determine the level of self-control among adults, psychologists created several psychometric scales to capture people's tendency toward or ability to exercise self-control.

To my knowledge, the Self-control Scale (Rosenbaum, 1980, SCS), the Consideration of Future Consequences Scale (Strathman et al., 1994, CFC), and the Zimbardo Time Perspective Inventory (Zimbardo and Boyd, 2008, ZTPI) are the three most

³ For the history and recent development of the marshmallow test, see Mischel (2014).

commonly used scales to measure people's self-control and time preferences.

3.2.1 Self-control Scale

The SCS was developed by Rosenbaum in 1980, but many SCS users refer to work by Tangney, Baumeister and Boone (2004) in education (e.g. Ackerman et al., 2009). The SCS is a 36-item Likert scale battery in which half of the items are reverse coded. The items ask respondents about their everyday behaviors or habits, such as “1. *I am good at resisting temptation*,” “8. *Getting up in the morning is hard for me*,” and “28. *Pleasure and fun sometimes keep me from getting work done*.” The SCS is found to be predictive of academic achievement and interpersonal relations.

3.2.2 Consideration of Future Consequence Scale

The CFC was suggested by Strathman et al. (1994) based on the theory of future-self connectedness. This 12-item scale asks the respondent to think of the future and to link the future consequence of the decision that the respondent is making now. In contrast, the SCS mostly focuses on the respondent's current behaviors, some of which may implicitly cause negative outcomes in the future. For example, the second item in the CFC is “2. *Often I engage in a particular behavior in order to achieve outcomes that may not result for many years*,” and the tenth item is “10. *I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time*.” The CFC scale has been found to relate to attitudes toward climate change (Corral-Verdugo et al., 2017), environmental protection (Khachatryan, Joireman and Casavant, 2011), academic performance (Joireman, 1999), alcohol use, smoking, and health concern (Strathman et al., 1994; Daugherty and Brase, 2010).

Even though Strathman and colleagues show that the CFC scale and the SCS are positively correlated, CFC is closer to the idea of intertemporal choice with which this dissertation is most concerned. The idea of intertemporal choice is to capture how people discount future outcomes against immediate ones. Therefore, the payoff

of the future outcome must be both clear enough and determined by the respondent's current behavior. If the respondent chooses the immediate reward, the delayed but larger one will disappear, and vice versa. Therefore, the CFC scale is better at capturing the trade-off calculations made in intertemporal choices.

3.2.3 *Zimbardo Time Perspective Inventory*

The ZTPI was developed by Zimbardo in 1990 and then extended to six aspects of time perspective (Zimbardo, Keough and Boyd, 1997; Zimbardo and Boyd, 2008). The complete scale includes 56 items. The items can then be classified into six categories: past-negative, past-positive, present-hedonistic, present-fatalistic, future, and transcendental-future. The items are similar to both the SCS and the CFC scale; they ask about respondents' habits and behaviors at different time points. For example, Q6 in the future category is "*I believe that a person's day should be planned ahead each morning,*" Q2 in the past-positive category is "*Familiar childhood sights, sounds, and smells often bring back a flood of wonderful memories,*" and Q17 in the present-hedonistic category says "*I try to live my life as fully as possible, one day at a time.*"

One of Zimbardo's major contributions was to point out that people treat the past, present, and future differently. In his eye, a single discount factor δ might be insufficient to capture how people think of time. For example, Zimbardo and Boyd (2008) show that Christians and Protestants care more about the future dimension, while Buddhists emphasize the past or memory. The ZTPI is also predictive of attitudes toward health (Zimbardo and Boyd, 2008; Daugherty and Brase, 2010), risky driving (Zimbardo, Keough and Boyd, 1997), drug use, and drinking (Keough, Zimbardo and Boyd, 1999).

3.3 Behavioral measures

Apart from pencil-and-paper questionnaires, researchers use several behavioral measures to study intertemporal choice and self-control. The marshmallow test is the leading example. In some cases, the respondents' behaviors are recorded and transformed into a measure of self-control. In other cases, the respondents are randomly assigned to treatments that are assumed to influence their level of self-control.

For example, respondents are usually assigned to complete an unsolvable math task (Baumeister, Vohs and Tice, 2007). The length of time for which the respondent sticks to the task is assumed to indicate her capacity for patience. Other examples include performance on a remote association test, (VanDellen and Hoyle, 2010; VanDellen, Hoyle and Miller, 2012), cheating (Hershfield, Cohen and Thompson, 2012), preferences over unsafe sex, and consuming junk food (Hofmann et al., 2008).

There are three major differences between behavioral measures and pencil-and-paper tasks. First, in the terms of VanDellen, Hoyle and Miller (2012), behavioral measures and treatments tend to estimate or influence the state of self-control rather than the trait. In other words, the time spent solving an unsolvable math task may represent the respondent's capability for intertemporal choice at that moment but not his tendency in everyday life.

Second, behavioral measures usually make some assumptions about the treatments or the measures. Researchers assume that those who consume more junk food care less about their long-term health. They assume the respondents with lower BMI values are healthier. They also assume that all respondents hate raw carrots. These assumptions may be problematic if they are correlated with the hypotheses being examined in the experimental design.

Finally, behavioral measures are difficult to apply in online survey platforms or in representative face-to-face surveys, which limits their generalizability. After all, it

would be weird to put a cup of M&Ms or a scoop of ice cream in the voting booth.

3.4 Why do I choose a ranked choice task?

So far, I have spent more than eight pages reviewing measures of intertemporal choice. Intertemporal choice is an interesting and important topic, so researchers in different disciplines have created numerous measures to capture and explain this tendency. Of the existing measures, I believe that ranked choice tasks are the most appropriate for political behaviorists to use to examine the relationship between intertemporal choice and political participation for two major reasons.

First, choice tasks have been shown to have good internal and external validity. This is the most widely used design in the discount factor category (Frederick, Loewenstein and O'donoghue, 2002; Cohen et al., 2016). The resulting measures are stable for individuals within three-month, one-year, and even three-year periods (Kirby, 2009; Urminsky and Zauberman, 2016; Martínez-Loredo et al., 2017). The values are also significantly correlated with the SCS and the CFC scale (Daly, Harmon and Delaney, 2009; Vischer et al., 2013). As previously mentioned, choice tasks are found to be predictive of a range of personal behaviors (Reimers et al., 2009).

Second, within the choice task category, ranked choice tasks provide the most flexibility in applying an intertemporal choice measure to a conventional political science questionnaire. At the beginning of this dissertation, I suggest that intertemporal choice can help us understand each stage of political participation from attitude formation, vote choice, and turnout to protest. To pursue both generalizability and validity, like most political scientists, representative surveys were used in the United States, Taiwan, and Ukraine, three democracies with different levels of development and cultures. Therefore, the number of items used to measure intertemporal choice cannot be too large, nor the items too complicated, which rules out most psychological scales and behavioral measures.

Moreover, unranked choice tasks and adaptive designs are not compatible with a conventional survey design. Ranked choice tasks are easier to understand and predictive of addictive behaviors (Hardisty et al., 2013). Therefore, a ranked choice task is the most appropriate tool with which to capture voters' time preferences at the current stage.

In using ranked choice tasks, I have made some assumptions and noted their limitations. I assume that a respondent's answer on this task reflects her tendency toward temporal discounting in both personal and political affairs. This assumption might not hold. It is possible that an individual is farsighted on political issues and on the future of her country while being myopic regarding her personal payoff. I will discuss this possibility further in Chapter 9 (especially in the section titled Social Discounting Rate). Recall that ranked choice tasks may suffer from anchoring bias. Even though I can use the scale to identify patient and non-patient respondents in the same dataset, cross-dataset comparisons may be improper.

3.5 Three datasets and their ranked choice tasks

In this dissertation, I will use three major datasets to examine the relation between intertemporal choice and political participation: (1) the 2014 Cooperative Congressional Election Study in the United States (*CCES2014*), (2) the 2016 Pollcracylab survey in Taiwan (*Taiwan2016*), and (3) the 2007 Ukrainian Longitudinal Monitoring Survey (*Ukraine2007*). Each of these three datasets includes ranked choice task items to measure the level of patience among the citizens of each country. However, the number of items varies in each dataset.⁴

In this section, I will briefly discuss the intertemporal choice measures included in the three datasets that I will use in this dissertation. Moreover, I will examine the external validity of these three measures, that is, whether the three measures

⁴ The three datasets and the code used in the analysis will be available on my research website: <http://sites.duke.edu/austinwang/>.

are correlated with some theoretically and empirically driven covariates. If they correlate with other relevant variables in the expected direction, we can be more confident that these three measures are at least as reasonable as other scales used in the literature. We further assume that people’s level of patience will spillover across domains, including personal and public affairs.

3.5.1 *CCES2014 (used in Chapters 4, 5, and 6)*

To my knowledge, *CCES2014* is the first representative survey of the United States that includes a precise measure of the respondent’s discount factor and political participation in the same questionnaire. When I submitted my proposal to add an intertemporal choice measure to the *CCES2014*, I followed the design of Fowler and Kam (2006), which was a 12-item non-ranked choice task. However, the cost of representativeness was high adding one item to the *CCES2014* cost about \$500 for 1000 nationally representative samples. Owing to budget constraints, two items were included in the finalized module. Coincidentally, I two other researchers also proposed the inclusion of intertemporal choice items in the *CCES2014*, and both of them proposed two-item ranked choice designs (Schafer, 2016; Hill, 2016). Although their modules have been unavailable to me, our similar approaches provide some shared confidence.

In this module, sponsored by Duke University (DKA), 1000 respondents were asked about their level of patience via these two items: Imagine you will receive a certain amount of money. Which of the following do you prefer? (A) To gain \$10 today (B) To gain \$20 six months later and (A) To gain \$1000 today (B) To gain \$2000 a year later. Table 3.1 shows a descriptive analysis of the *CCES2014* data.

In this dissertation, I simply assume that U.S. respondents who chose the immediate but smaller rewards on both items are impatient and that those who choose both delayed and larger rewards are patient. In the *CCES2014*, 393 (39.3%) respon-

Table 3.1: Descriptive Analysis of the *CCES2014*

Variable	N	Mean	St. Dev.	Min	Max
Supporting Welfare	1,000	-0.227	1.080	-2	2
Level of Patience	946	0.490	0.451	0.000	1.000
Family Income	890	6.096	3.166	1	12
Age	1,000	49.034	16.429	18	95
Male	1,000	0.458	0.498	0	1
Edu	1,000	3.686	1.453	1	6
Black	1,000	0.135	0.342	0	1
PID (Rep. = -3)	789	0.247	2.209	-3	3
Ideology (Lib. = 1)	996	4.161	1.731	1	7
Religion (1 = Catholic)	1,000	0.620	0.486	0	1

dents are coded as impatient and 375 (37.5%) as patient. This distribution suggests enough variance for analysis, and people are not choosing at random.⁵ Measuring intertemporal choice using two or fewer items is not uncommon, albeit not perfect (e.g., Klochko and Ordeshook, 2005; Reimers et al., 2009; Wang, Rieger and Hens, 2009; Hoel, Schwab and Hoddinott, 2016).

Table 3.2 shows the relationships among the important variables that will be further analyzed in Chapter 4 and Chapter 5. In the *CCES2014*, consistent with previous studies, being patient positively correlates with educational level (Duckworth and Seligman, 2005) ($r = 0.28, p < 0.01$), family income (Harrison, Lau and Williams, 2002) ($r = 0.28, p < 0.01$), and regulating CO2 emissions (Dietz, Dan and Shwom, 2007; Bolsen, Reifler and Shapiro, 2014; Corral-Verdugo et al., 2017) ($r = 0.07, p = 0.05$). The correlations above suggest that a certain level of external validity is achieved when measuring individual patience using two items.

⁵ It is also possible to calculate the discount rate range based on the two items. A total of 54 (5.4%) respondents chose a delayed reward in the first item (with a smaller reward) but an immediate one in the second item (with a larger reward), and 178 (17.8%) made the opposite choices. The main results and conclusions do not change with different coding.

Table 3.2: Correlation Table of *CCEs2014*

	Redis.	P.	Inc.	Age	Male	Edu	Black	PID	Ideo.
Patience	-0.07*								
Income	-0.19*	0.26*							
Age	-0.13*	0.02	0.05						
Male	-0.07*	0.13*	0.16*	0.14*					
Edu	-0.04	0.25*	0.36*	-0.02	0.08*				
Black	0.14*	-0.16*	-0.04	-0.08*	-0.12*	0.02			
PID	0.42*	-0.07	-0.10*	-0.13*	-0.13*	-0.01	0.26*		
Ideology	-0.40*	-0.05	0.05	0.16*	0.10*	-0.06	-0.09*	-0.70*	
Religion	-0.15*	-0.09*	0.10*	0.23*	0.00	0.03	0.04	-0.25*	0.31*

Note: *p<0.05

3.5.2 *Taiwan2016* (used in Chapter 4)

The Taiwanese subjects used in this dataset were recruited through Pollcracylab web services.⁶ The most distinctive characteristic of Pollcracylab is that its sampling frame is based on the official household registration records of Taiwanese citizens.⁷ Subjects were randomly sampled from the official household registration records, and they were invited by Pollcracylab to register through mailers and phone calls.

In this project, 500 subjects were randomly invited by email to participate in an online survey. Participants earned convenience store gift cards of NTD \$50 (equal to USD \$1.5). Compared to other experimental studies or opt-in surveys, the advantage of Pollcracylab is its probability sampling of the national population, which means that every Taiwanese citizen has a non-zero probability of being chosen. This method also boosts subject diversity. To enhance Taiwanese subjects' willingness to participate in the survey, *Taiwan2016* was conducted over January 10-11, 2016, which was one week before the 2016 Presidential Election. A descriptive analysis of the *Taiwan2016* data is presented in Table 3.3.

⁶ <http://pollcracylab.com/>.

⁷ Pollcracylab was established by National Chengchi University in Taiwan, and official records can only be used for research and academic proposes.

In the *Taiwan2016* data, each subject’s level of patience was measured by two items (in Chinese): Imagine that you will receive a certain amount of money. Which of the following do you prefer? (A) To gain \$300 today or (B) To gain \$450 in six months and (A) To gain \$500 in three months or (B) To gain \$800 in six months. Following the same coding method used in the previous section, I assume that those who choose the immediate but smaller reward on both items are impatient and that those who choose both delayed and larger rewards are patient. Among the 503 respondents, 114 (22.4%) are coded as impatient and 293 (57.6%) as patient.

Table 3.3: Descriptive Analysis of *Taiwan2016*

Statistic	N	Mean	St. Dev.	Min	Max
Individual Patience	503	0.678	0.413	0.000	1.000
Family Income	509	3.299	1.005	1	5
Age (1=20-29,5=60 up)	508	2.697	1.149	1	5
Male	509	0.585	0.493	0	1
Edu	509	4.538	0.727	2	5
Race (Mainlander = 1)	509	0.173	0.379	0	1
PID (Pan-blue camp = 1)	509	0.322	0.468	0	1

The correlations between the measure of intertemporal choice and other important variables in the *Taiwan2016* survey can be found in Table 3.4. Once again, patience is weakly correlated with household income ($r = 0.10, p = 0.025$); its relation to education level is in the expected direction, albeit not significant ($r = 0.04, p = 0.404$). There is no item related to climate change in the *Taiwan2016* survey. Fortunately, one item measuring self-control is included: “Immediate pleasure is much more important than the future outcome.” Patience is negatively correlated with this self-control item ($r = 0.149, p < 0.001$), even though the correlation is not strong. Therefore, the reliability of this two-item measure in *Taiwan2016* mostly holds.

Table 3.4: Correlation Table of Taiwan2016

	Redis.	P	Inc.	Age	Male	Edu	Race
Patience	0.03						
Income	-0.12*	0.10*					
Age	-0.11*	-0.08	0.05				
Male	-0.01	0.14*	0.06	0.13*			
Edu	0.03	0.04	0.15*	-0.24*	-0.01		
Race	-0.03	-0.05	-0.02	0.20*	-0.04	-0.01	
PID	-0.04	-0.06	-0.15*	0.24*	0.03	-0.87*	0.02
<i>Note:</i>							*p<0.05

3.5.3 Ukraine2007 (used in Chapters 5 and 7)

The Ukrainian data come from the Ukrainian Longitudinal Monitoring Survey (ULMS) (Lehmann, Muravyev and Zimmermann, 2012), a face-to-face interview conducted by the Institute for the Study of Labor, IZA (Forschungsinstitut zur Zukunft der Arbeit)⁸. The survey population is the working-age population in Ukraine, that is, 15-72 years inclusive. The three waves of the ULMS were conducted in 2003, 2004, and 2007. In this dissertation, the 2007 individual-level survey ($n = 6774$) was analyzed because it includes a measure of patience and the level of participation in the Orange Revolution, which will be discussed further in Chapters 5 and 7. The survey was conducted from March to December 2007.

An individual's level of patience is measured in the *Ukraine2007* survey by a five-item ranked choice battery. The subject was first asked, “*Imagine that you were offered 1000 Hryvnias today or 1200 Hryvnias in a year from now. What would you prefer?*” (translated by IZA). As background, \$1000 Hryvnias was about USD \$186.1 in 2004. If the subject chose the later but larger option, this battery ended. If the subject chose the smaller but immediate one, he or she was then asked to choose between 1000 and 1400, then 1600, 1800, and 2000. The description is similar to those used in the *CCES2014* and *Taiwan2016* surveys.

⁸ <https://idsc.iza.org/?page=27&id=56>, Access: 06 August 2016

Subjects' responses were then transformed into individuals' patience values following previous studies. If the subject chose 1200 over 1000 for the first item, his or her level of patience is $\frac{1+\frac{1000}{1200}}{2} = 0.917$, which is the mean value of the possible discount factor range based on the responses. Similarly, if the subject chose 1000 over 1200 in the first item but 1400 over 1000 in the second, then his or her patience is $\frac{\frac{1000}{1200}+\frac{1000}{1400}}{2} = 0.773$, and so on. If the subject chose 1000 on all five items, then his or her patience is assumed to be $\frac{\frac{1000}{2000}+0}{2} = 0.25$.

A descriptive analysis of the *Ukraine2007* data can be found in Table 3.5.

Table 3.5: Descriptive statistics of Ukraine2007

Statistic	N	Mean	St. Dev.	Min	Max
Level of Patience	6167	0.391	0.229	0.250	0.917
Joined Orange Revolution	6774	0.060	0.237	0	1
Self-identified Ukrainian	6774	0.813	0.390	0	1
Preferred EU integration	6774	-0.363	1.416	-2	2
Age	6774	43.874	16.993	15	73
Female	6774	0.572	0.495	0	1
Level of Education	6758	9.671	1.306	0	12

Figure 3.1 shows the distribution of individual patience in the *Ukraine2007* data. Compared to the *CCES2014* and *Taiwan2016* data, the percentage of myopic respondents in Ukraine is relatively high – 69.6% of respondents chose the small-but-near option across the battery. In the United States and Taiwan, 39.3% and 22.4% of respondents are myopic, respectively. Fortunately, this distribution provides enough variance over which to analyze the relationship between individual patience and the decision to join the protest. Pearson's r also shows that an individual level of patience in *Ukraine2007* is negatively correlated with the respondent's BMI ($r = -0.08, p < 0.001$) and positively correlated with support for environmental protection ($r = 0.05, p < 0.001$), findings that are consistent with previous studies linking

patience and personal behaviors.

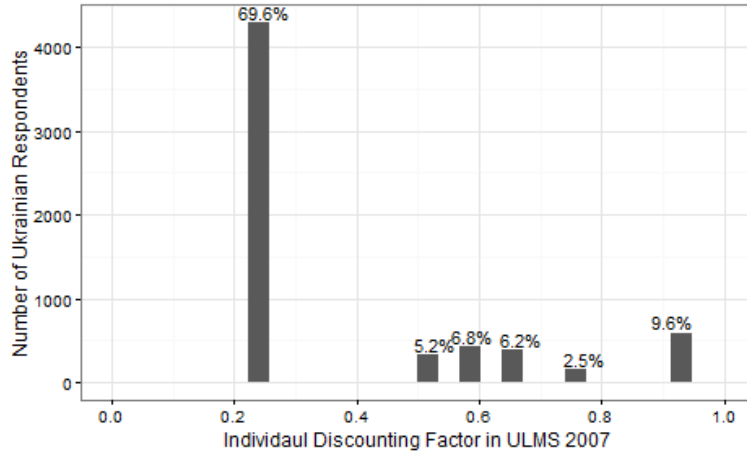


FIGURE 3.1: Distribution of individual's patience in *Ukraine2007*

3.6 How stable are people's discounting factors during changing politics?

In the previous section, I show that the intertemporal choice measures that I will use for analysis – *CCES2014*, *Taiwan2016*, and *Ukraine2007* – are correlated with other behavioral or demographic variables in the expected direction. Even though the ranked choice tasks in these surveys only include two to five items, this approach is neither uncommon nor unreliable.

However, we cannot use the intertemporal choice measures to explore their relations to political behavior without further validation. Specifically, *CCES2014*, *Taiwan2016*, and *Ukraine2007* are cross-sectional data. Even though previous studies show that an individual's level of patience (or the trait of self-control) is quite stable over time, other studies reveal that some extreme scenarios, such as natural disasters or civil war, may impact people's level of patience. Hence, if major political episodes shape people's level of patience, we may treat patience as a dependent variable rather than an unmoved mover that shapes other political behaviors.

How stable are people's discount factors in a changing political context? To

confirm that levels of patience are indeed unmoved movers for explaining political behaviors, I will provide two pieces of evidence in this section for (1) the 2016 Taiwanese presidential turnover and from an attempt to (2) frame national identity and linked fate in MTurk.

3.6.1 Study 1: Presidential turnover does not influence the discounting factor

Study 1 exploits two valuable datasets from Taiwan and its third presidential turnover in 2016. Taiwan is an autonomous region that has been claimed as a province of China since 1949. With the demise of the former authoritarian government, which claimed to represent the whole of China, Taiwan began to democratize and to search for a Taiwanese identity in 1987 (Chu and Lin, 2001; Dittmer, 2004; Wang, 2017b). Since democratization, Taiwan had experienced five presidential elections and three peaceful turnovers. To squash the emerging Taiwanese independence movement, the PRC government has implemented both carrot and stick policies, also called *liang-shou celue* (Niou, 2008). The stick is military threat, including the 2005 Martial Anti-Secession Law, and the carrot is favorable economic policies, which reached their highest point when China and Taiwan signed the 2010 Economic Cooperation Framework Agreement (ECFA). In such a unique political context, the unification-independence issue dominates all elections in Taiwan, and the majority of Taiwanese voters fully understand how presidents from opposite party might lead cross-strait relations (Achen and Wang, 2017). If a changing political context temporarily influences patience, its effect should be quickly revealed in the case of Taiwan.

The Taiwanese data come from the Taiwan National Security Survey (TNSS), a representative phone survey conducted by National Chengchi University in Taiwan and sponsored by the Program in Asian Security Studies at Duke University.⁹ TNSS respondents are randomly sampled from the official household registration records of

⁹ <https://sites.duke.edu/pass/data/>.

Taiwan (with household selection), which ensures representativeness and credibility.¹⁰

In Study 1, TNSS2015 ($n = 1071$, undertaken Oct.27–Nov.03, 2015) and TNSS2016 ($n = 1069$, carried out Nov.18–22, 2016) are analyzed. In January 2016, the third presidential turnover occurred in Taiwan. The Democratic Progressive Party (DPP) candidate, Tsai Ing-wen, defeated Kuomintang (the Nationalist Party, KMT) candidate Eric Chu. Since the unification-independence issue is the main political cleavage dividing Taiwanese society and is represented by the positions of the two largest parties, the KMT and the DPP, it is possible that people’s level of patience, especially among partisans, is conditioned by the party of the president, who also serves as the commander-in-chief in Taiwan.

Individual levels of patience were measured in both the TNSS2015 and TNSS2016 waves by one choice task item: Imagine that you were offered \$300 NTD today or \$450 NTD six months from now. What would you prefer?¹¹ If people indeed changed their levels of patience after the presidential election, it should be reflected in the proportion of respondents choosing the delayed but larger reward.

However, there is no evidence that Taiwanese people changed their discount factors after the turnover. In TNSS2015, 45.8% of respondents chose the delayed but larger option, while 44.7% did so in TNSS 2016. A Chi-squared test shows that the difference between these surveys is not significant ($p = 0.76$). Among DPP supporters, 43.8% and 43.8% chose the patient option in 2015 and 2016, respectively. Among KMT supporters, 45.2% and 40.8% chose the patient option in 2015 and 2016, respectively, but the difference is not statistically significant ($Chi^2 = 2.178, p = 0.14$). Among non-partisan voters, 42.1% and 46.8% chose the patient option in 2015 and 2016, respectively ($p = 0.17$). There are also no significant differences or trends among KMP, DPP, and non-partisan voters each year; Chi-square tests show that $p = 0.765$

¹⁰ Official household registration records are provided by the government for research proposes only.

¹¹ \$300 NTD was about \$9.45 USD in December 2016.

and $p = 0.117$ in 2015 and 2016, respectively.

In short, there is no evidence that presidential turnover in an extremely polarized political environment will alter voter's discount factors, at least at the group level.

3.6.2 *Study 2: Framing national identity and linked fate do not influence the discounting factor*

In the political context of the United States, American patriotism or national identity is believed to promote political participation (Huddy and Khatib, 2007). National identity is also a highly debated political issue in Taiwan and Ukraine. If a change in national identity during an election campaign influences people's level of patience, it may confound our examination of the relation between intertemporal choice and political participation.

To test for this possibility, Study 2 recruited 150 MTurk subjects on November 20, 2015, and May 7, 2016.¹² They were invited to take a survey titled "Survey of Public Opinion and Political Participation." At the beginning of the survey, subjects were asked to report on their daily political behaviors, such as news consumption, political discussions, and political interests. Then, they were asked to complete a battery of questions related to preferences over presidential candidates, which was not related to Study 2.

The subjects were then randomly assigned into three groups. In the *Nationalism* group, subjects were asked to answer a four-item battery regarding national identity (Huddy and Khatib, 2007) containing questions such as "How important is being American to you?" In the *Linkedfate* group, subjects were asked to answer a two-item battery regarding their linked fate to other Americans; for example, "Does what generally happens to other Americans in this country have something to do with your life?" In the *Control* group, subjects did not answer any further questions.

¹² Study 2 was sponsored by Professor Emerson Niu's research fund on strategic voting. Duke IRB 0246.

After these treatments, all MTurk subjects completed a five-item battery of ranked choice tasks, as shown below. Their discount factors were then calculated similarly to the function used in the *Ukarine2007* survey. Finally, all subjects were asked about their demographic backgrounds.

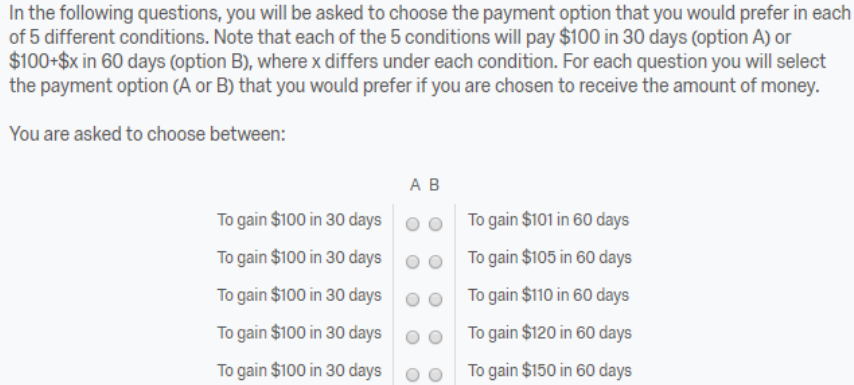


FIGURE 3.2: The Five-item ranked Choice task used in Study 2

The distribution of discount factors in the three groups is shown in Figure 3.3. In this figure, the Y-axis indicates the discount factor, while the error bars indicate 95% confidence intervals. This figure shows that the assignments did not influence MTurkers’ discount factors. Even when asked to consider their national identity or linked fate with other Americans, levels of patience, as measured by the five-item ranked choice task, remain indistinguishable from those in the control group. An ANOVA shows no significant differences in the mean values of the three groups ($F = 0.392, p = 0.676$).

However, it is possible that the “content” of nationalism or linked fate matters. Perhaps the items make some patriots more patient while making others lukewarm. To test for this possibility, I separated the subjects in the two treatment groups based on their answers. In the *Nationalism* group, 26 of 48 subjects reported high levels of national identity (which averaged value > 3 on a 1 to 5 scale.), while in the *LinkedFate* group 22 of 49 subjects reported a high level of linked fate to other

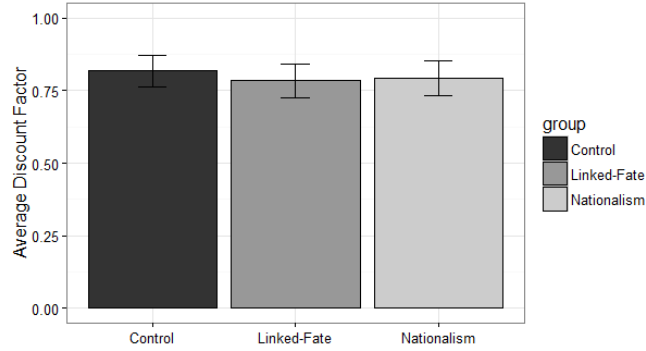


FIGURE 3.3: MTurkers' Level of Discounting Factor among groups in Study 2

Americans. Figure 3.4 shows the discount factors for the control group and for the high/low nationalism/linked fate groups. Even though the treatment framed MTurkers' national identity or linked destiny with others, it fails to change people's levels of patience, at least in this study. An ANOVA shows no significant differences in the mean values among all five groups ($F = 0.798, p = 0.529$), and no single group is distinguishable from the control group.

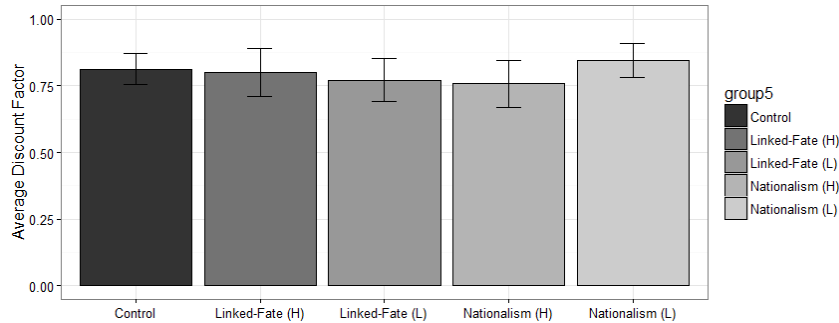


FIGURE 3.4: MTurkers' Level of Discounting Factor among High/Low Nationalism/Linked-fate Group in Study 2

3.7 Conclusion

In this chapter, I spent more than twenty pages explaining why and how I chose to use ranked choice tasks to measure intertemporal choice. The three representative datasets I analyze in this dissertation – *CCES2014*, *Taiwan2016*, and *Ukraine2007*

– two- and five-item ranked choice tasks were designed to capture citizens’ level of patience in these three different countries. Even though the number of items is small, with different rewards and delay periods, they all correlate with theoretically driven variables in the expected direction. Additionally, previous studies have suggested the robustness and reliability of this measure. Moreover, I provide two studies to show that people’s level of patience, as captured by the ranked choice task, cannot be altered even by crucial political episodes such as presidential turnover or by nationalism.

Taken together, this evidence suggests that intertemporal choice, as measured by ranked choice tasks, may be considered a trait-like unmoved mover, which can be further used to explain political participation. In Chapter 4, I will show how discounting the future can help us understand individual’s political behaviors as well as this political world.

Patience moderates the class cleavage in demand for redistribution

4.1 Introduction

When the idea of democracy first entered into human civilization, Aristotle explicitly warned in *Politics* that “...*Democracy is for the benefit of the poor...If justice is what the numerical majority decide, they will commit injustice by confiscating the property of the wealthy few.*”¹ Over two thousand years, the democratic system was gradually established in most Western countries and spread worldwide. Karl Marx, in his *Communist Manifesto*, predicted future class conflict between the haves and the have-nots: “...*Society as a whole is more and more splitting up into two great hostile camps, into two great classes directly facing each other: Bourgeoisie and Proletariat.*”

Given these deterministic predictions, however, empirical studies linking class and redistribution yield mixed results (e.g., Hochschild, 1981; Ladd and Bowman, 1998; Alesina and Giuliano, 2011). The poor do not always support the idea of redistribution, while a considerable proportion of the rich is willing to be taxed for

¹ The early version of this chapter is already published in *Social Science Research* in 2017. This chapter includes the mathematical model and simulation in 4.2. See (Wang, 2018)

the poor. Why are some people not motivated by self-interest, as is assumed in the Meltzer-Richard model?

Many studies try to explain this irrational phenomenon by drawing on religion (Stegmuller, 2013), social mobility (Benabou and Ok, 2001), and education (Alesina and Giuliano, 2011). However, the psychological mechanisms behind religion and education are not explicitly illustrated, and cross-national analyses yield inconsistent results (Alesina and Giuliano, 2011). Although the widely cited *prospect of upward mobility* theory (POUM hereafter) suggested by Benabou and Ok helps explain the influence of the American Dream on the poor, what about the rich? Why do rich people in the U.S. worry more about inequality (Alesina, Di Tella and MacCulloch, 2004)? Why do the rich show relatively high support for redistribution in states with higher inequality (Dimick, Rueda and Stegumeller, 2014)? Why did wealthy people support Barack Obama and his idea of redistribution during and after the 2008 presidential election (Page and Jacobs, 2009)? Are people really economic irrational?

Regarding “rationality”, the ultimate goal for *Homo economicus* is to maximize his utility across the lifespan. However, by nature, people tend to assign different weights to immediate and distant outcomes. While some rich people focus on immediate tax cuts and reductions in social welfare, others emphasize the risk of layoffs or of another financial crisis, possibly in the next ten years. While some poor people expect rising unemployment compensation and redistributive tax return, some other poor people believe in the American Dream and do not want high tax rate if they expected to become rich in the future. When people discount the future differently, even if they face the same level of risk and uncertainty over the lifespan, they will obtain different accumulated utilities and therefore have different policy preferences.

This chapter argues that *individual patience* is the key determinant of redistributive preference; specifically, patience can help explain preference heterogeneity within each class. How does patience moderate the impact of class on redistributive prefer-

ence? We first assume that there are two classes, the rich and the poor, in a democracy with some level of social mobility and a moderate ratio of rich to poor individuals. This does not mean that the level of inequality will not increase but that there are many people in each class, and everyone enjoys a considerable probability of class mobility in the future. When everyone is myopic and only cares about the immediate outcome, redistributive policy is a single-shot zero-sum game between the two classes - the poor rationally support redistribution, while the rich oppose the policy.

When the game is extended to a repeated one, the patient poor see the possibility of joining the upper class, while the patient rich are aware of the chance of falling into the lower class in the future. Empirical analyses suggest that people in the higher class are much more likely to suffer from downward mobility, while those in the lower class are much more likely to experience upward mobility (e.g., Smith, 1994; Hertz, 2006).

Meanwhile, among the impatient rich and poor, preferences remain unchanged, since they still focus on immediate gains and losses. Patient poor and rich are behind a *partial veil of ignorance*: they know the social structure and where they are currently located, but they are not sure where they will be in the next round and beyond. People pay taxes and receive welfare benefits every year, so people should not treat redistribution policy as a one-shot game. Thus, differing levels of patience among the members of each group may cause the observed lack of class consensus. The individual members of each class still behave rationally, but they differ in patience and thus have different lifetime utility maximization calculations.

Figure 4.1 summarizes the main hypothesis of this chapter: patience (represented by δ in the figure) moderates the class cleavage in the demand for redistribution. When everyone in society emphasizes immediate reward and punishment, the class cleavage will widen. In this scenario, politicians can exploit the class cleavage and mobilize class conflict. In a patient society, people's time horizons are extended, and

the gap in support for redistribution between the rich and the poor is narrower.

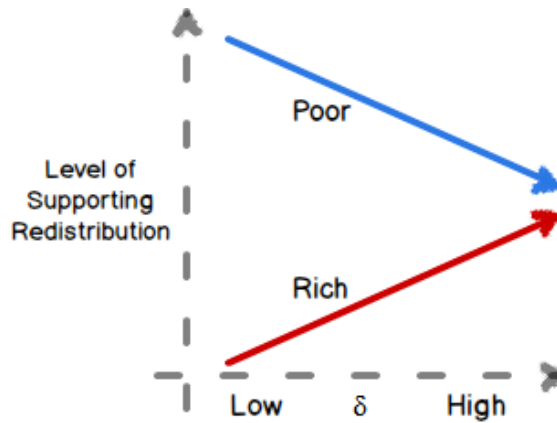


FIGURE 4.1: Intertemporal Choice, Redistribution, and Class Cleavage – Theoretical Framework

My argument is distinct from those in previous studies of the POUM hypothesis and risk perception, which predict convergence in the preferences of people with different incomes. On the one hand, Benabou and Ok (2001) provide a mathematical framework to illustrate why poor people may rationally expect to be richer than average in the distant future. However, they do not provide an explanation for the preferences of rich people. Nor do they discuss why the rich do not have homogeneous preferences.²

On the other hand, Iversen and Soskice (2001) suggest that people who make risky investments in specific skills will require insurance to protect them from future losses owing to unemployment. In their model (see their Fig. 2), people with higher incomes are generally less likely to support redistribution, but the level of skill specificity will increase everyone’s demand for redistribution. In other words, if the fear of future losses dominates calculations of redistributive preference, then *both* patient rich and patient poor voters would support redistribution more than their impatient

² Interestingly, Benabou and Ok (2001) also discuss the role of discount factor. On p.478, they argue that the POUM may not have a political impact unless *voters have very low discount rates*. This chapter can also serve to test this argument.

counterparts. Compared with the POUM and risk perception model, the convergence pattern suggested in this chapter and Figure 4.1 may better explain the decline of class voting observed in many countries (e.g., Clark and Lipset, 1991; Van der Waal, Achterberg and Houtman, 2007; Evans and Tilley, 2012).

This chapter also differs from previous studies of POUM and risk perception in the assumptions made about social structure. POUM research focuses on the chance that poor people can move upward in the future, while the risk perception model assumes that everyone can experience unemployment. However, empirical studies suggest that people in different income groups face different chances of upward and downward mobility. To illustrate, Hertz (2006) analyzes the Panel Study of Income Dynamics (PSID) from 1968 to 2001 to show that for those in the top 5% of the household income distribution in 1967, only 21.7% remained in the top 5% in 2000. Among those who were in the second quintile and earned \$29900 to \$42000 in 1967, 22.6% had moved down to the first quintile; meanwhile, 51.6% had moved up. In contrast, among those who were in the fourth quintile and earned \$54301 to \$72300 in 1967, only 24% had moved to the fifth quintile, but 50.8% had moved down by 2000. Similar asymmetric upward and downward mobility between the rich and the poor is observed in a previous study using the PSID data (Smith, 1994), another representative survey of U.S. citizens (Johnson and Reed, 1996), and survey data from Mexico (Parrado, 2005) and rural China (Shi, Nuetah and Xin, 2010). Since rich people are much more likely to move downward while poor people move upward over the long term, higher levels of patience may change their calculations of accumulated lifetime utility.

I fully agree with the argument that people who believe in upward mobility tend to oppose redistribution, and those who have higher risk perceptions tend to support it (e.g., Guillaud, 2013). My contribution to the existing studies is that since members of different classes face different chances of upward and downward mobility,

patience helps explain preference diversity within each class, as well as convergence in redistributive attitudes between the patient members of each class.

The remainder of this chapter is organized as follows. In Section 4.2, a model linking patience and redistributive preference among the rich and the poor will be provided. Simulation result will help illustrate how the level of individual patience influences voter's preference on redistribution in the multiple-shot game. Section 4.3 presents the individual-level empirical examination using *CCES2014*. To address potential threats to external validity and question wording, *Taiwan2016* is analyzed in Section 4.4. Both sets of results are highly consistent. Finally, Section 4.5 concludes and discusses the possible linkage of the findings with religion, levels of inequality, and macro-level political cleavages.

4.2 Model of patience and redistributive preference

Assuming there are two types of citizens in a specific society, the rich class and the poor class. Each citizen is either rich or poor, and the proportion of rich people in this society is W , $0 < W < \frac{1}{2}$, indicating there are more poor people than the rich. In each round of the game, a certain amount of citizen P , $P \leq W$, will switch their type - $\frac{P}{W}$ of rich will become poor, while $\frac{P}{1-W}$ of poor will join the rich. P captures the consideration of social mobility. Meanwhile I assume the social structure - the fraction between rich and poor - will hold constant.

The total wealth generated by the society in each round is 1. When there is no redistribution, rich people evenly acquire the whole wealth 1, so each rich individual will gain $\frac{1}{W}$. Each poor individual will then gain 0. Rich citizen would receive more wealth than the poor in each round. In the first round of the game, they will hold a referendum whether to implement the redistribution policy. If the referendum is passed, all of the citizens will receive $\frac{1}{W+1-W} = 1$ in every round. Moreover, since people's perception toward reward is closer to the law Of diminishing marginal utility,

I assume that people's utility for the reward follows a concave function $f(\frac{1}{W})$. For simplification, I assume that the concave function can be represented as the square root of received reward, $f(\frac{1}{W}) = \frac{1}{\sqrt{W}}$.

In the end, the main explanatory variable in this chapter, individuals' level of patience, is defined as $\delta, 0 \leq \delta \leq 1$. An individual will discount the outcome in the next round by the factor δ . In this model, people did not vote behind *the veil of ignorance* (Rawls, 1999). Every citizen knows that he is in the upper or lower class in the first round, and their decision on redistribution policy is decided by how much weight they would like to put on the possible social mobility in the future.

4.2.1 One-shot game as pure class conflict

When everyone in this society has an extremely small discount factor $\delta = 0$, they only care what they will receive immediately in the first round. Since the rich expects to gain $f(\frac{1}{W}) \geq f(\frac{1}{\max(W)}) = \frac{1}{\sqrt{2}} = \sqrt{2} > 1$, they will always oppose redistribution. In contrast, the poor will receive $0 < 1$, so the poor will ultimately support redistribution in this one-shot game. When everyone only cares what they will immediately receive and ignore the potential future mobility, redistribution is a pure class conflict between the rich and the poor. Since the poor outnumber the rich ($W < \frac{1}{2}$), a redistribution referendum will be passed.

4.2.2 Two-shot game and social mobility

Assuming everyone will gain the wealth in two rounds. When $\delta = 0$, everyone will still behave the same as in the one-shot game. However, when $\delta > 0$, the rich and the poor start putting more weight on what would happen in the second round. Especially, there is a chance that the rich people would fall into poverty, while the poor may join the upper class.

When there is redistribution, the expected utility for everyone in the first round is $1 + \delta\sqrt{1} = 1 + \delta$. Without redistribution, however, the rich expects to gain $\frac{1}{\sqrt{W}} + \delta((1 -$

$\frac{P}{W})\frac{1}{\sqrt{W}}$). Thus, rich people have incentive to support redistribution if $\delta \geq \frac{1-\sqrt{W}}{\frac{P}{W}-(1-\sqrt{W})}$. δ exists when $\frac{P}{W} - (1 - \sqrt{W}) \geq 1 - \sqrt{W}$. Since $P \leq W$, δ exists when $W \geq \frac{1}{4}$ and $P \geq \frac{4}{27}$. Therefore, when there is *certain level of social mobility and enough people in the rich class*, farsighted rich people has an incentive to support redistribution to prepare for a rainy day. The same boundary conditions also apply to the poor people's opposition to redistribution.

4.2.3 Infinitely repeated game and simulation

When the time horizon is extended to infinity, after redistribution everyone is expected to gain $1 + \delta + \delta^2 + \dots = \frac{1}{1-\delta}$. Without redistribution, let $T \begin{bmatrix} 1-P/W & P/(1-W) \\ P/W & 1-P/(1-W) \end{bmatrix}$, and the utility for the rich people without redistribution is given by $\sum_{n=1}^{\infty} \delta^n [\frac{1}{\sqrt{W}} \ 0] T^n [\frac{1}{0}]$. Note that T has eigenvalues 1 and $1 - \frac{P}{W} - \frac{P}{1-W}$ with corresponding eigenvectors $[W \ 1-W]^T$ and $[1 \ -1]^T$. Since $[\frac{1}{0}] = [\frac{W}{1-W}] + (1-W)[\frac{1}{-1}]$, the utility function can therefore be reduced to $\frac{\sqrt{W}}{(1-\delta)} + \frac{1-W}{\sqrt{W}(1-\delta(1-\frac{P}{W}-\frac{P}{1-W}))}$. Therefore, the rich people have an incentive to support for redistribution when $\delta \geq \frac{1}{1+\frac{P}{\sqrt{W}(1-W)}}$. Similarly, poor people would be motivated to oppose redistribution when $\delta \geq \frac{1}{1+\frac{P}{W(1-\sqrt{W})}}$. For both the rich and the poor people, when the level of social mobility or when the amount of people in the rich class increases, the level of patience needed for changing redistributive preference from the one-shot game is lower.

To further illustrate the influence of individual patience on the redistributive preference among classes, I use a simulation to illustrate the theoretical interaction effect. Assuming in the society, one-fourth of the residents are rich $W = 25\%$. In each round of the game, $P = 10\%$ of the people would either switch to the rich or poor categories, while 90% remains in the same class. At the beginning of the simulation, 1000 citizens are randomly assigned to be in the rich category with probability 25%. For each round, everyone may either stay in the previous category, or move to another,

and the wealth everyone gains in each round is discounted by δ and then accumulated. The game is repeated 1000 times under different conditions of δ from 0 to 1. The accumulated wealth without redistribution is then compared with those under redistributive policy.³

Figure 4.2 illustrates how people's level of patience in an unequal society would influence their perceived utility of redistributive policy, given a constant social mobility. In the first round of the game, when rich people put more weight on the future outcome, they may treat the downward mobility in the future much seriously. In this Figure, when the patience of rich people is around 0.9, they can expect a 30% chance that they will gain less than after redistribution in the 1000 rounds of game. To avoid the worse outcome in the future, patient rich then has a higher motivation to support redistribution in the first round. Similarly, myopic poor people support redistribution in general, but their level of support decreases when they discount less on the potential upward mobility in the future. Simulation result in Figure 4.2 generated by the model is similar to the main argument in the last section and Figure 4.1.

4.3 Empirical evidence: U.S.

4.3.1 Data and measures

The empirical analysis of individual patience and redistributive preference is based on the *CCES2014*. In this module, 1000 respondents were asked about their level of patience (discussed later), preference for social welfare policy, family economic condition, party identification, and sociodemographic background. In *CCES2014*, two-item ranked Choice task is used to measure the individual's level of patience. (For more information, see Section 3.5.1.) The analysis is conducted in R 3.1.3, and the regression models are estimated using the *glm* function.

The main independent variable, *Income*, is measured as self-reported family

³ The simulation is run through R 3.1.3, and the code can be found on the author's website.

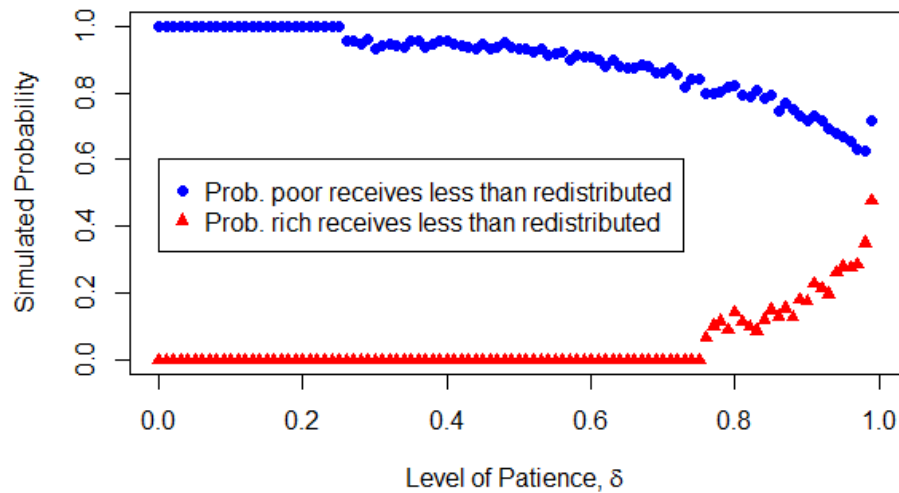


FIGURE 4.2: Patience, Class, and Expected Utility in Infinitely Repeated Game

monthly income. The response will be coded 1 if his or her monthly income is less than \$10,000; 12, if more than \$500,000. Measuring social class is a highly debated issue. Kogevinas et al. (1997) recommend including information at the individual, household, and community levels in addition to wealth and specific assets. Similarly, Adler et al. (2000) suggest that subjective social status is a better predictor of health-related behaviors. However, I use household income as the measure of class in this chapter for three reasons. First, individual income taxes and payroll taxes are the two largest sources of U.S. tax revenue (47% and 33%, respectively).⁴ When people use their patience to think about the idea of redistribution through taxation, it is likely that they base their decision on household income. Second, subjective social status will not change how an individual's income is taxed or whether an individual's social welfare benefits are approved by the government. Third, the previous studies of social mobility mentioned above mostly categorize groups of people based on income.

⁴ <http://www.cbpp.org/research/policy-basics-where-do-federal-tax-revenues-come-from> Accessed: May 17, 2017.

The dependent variable, *Redistribution*, is captured by the item "State legislatures must make choices when making spending decisions on important state programs. How would you like your legislature to spend money on each of the five areas below? Welfare." Responses are coded 2 if the amount of social welfare should be greatly increased, 1 for slightly increased, 0 for maintained, -1 for slightly decreased, and -2 for greatly decreased.⁵ Thus, this measure did not directly ask respondents about their redistributive preferences, as in the World Value Survey or the General Social Survey. However, as Alesina and Giuliano (2011) argue, the main objective of the modern welfare state is to redistribute wealth from the rich to the poor and to provide social insurance. Empirically, it may be difficult to distinguish between people's preferences regarding these two goals, and I do not address this methodological challenge. For simplicity, I assume in this chapter that a U.S. respondent will think of the idea of redistribution when "spending on welfare" is mentioned. A similar design is used by Iversen and Soskice (2001). To mitigate potential problems with measurement, a revised item is used in the case of Taiwan in the next section.

The interaction term between an individual's family income and patience is the product of the two independent variables. However, since the product may induce collinearity, the independent variable *income* is mean centered before multiplying it with patience and being added to the regression model. Theoretically, mean centering will not change the estimated effect, but it will improve the interpretability of the main effect.

In addition to patience and family income, covariates capturing individual differences in redistributive preference are included in the regression model, including age (in 2014), gender (male=1), level of education (1-7), race (African American=1), unidimensional party identification (1-7), self-reported ideology (1-7, very conser-

⁵ The other four areas included in the questionnaire are health care, education, law enforcement, and transportation/infrastructure. These are important policies but are not directly linked to the concept of redistribution.

vative=7), and religion (Protestant or Roman Catholic=1 and 0 otherwise). The descriptive analysis of subjects in *CCES2014* and the correlations between redistributive preference, income, patience, and all control variables can be found in the Appendix. General speaking, the correlations between control variables are consistent with previous studies, but a VIF test is needed to check for potential collinearity problems in the regression analysis.

4.3.2 Results

Table 4.1 illustrates the relationships between patience, family income, and redistributive preference. Across the three models, family income is negatively correlated with the redistributive policy preference, which is consistent with the Meltzer-Richard model; the rich are less supportive of social welfare, while the poor tend to support it. In model 1, patience is not correlated with redistributive preference when controlling for family income; this indicates that the relationship between patience and redistribution is at least not linear. However, in models 2 and 3, the partial coefficient of the interaction between household income and patience is significantly correlated with the redistributive preference, indicating that the influence of family income on redistributive preference is moderated by the level of individual patience. The significant interaction effect remains strong even when controlling for a respondent's partisanship, self-reported ideology, religion, and sociodemographic background. The VIF test results in the last row of the table show that multicollinearity is not a serious problem in these three models.

Figure 4.3 illustrates the moderation effect of patience on class voting. The two lines indicate the predicted probabilities of supporting redistribution, controlling for all other variables included in model 3 of Table 4.1 at their means. The dashed lines indicate the 95% confidence bands of the distribution of 500 predicted values generated by the variance-covariance matrix estimated by model 3. In Figure 4.3,

Table 4.1: Patience, Income, and Redistributive Preference (*CCES2014*)

	<i>Dependent variable:</i>		
	Supporting Redistributive Policy (-2 - +2)		
	(1)	(2)	(3)
Family Income	-0.064*** (0.012)	-0.087*** (0.017)	-0.101*** (0.020)
Patience	-0.069 (0.084)	-0.074 (0.084)	-0.067 (0.095)
Income × Patience		0.049* (0.026)	0.082** (0.029)
Age			-0.002 (0.003)
Male			0.089 (0.082)
Edu			0.012 (0.029)
Black			0.189 (0.131)
PID			0.106*** (0.026)
Ideology			-0.170*** (0.033)
Religion			-0.049 (0.088)
Constant	-0.163*** (0.054)	-0.180*** (0.055)	-0.274 (0.184)
Observations	844	844	664
Log Likelihood	-1,245.182	-1,243.439	-946.209
Akaike Inf. Crit.	2,496.363	2,494.878	1,914.418
$VIF_{highest}$	1.074	2.293	2.656

Note:

*p<0.1; **p<0.05; ***p<0.01

poor's redistribution preference is simulated by putting the recorded response of the lowest income category in *CCES2014* into model 3 and interacting with different level of patience, controlling for all other variable at its mean; similarly, the rich's redistribution is calculated by putting the recorded response of the highest income category.

Overall, rich people show less support for redistribution (≤ 0), while poor people tend to support the idea (≥ 0). However, the effect of family income on redistributive preference is smaller (albeit still significant, $p < 0.001$ in t-test) among respondents who chose the delayed but larger option on both items in the questionnaire. In the figure, the 95% confidence interval of the difference between impatient rich and poor people is [1.029, 1.061], while the difference between patient rich and poor people is [0.112, 0.144]. Additionally, for a poor respondent, an increase in his level of patience from 0 to 1 decreased his average level of support for redistribution from +0.268 to -0.226, whereas for a rich respondent, this increase in patient increased his support for redistribution from -0.794 to -0.344. The simulated results presented in Figure 4.2 provide empirical support for the main argument of this chapter shown in Figure 4.1.

The consideration of social mobility influences how an individual calculates potential future payoffs, so patient people do not regard redistribution as a pure class conflict. To the contrary, redistribution may serve as a safety net, which may save the rich person from falling into poverty in the future. Empirical evidence from the *CCES2014* supports the hypothesis that patience moderates the influence of class on redistributive preference.

4.4 Empirical evidence: Taiwan

There are three major weaknesses of the analysis of *CCES2014*. First, redistributive preferences in the U.S. are usually distinct from those of people around the world

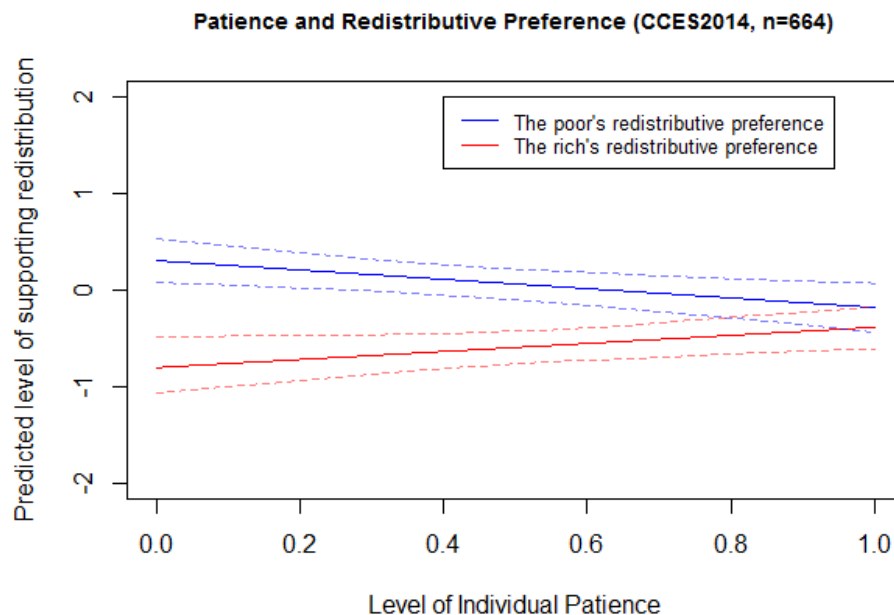


FIGURE 4.3: Predicted redistributive preferences of the poor and the rich are moderated by individual patience, *CCES2014*.

(e.g., Alesina, Di Tella and MacCulloch, 2004; Alesina and Giuliano, 2011), so the generalizability of the results presented in Section 3 may be questioned. Second, the item used in *CCES2014* to measure the individual's redistributive preference did not ask about redistribution directly; instead, the item asks about "changing spending on welfare." It is possible that people define the term "welfare" differently or view the source of financing for welfare differently (e.g., Mettler, 2011). Third, *CCES2014* was not conducted in a presidential election year. Therefore, it is possible that respondents are more engaged voters and those with higher political knowledge. To address these issues, I conducted *Taiwan2016*, a survey in Taiwan on January 10-11, 2016, one week before its presidential election ($n = 503$). The item measuring redistributive preference was also properly revised (discussed later).

In addition to addressing methodological issues, considering Taiwan as a comparison group provides an advantage for examining the relationship between redis-

tributive preference and the income–individual patience interaction. In the Western world, left-right ideology and religion undoubtedly shaped people’s attitudes toward redistribution, and the *CCES2014* data are no exception (as shown in the column 3 in Table 4.1). Hence, the influence of these two variables may remain even though they are controlled for in the linear regression model. However, left-right ideology is not an issue in the Taiwanese political arena (Jou, 2010; Yi-ching and Su-feng, 2014). Indeed, Taiwanese people hardly know the meaning of left and right politics, not to mention the difference between the two (Huber and Stanig, 2006; Achen and Wang, 2017). Moreover, most Taiwanese people do not hold strong religious beliefs, and their influence on redistributive policy preferences is mixed (Chang, 2010). Therefore, the analysis of Taiwanese data may suffer less from attribution bias and distraction from the substance of morality. In other words, the analysis of *Taiwan2016* can emphasize how the individual patience of rich and poor people influences their lifetime utility calculations.

4.4.1 *Data and measures*

Taiwan2016 is designed as follow. (For the demographic information, see Section 3.5.2.). At the beginning of the questionnaire, subjects were asked to report their routine political behaviors, including news consumption, political interest, political discussions, and thermometer ratings of the three 2016 presidential candidates. Then, each subject’s level of patience was measured by the two-item ranked Choice task as is discussed in Chapter 3.

The dependent variable, *Redistribution*, is measured by a binary item: ”*People hold different attitudes about what the government should do. Some believe the government should enforce redistribution between the rich and the poor, while others disagree. Do you agree with the idea that the government should tax the rich more and redistribute to the poor?*” Those who agree with this argument are coded

Redistribution = 1; otherwise, 0. Compared with the *CCES2014*'s item on welfare spending, the *Taiwan2016* item directly measures respondents' attitudes toward redistribution. Moreover, the description clearly emphasizes that redistribution occurs from the rich to the poor, which may eliminate alternative explanations, such as helping the poor through charity or by eliminating corruption. Since the dependent variable is binary, logit regression is used to test the hypotheses.

Again, the main independent variable, *Income*, is measured as self-reported family monthly income. The response is coded 1 if his or her monthly income is less than NTD \$20,000 and 5 if more than NTD\$150,000. The interaction term between an individual's family income and patience is the product of the two independent variables. To avoid multicollinearity, *Income* is mean centered.

In addition to patience and family income, covariates capturing the individual differences in redistributive preferences are included in the regression model, including age (in 2016), gender (male=1), level of education (1-5), race (Mainlander=1), and party identification (pan-blue camp=1)⁶. However, the regression model does not include ideology and religion, since there is a lack of data on the empirical importance of these factors in the context of Taiwan.

4.4.2 Results

Table 4.2 illustrates the relationships among patience, family income, and redistributive preference in *Taiwan2016*. Indeed, Tables 4.1 and 4.2 show the exactly same pattern. Across the three models, household income is negatively correlated with the preference on redistributive policy, and patience itself cannot explain the dependent variable. However, in models 2 and 3, the partial coefficients of the in-

⁶ In Taiwanese politics, one's attitude toward China is always the most salient issue. The pan-blue camp consists of Kuomintang (the Nationalist Party, KMT), the People First Party (PFP), and the New Party (NP), which are pro-unification and support expanding cross-Strait exchange. In contrast, the pan-green camp includes the Democratic Progress Party (DPP), the Taiwan Solidarity Union (TSU), the New Power Party, and other pro-independence parties. This camp seeks a more independent status for Taiwan and argues for cautious interactions with China.

teraction term between family income and patience are significantly correlated with the redistributive preference, which suggests that among Taiwanese people, the influence of family income on redistributive preference is also moderated by the level of individual's patience. The interaction effect remains strong when controlling for an individual's partisanship and sociodemographic background.

Table 4.2: Patience, Income, and Redistributive Preference (*Taiwan2016*)

	<i>Dependent variable:</i>		
	Supporting Redistribution (0-1)		
	(1)	(2)	(3)
Income	-0.404*** (0.146)	-0.997*** (0.285)	-1.041*** (0.295)
Patience	0.308 (0.332)	0.008 (0.375)	-0.090 (0.386)
Income × Patience		0.925*** (0.355)	0.961*** (0.362)
Age			-0.277** (0.132)
Male			0.120 (0.298)
Edu			-0.028 (0.367)
Race			-0.023 (0.368)
PID			-0.322 (0.563)
Constant	1.871*** (0.258)	2.086*** (0.308)	3.116*** (1.931)
Observations	503	503	502
Log Likelihood	-177.597	-173.957	-170.518
Akaike Inf. Crit.	361.195	355.914	359.036
$VIF_{highest}$	1.007	3.802	3.923

Note: *p<0.1; **p<0.05; ***p<0.01

Figure 4.4 illustrates the moderation effect of patience on class voting among Taiwanese people, with the solid line indicating the predicted probability of supporting

redistribution through taxation of the rich. The dashed lines indicate the 95% confidence bands of the simulated results. The rich and the poor shown in the Figure 4.3 are again defined as the highest group and lowest group, respectively, on the self-reported income question. Generally speaking, in Taiwan, both the rich and the poor support redistribution through taxing the rich (≥ 0.5), but the level of support is lower among the upper class (the 95% confidence interval of the difference is [0.384, 0.402] based on a t-test). However, the distinction diminishes among patient poor and rich people: patient poor people are less likely to support redistribution compared with their impatient counterparts, while patient rich people have higher levels of support (the 95% confidence interval of the difference is [0.014, 0.025] based on a t-test). An increase in the level of patience for a poor Taiwanese person decreases the probability of supporting redistribution from 0.986 to 0.896; for a rich Taiwanese person, the probability of supporting redistribution increases from 0.593 to 0.876. Empirical evidence from this 2016 Pollcracylab survey supports the hypothesis that patience moderates the influence of class on redistributive preference, as shown by the similarity of Figures 4.1 and 4.3.

4.5 Conclusion

In Chapter 4, I firstly illustrate how people's level of intertemporal choice can help us understand people's preference formation - in the case of people's attitude toward redistribution. Why is the class consensus difficult to achieve, and why has class conflict, as predicted by Aristotle and Marx, not yet materialized? Because people have different levels of intertemporal choice, they assign different weights to the immediate and future outcomes of redistributive policies. Even everyone follows their own rationality, individuals in the same class may make different decision based on his or her level of patience. By assuming a stable social structure and a certain level of social mobility in both directions, this chapter suggests that patience generates a

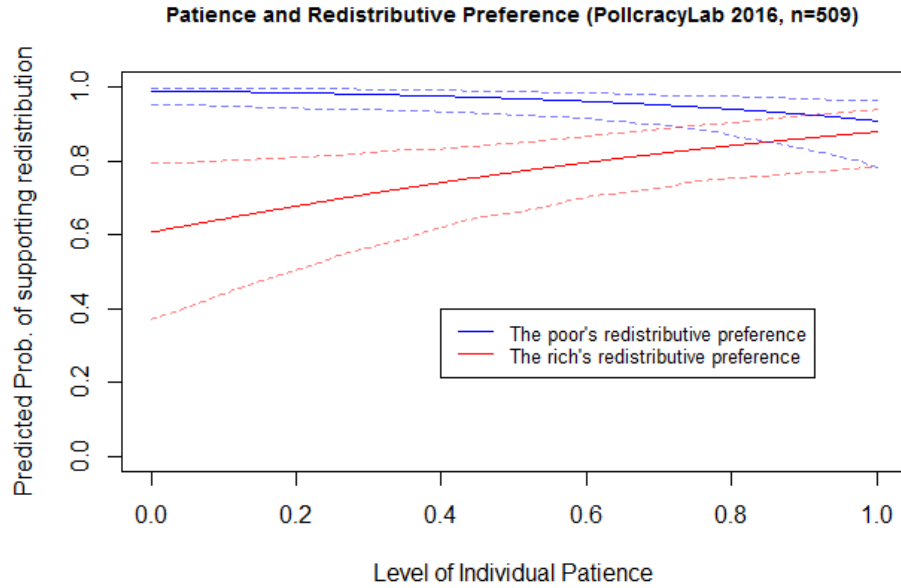


FIGURE 4.4: Predicted redistributive preferences of the poor and rich are moderated by individual patience, *Taiwan2016*.

counterbalancing effect on the rich and the poor, contrary to the results of a one-shot game. This hypothesis is supported by empirical data from both the U.S. in 2014 and Taiwan in 2016. The convergence pattern depicted in Figures 4.2, 4.3, and 4.4 illustrates the distinction between this chapter and others based on the POUM and risk perception theory.

At the macro level, the convergence pattern predicts that a country may experience class conflict when both the upper and lower classes become myopic. Although the level of individual patience is relatively stable over time, it can be manipulated by psychological treatments, future-self connectedness (Bartels and Urminsky, 2011), and emotions (Shiv and Fedorikhin, 1999) (for a review, see Urminsky and Zauber- man (2016)) or by natural disasters, such as earthquakes (Li et al., 2011). Therefore, we should observe increases in class voting in countries that have just suffered from the negative random shocks such as natural disaster. Alternatively, we should observe

that democracies with lower average levels of patience among their voters have higher levels of class voting compared to those with higher average levels of patience. This also implies another psychological mechanism behind the rebellions that historically follow natural disasters in China (Zhao, 2009).

By focusing on the psychological effects of patience, we can explore the influence of religion on redistributive preference more deeply. Stegmueller (2013) and De La O and Rodden (2008) suggest that Christianity may distract the poor from supporting redistribution through its emphasis on moral values. However, why are similar effects found among Buddhists but not among Jews (Alesina and Giuliano, 2011)? Why are religious wealthy people more likely to vote on the left in many countries, as in De La O and Rodden (2008)'s study? why is the opposite trend found among the poor? Christianity fails to explain the behavior of the religious rich across cultures. In contrast, McCullough and Willoughby (2009) summarize the existing studies linking patience and different religions. Thus, patience may serve as mediator linking religious and redistributive preferences. The values and practices of a religion need to be more closely examined reveal their linkages to individual patience and redistributive preferences.

The major weakness of this chapter is that both datasets are cross-sectional. Therefore, it is impossible to examine the causal relationships among patience, income, and redistributive preference. A first step toward such an analysis would be to estimate the change of an individual's preference by temporarily manipulating patience, which I will try in Chapter 6.

Additionally, in the model, I strongly assume that people perceive the social structure – the proportion of rich and poor people – to be relatively stable. To my knowledge, this assumption has not been studied empirically. Previous studies have measured people's attitudes toward upward and downward mobility, the American Dream, and deservedness. If the majority of respondents hold different views of

the stability of the social structure, my model needs considerable revision. In the end, the gap between public opinion and policy outcomes is worth studying. The average federal tax rate in the U.S. was around 18% in 2011, while the average tax rate in Taiwan was around 12%. However, according to the *Taiwan2016* results, both the extremely poor and extremely rich Taiwanese support the idea of redistribution by taxing the rich. It is possible that Taiwanese people are, in general, more patient. Thus, inequality does not transform into class conflict, and redistributive policy is not realized. Based on the World Value Survey, Hofstede, Hofstede and Minkov (1997) suggests that Chinese culture is related to future orientation. The linkages among voters' patience, their redistributive preferences, and the implementation of redistribution await further study.

Patience as the rational foundation of sociotropic voting

*"When you think economics, think elections; when you think elections,
think economics."* (Tufté, 1980, pp. 65)

5.1 Introduction

This chapter intends to provide one more theoretical linkage between intertemporal choice and political behavior along with an empirical falsification - how intertemporal choice influences people's vote choice.

Economic voting is one of the most important mechanisms for explaining voting behavior and the establishing accountability of the democratic system.¹ Voters reward the incumbent when they feel the times are good, and ask for the turnover when the times are bad. Abundant researchers suggest significant relationship between economic performance and election outcome around the world (e.g. Lewis-Beck and Stegmaier, 2000; Kayser, 2014).

Given the economic growth, not everyone can enjoy the fruit at the same time.

¹ The early version of this chapter is already published in *Electoral Studies* in 2017. In this Chapter, additional evidence from *Ukraine2007* is provided in Section 5.4. See Wang (2017a)

Some economic reform may improve the national economy and competitive strength of a country in the long run, but tens of thousands of people may lose their job during the process. More specifically, people may feel differently on the personal and national economic condition. For example, in the 2012 ANES survey, 5.9% of respondents (226 in 3783) reported that their family income got worse in the previous year while the national economic went up, and 7.2% (274) believed the national economy was declining but their family income raised. Thus, studies on economic voting distinguish between "pocketbook" and "sociotropic" voting: pocketbook voting is the choice that voter rewards incumbent in the election owing to the improvement of personal economic condition, while sociotropic voting describes the behavior when voter evaluates the incumbent based on national economic change. Generally speaking, macro and micro-level data suggest that most voters in the U.S. are sociotropic ones (e.g. Kinder and Kiewiet, 1981; Markus, 1988; MacKuen, Erikson and Stimson, 1992).

But, why are voters sociotropic? Again, the sociotropic orientation seems to contradict with *Homo economicus* assumption: self-interest. In the 2012 ANES, for instance, among those who perceived that the national economy got better but personal one went down, 78.3% of them still voted for the incumbent. In contrast, only 28.1% of voters supported the incumbent who observed the decline of the national economy and given the increase of personal one in the previous years.

One possible explanation for the sociotropic voting is altruism (Kinder and Kiewiet, 1981; Edlin, Gelman and Kaplan, 2007; Kiewiet and Lewis-Beck, 2011). Voter evaluates the incumbent basing on not her own condition, but the well-being of all Americans. Voter supports the incumbent merely because he or she believed other people have a better life led by this incumbent.

Apart from altruism, in the original piece Kinder and Kiewiet (1981) also suggest a possible foundation of economic rationality behind the sociotropic voting: *...Prototypic sociotropic voters may construe the incumbent administration's handling of the*

economy as a public good, and thus use the incumbent's ability to promote (eventually) their own economic welfare - and only incidentally that of fellow citizens as well. The sociotropic consideration outweighs the pocketbook one because voters believe the growing national economy will eventually trickle down to their pocket one day in the future. Taking the expected future personal gain into consideration, self-interested voters support the well-performed incumbent despite current pocketbook loss, as is reflected in the ANES data.

If Kinder and Kiewiet's guess is right, there is one key determinant of constructing the self-interest foundation of sociotropic voting: *intertemporal choice*. A voter who observed good national economy must be patient enough to wait until the trickle-down effect comes true one day in the future. Similarly, a future-oriented voter can see the future negative influence on his pocketbook from the current national economic decline. Therefore, patient voters are much more sensitive to the performance of the national economy because they take its future influence on his pocketbook into account; they are "self-interested sociotropic" voters accordingly. In contrast, if the voter discounts the future outcome a lot, he may care less about the potential trickle-down economic gain. In this scenario, the national economic condition would be less influential on impatient people's vote choice.

The exploration of patience may also help disentangle the altruistic and self-interest factors behind sociotropic voting. After four decades of research on economic voting since Kinder and Kiewiet (1981), Kiewiet and Lewis-Beck (2011) still warn about the lack of empirical evidence for distinguishing between the self-interest and public interest motivation. If there is a positive correlation between individual patience and sociotropic voting, the evidence may provide the foundation for the self-interest mechanism. If no evidence linking patience and sociotropic voting is found, the self-interest hypothesis is less supported. The exploration in this chapter cannot rule out the influence of altruism, but it may help explore the economic rationality

behind the sociotropic voting.

The remainder of Chapter 5 is organized as follows. Section 5.2 discusses the hypothetical linkages between patience and sociotropic voting. Section 5.3 presents the individual-level empirical examination using *CCES2014*. I will also provide some evidence against the explanation of altruism on sociotropic voting. Section 5.4 will provide more evidence in the case of impatience and pocketbook voting from *Ukraine2007*. Section 5.5 concludes with the main findings in this chapter.

5.2 Patience and self-interested sociotropic voting

The influence of the national economy on personal welfare is, in general, indirect and not immediate. For the majority of the people, a slight increase in the unemployment rate or a gradual decline in GDP growth may not have an immediate impact on their income or employment status. Therefore, if self-interest is the main motivation behind sociotropic voting, this individual motivation is moderated by how much he or she discounts the outcome of the future event. Patient people may perceive the future negative impact on their pocketbook owing to the current decline of the national economy, and vice versa. For impatient people, however, considering the future outcome from the national economy is a cognitive energy-consuming process. They instead tend to focus more on the immediate pocketbook records.

Meanwhile, altruism is the social preference of other-regardingness. An individual evaluates the incumbent by the national economy because she wants other people in the society to live better (Simon, 1995; Edlin, Gelman and Kaplan, 2007). In this scenario, patience may also moderate the altruistic utility: if an individual's utility function is built on the utility of the others, then the long-term influence from the current national economic change may also render long-term impact on other people. However, I assume that the moderation effect of patience on self-interest motivation would be stronger than the effect on altruism. Following the law of diminishing

marginal utility, since the altruistic sociotropic voters believe that other people have immediate gain thanks to the improved national economy, the marginal utility for the gain coming in the future is relatively low. In contrast, in the eye of the self-interested sociotropic voters, they are comparing zero or negative gain now and some positive gains in the future; thus, they would perceive higher marginal utility gain.

Besides, if altruism is the main mechanism behind sociotropic voting, we would expect to see sociotropic voter to have more pro-social behavior or other-regardingness attitude, both of which can be empirically verified.

How about the impatient voters? In my theory, impatient voters may also be sociotropic owing to altruism. But when people discount the future a lot and focus merely on immediate personal interest, it would be rational for them to reward or punish the incumbent based on their pocketbook record right before the Election Day. In this scenario, the impatient voter would behave closer to the definition of rational economic man.

To sum up, if patience plays no role in the economic voting, it implies that voters care less about the possible trickle-down effect from the current national economic change. Thus, we can be more confident that it is altruism that contributes to this sociotropic behavior. In contrast, if patient voters are much more sensitive to the national economic condition, then it is much more likely that both self-interest and altruism drive sociotropic voting. In addition, if the impatient voters are more sensitive to the pocketbook record, it implies that self-interest may play an even more important role in explaining economic voting. Patience may not confirm the existence of self-interested sociotropic voting, but it can serve as the bridge of rationality that makes the self-interest factor possible.

H₁: Patient people tend to be sociotropic voter.

H_2 : *Impatient people tend to be pocketbook voter.*

Sociotropic voting is defined as that the perceived national economic condition significantly influence a voter's support for the incumbent, while pocketbook is from perceived change in family income. Therefore, H_1 and H_2 can be operationalized by using interaction term in the regression model. The regression model would be like:

$$VoteIncumbent = \beta_0 + \beta_1 \times NationalEco + \beta_2 \times PersonalEco + \beta_3 \times Patience + \beta_4 \times NationalEco \times Patience + \beta_5 \times PersonalEco \times Patience + controls + \epsilon$$

According to H_1 , both β_1 and β_4 should be positive, indicating that people in average are sociotropic voters, but patient people rely more on the perceived national economy on evaluating the incumbent. When people perceived that the national economy goes well, patient people are much likely to vote incumbent; if an individual perceived the decline of the national economy, patient people blame the incumbent much more severely. If only β_1 is significant but not β_4 , it implies the rational foundation behind the self-interest sociotropic voting is less supported, and the altruism may be much important. In addition, β_5 can examine the hypothesis H_2 : if self-interest is the driving force behind economic voting, impatient voters would be highly motivated to evaluate incumbent by the change pocketbook before the Election Day.

Needless to say, personal and national economic condition are not the only influential factors on individual vote choice. Based on the Eurobarometer data from 1976 to 1992, (Kayser and Wlezien, 2011) find out that economic voting is contingent on the pattern of partisanship. When an individual does not identify himself with any specific party, he may rely more on the perceived economic condition while making vote choice. Therefore, in the regression model, the party identification should be controlled. Moreover, Kayser and Wlezien's result suggest that H_1 and H_2 would find stronger supportive evidence among the non-partisan voters. Thus I would an-

alyze the result on both full and non-partisan samples respectively. Other controls including gender, race, educational level, and family income are also included in the regression model.

5.3 Analysis

5.3.1 Data and measures

The empirical analysis on the individual patience and sociotropic voting is, like Chapter 4, based on *CCES2014*. In the module, 1000 respondents were asked about their level of patience (discussed later), perceived national and family economic condition, vote choice in 2012 and in 2014, party identification, and socio-demographic background. The analysis is done by R 3.1.3, and the logit models are estimated by the *glm* function. The level of *patience* is measured by the two-item ranked Choice task.

The main dependent variable, *VoteIncumbent*, takes the value of 1 if the respondent voted for the incumbent Democratic party and 0 if not, following the political context. Besides, I also use the favorability ratings of the Democratic president for validity check (2= very favorable to -2 = very unfavorable). In the *CCES2014*, respondents were asked to recall their vote choice in the 2012 Presidential election, to self-report the preference among candidates in the 2014 Gubernatorial election, and to evaluate how much they favor Barack Obama at that moment. All of the three items have pros and cons on examining the patience-sociotropic voting linkage. For the vote choice in 2012 presidential election, the president is widely believed to be responsible for the national economy, but the *CCES2014* was conducted two years after the election. Even though Kirby (2009) shows that an individual's level of patience has at least one-year stability, whether the assumption holds for more than two years is not without question. Moreover, it is possible that people's perceived economic condition had changed.

For the 2014 election, the survey was conducted right before the Election Day

(from October 1 to November 3). Even though the candidates in midterm election, say governors, should not be directly responsible for the national economy, previous studies still suggest that national economy or presidential approvals are important factors shaping the vote choice in the midterm election(Chubb, 1988; Cohen, 2007). For the favorability item, it is possible that people dislike the incumbent because he did a bad job. However, the relationship between favorability and vote choice might not be linear. After all, the topic of interest is vote choice. Given the limitations, the three measures cover some aspects of how an individual evaluates and rewards the incumbent, and can be used to examine the relationship between patience and sociotropic voting. Therefore, I will use the three items respectively as the dependent variable in regression models. Future work can be done with better measures such as survey in the year having a presidential election.

The two major independent variables, perceived national and personal economic conditions, are defined as followed. In the *CCES2014*, perceived national economy (*NationalEco*) is measured and coded from the item "Would you say that OVER THE PAST YEAR the nation's economy has ...? 2 = Gotten much better (4.6%)², 1 = Gotten better (22.8%), 0 = Stayed about the same (36.4%), -1 = Gotten worse (23.6%), -2 = Gotten much worse (9.0%)." The perceived personal economy (*PersonalEco*) is defined by the item "Over the Past FOUR YEARS, has your household's annual income...? 2 = Increased a lot (4.9%), 1 = Increased somewhat (25.6%), 0 = Stayed about the same (37.3%), -1 = Decreased somewhat (20.4%), -2 = Decreased a lot (11.7%)."

5.3.2 Results: full samples

Table 5.1 illustrates the relationship between patience and economic voting in the 2012 and 2014 election. In all six models, consistent with previous studies, the

² In the parenthesis is the distribution of *CCES2014* respondents, while 3.6% reported not sure or skip the national economy item. All of the subject answered the personal income item.

perceived change of the national economy strongly shaped vote choice in both the 2012 presidential and 2014 gubernatorial elections, and also the favorability of the president in 2014. Moreover, the interaction between patience and perceived national economy positively influence the vote choice in both elections, even controlling for socio-demographics and party identification. Both the partial coefficient of *NationalEco* and *NationalEco* \times *Patience* are positively different from zero in five of the six models, indicating H_1 received empirical support: patient voters are much sensitive to the national economic change.³ Meanwhile, the perceived personal economic change has no effect on the vote choice, but renders some positive effect on the favorability. The difference alludes that the personal gain may make the incumbent much favorable, but it did not transfer to vote choice directly. That is the weakness of using favorability as is discussed before. Besides, the interaction between patience and the personal economy is negative among all models, but none of them reach a significant level, which implies that H_2 is not supported.

Figure 5.1 illustrates the moderation effect of patience on the sociotropic voting. The two lines in each cell indicate the predicted probabilities to vote for the incumbent party or favorability to the President, controlling all other variables in model 2, 4, and 6 in Table 5.1 at the mean, while the shadowed area is the plus and minus one standard error. Overall, both patient and impatient voters use national economy to evaluate the incumbent, which is shown as the positive slope in both lines. Compared to the impatient counterpart, however, patient people are much sensitive to the national economic change; they reward the incumbent more when the perceived time is good, and punish the incumbent much harshly when the perceived time is bad. Since the interaction between patience and perceived national economy is positive, it indicates that people take the possible future outcome seriously. I suggest the behavioral

³ The positive interaction effect between patience and perceived national economic condition in model 2 and 4 remain strong even when the interaction between educational level and perceived national economy is added in the model.

Table 5.1: Patience and Economic Voting in the 2012 and 2014 Election, *CCES2014*

	<i>Dependent variable:</i>					
	Vote Dem P in 2012		Vote Dem G in 2014		Dem Favorable 2014	
	(1)	(2)	(3)	(4)	(5)	(6)
NationalEco	0.846*** (0.127)	0.495*** (0.157)	0.529*** (0.120)	0.290** (0.135)	0.772*** (0.074)	0.519*** (0.064)
PersonalEco	0.141 (0.115)	0.242 (0.148)	0.072 (0.115)	0.096 (0.130)	0.138* (0.073)	0.193*** (0.061)
Patience	-0.199 (0.176)	0.289 (0.239)	-0.253 (0.179)	-0.028 (0.215)	-0.364*** (0.107)	-0.034 (0.098)
NationalEco × P	0.695*** (0.229)	0.720*** (0.273)	0.419** (0.204)	0.389* (0.227)	0.211* (0.114)	0.099 (0.096)
PersonalEco × P	-0.263 (0.177)	-0.339 (0.222)	-0.090 (0.175)	-0.122 (0.198)	-0.110 (0.110)	-0.086 (0.091)
Control Age, Male, Edu, Income, Race, and PID		Yes		Yes		Yes
Observations	745	670	745	670	627	564
Adjusted R ²					0.318	0.574
Log Likelihood	-414.426	-273.849	-417.238	-336.463		
Akaike Inf. Crit.	840.852	573.698	846.475	698.927		

Note:

*p<0.1; **p<0.05; ***p<0.01

difference between patient and impatient voters on sociotropic voting is partially owing to the self-interest consideration as is discussed earlier. However, even among the impatient voters, sociotropic voting still exist. Therefore, empirical evidence from *CCES2014* does not rule out the possible influence of altruism on explaining the sociotropic voting, but rather suggest that the moderation effect of patience can be seen as the rational foundation for the self-interest motivation.

5.3.3 Results: non-partisan samples

Table 5.2 presents how the patience influences economic voting among the non-partisan voters. In this table, H_2 , the interaction between impatience and pocketbook voting, receives limited support on model 7 and 11. When $Patience = 1$, indicating

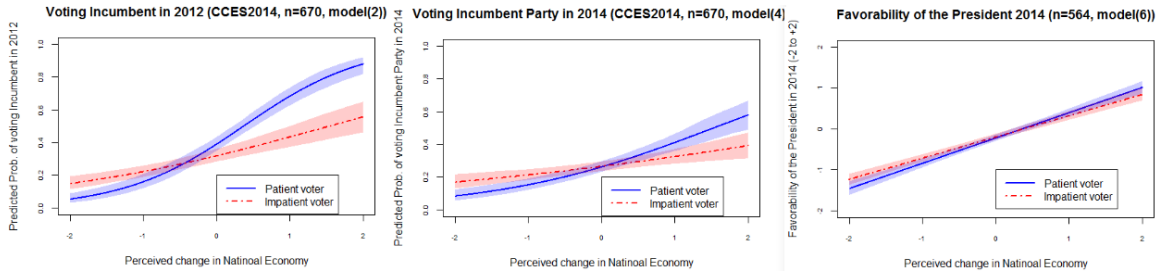


FIGURE 5.1: Voters with higher level of patience are much more sensitive to the national economic change on evaluating the incumbent

patient non-partisans, the net effect of perceived personal economy, which can be calculated by adding up the estimated partial coefficients of *PersonalEco* and the $PersonalEco \times Patience$, is indifferent from zero in all six models. The results suggest that patient non-partisan voters are not sensitive to the current pocketbook record ($\beta_2 + \beta_5 = 0$ in all six models, according to F-test of multivariate linear hypothesis), while impatient voters to some extent tend to have pocketbook voting ($\beta_2 + 0 \times \beta_5 > 0$ in model 8 and 12).

The difference between the impatient and patient people on pocketbook voting is further illustrated in Figure 5.2, which shows the predicted probability of non-partisans to vote for the incumbent in the 2012 and 2014 election, as well as the favorability of the incumbent. The predicted probability and value are based on model 8, 10, and 12. The shadowed area is plus and minus one standard error. In this figure, patient non-partisans are indifferent on the perceived personal economic change, while the impatient voters sensitively use pocketbook record on evaluating the incumbent.

5.3.4 Sociotropic voting and altruism? Preliminary rebuttal

The alternative explanation behind the sociotropic voting is that the change of national economy impacts on the welfare of other people, not on the respondent herself. If the altruistic concern is the main mechanism behind sociotropic voting, we should expect that sociotropic voters would have more pro-social attitude and

Table 5.2: Patience and Economic Voting among Non-partisans in the 2012 and 2014 Election, *CCES2014*

	<i>Dependent variable:</i>					
	Vote Dem P in 2012		Vote Dem G in 2014		Dem Favorable 2014	
	(7)	(8)	(9)	(10)	(11)	(12)
NationalEco	0.774*** (0.190)	0.620*** (0.210)	0.319* (0.188)	0.254 (0.201)	0.606*** (0.116)	0.586*** (0.117)
PersonalEco	0.296 (0.180)	0.343* (0.199)	0.173 (0.187)	0.240 (0.197)	0.194 (0.120)	0.223* (0.119)
Patience	0.136 (0.264)	0.382 (0.308)	0.320 (0.270)	0.279 (0.305)	-0.381** (0.173)	-0.115 (0.185)
NationalEco × P	0.663** (0.333)	0.763** (0.367)	0.425 (0.299)	0.591* (0.334)	0.302* (0.181)	0.208 (0.181)
PersonalEco × P	-0.596** (0.266)	-0.445 (0.295)	-0.002 (0.267)	-0.122 (0.295)	-0.353** (0.175)	-0.177 (0.176)
Age, Male, Edu, Race, Income, and PID		Yes		Yes		Yes
Observations	343	304	343	304	230	203
Adjusted R ²					0.262	0.373
Log Likelihood	-182.563	-156.658	-180.319	-159.465		
Akaike Inf. Crit.	377.126	335.315	372.637	340.930		

Note:

*p<0.1; **p<0.05; ***p<0.01

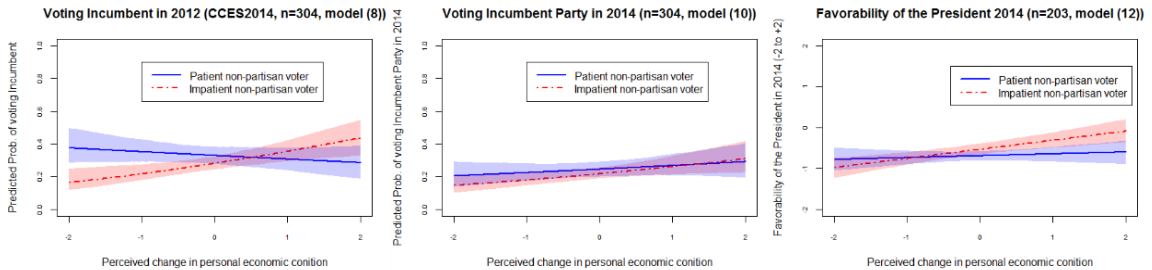


FIGURE 5.2: Non-partisan voters with higher level of patience are much more sensitive to the personal economic change on evaluating the incumbent

behavior. Unfortunately, there is no direct measure of altruism in *CCES2014*, so I provide some preliminary examination on the sociotropic voting and some behavior and attitudes linking to other-regardingness.

The first test is its correlation to blood donation. Blood donation is widely considered as an altruistic behavior, especially after monetary incentive policy was canceled in 1975 (e.g. Alessandrini, 2007; Steele et al., 2008). Thankfully, respondents in the CCES 2014 dataset were also asked about their blood donation last year, which is the only both behavioral and non-political question in the survey. In the survey, 13.9% of respondents (119 in 854) had ever donated blood in the previous year.⁴ To test the effect of altruism (measured by the blood donation) on sociotropic voting, I replaced the *Patience* with *BloodDonation* in regression models 2, 4, and 6 in Table 5.1. Regression result shows that the coefficient of the interaction between blood donation and perceived national economy is not significant in model 2 and 6 ($p = 0.745$ and 0.945 , respectively), and is on the opposite direction in model 4 (-0.507^* , $p = 0.072$). This result indicates that blood donors are not much likely to use national economy to evaluate the incumbent party. Besides, the variable *BloodDonation* itself is not correlated to supporting the incumbent in all models, indicating that it serves as an unbiased measure of altruism for estimating its impact on vote choice.

The second test turns back to the political issues. For domestic issues, separating the self-interested and altruistic motivations is not theoretically easy since the left-right ideology defines the diverse meaning of fairness and worthiness between citizens. For example, a voter who wants to cut government spending on social welfare may still love to help the poor through charity. In contrast, the definition of self-interest and altruism may be clearer on international issues, since an individual can easily distinguish between the in-group and out-group (foreign countries). In the dataset, there are two binary questions asking respondents' attitude toward the military action to "intervene the region with genocide or civil war" and to "destroy a terrorist camp." Drezner (2008) suggests that the former motivation is much closer to altruism, while

⁴ According to the America's Blood Center, the annual donation rate of the eligible donors in the U.S. is less than 10%. See <http://www.americasblood.org/about-blood/facts-figures.aspx>. Access Date: February 14, 2017.

the later is somewhat closer to self-interest.⁵

When *Patience* is replaced with the *InterveneGenocide* and *DestroyTerrorist* in the regression models 2, 4, and 6 in Table 3.1, the interaction between perceived national economy and *InterveneGenocide* is not significant in all three models ($p = 0.678, 0.489,$ and $0.540,$ respectively). In comparison, the interaction between perceived national economy and *DestroyTerrorist* is significantly positive in model 2 ($+0.606^{**}, p < 0.02$), and is in the positive direction in model 4 and 6 ($p = 0.284$ and 0.564). Therefore, concern over genocide and civil war abroad has no impact on sociotropic voting, while destroying a terrorist camp might have. The result further suggests that sociotropic voting may be driven not by altruism but by self-interest, which is amplified by the level of patience.

Admittedly, the evidence provided in this section is indirect and not strong since the voters may have different criteria evaluating domestic and international issues; she can be a altruistic nationalist. However, this evidence suggests that sociotropic voters are at most at the same level of altruism, or less, than the non-sociotropic counterparts. When an individual's level of patience is moderating the perceived national economic change on vote choice, it is much more likely that the moderating effect comes from the consideration of future trickle down effect.

5.3.5 Discussion

In the twelve models, the moderation effect of patience on sociotropic voting is mostly supported. When people are patient and discount the future less, their response to the perceived national economy is stronger than those who are impatient. I suggest that the interaction effect comes mostly from the self-interest consideration behind sociotropic voting, even though the altruistic motivation cannot be neglected. Farsighted people would take the future influence to their pocket from current eco-

⁵ At least in the U.S. context. Also see <https://www.thechicagocouncil.org/blog/running-numbers/american-public-opinion-syria> . Access: February 14, 2017.

conomic change into consideration, so they rationally emphasize the importance of the national economy much. The limited evidence on the relationship between impatience and pocketbook voting also suggests self-interest consideration behind the economic voting, at least among the non-partisans. Therefore, empirical data in *CCES2014* suggest that patience is an important moderator that helps bridge rationality with sociotropic voting calculations in the U.S.

5.4 Evidence linking impatience and pocketbook voting: *Ukraine2007*

There are three possible explanations of why H_2 is not strongly supported in *CCES2014*. First, the measure of patience only includes two items, so the scale may fail to capture enough variance on the level of patience. Second, even though a wider scale is used, it is possible that people in the U.S. are, in general, patient enough. In this scenario, the effect of patience on pocketbook voting may not be found in the U.S. samples. Third, as is discussed before, all of the three dependent variables in the previous section have their own limitations.

To address these weaknesses, *Ukraine2007* provides a great opportunity to examine H_2 . *Ukraine2007* was conducted in 2007, in which an important parliamentary election took place in September 30. The dataset includes people's intended vote choice in that election as well as their attitude toward national and personal economic condition. Unfortunately, the similar test cannot be done in *Taiwan2016* for the late of items.

Incumbent is coded 1 for those who vote Our UkrainePeople's Self-Defense Bloc (OU-PSD) and Yulia Tymoshenko's Bloc (BYuT), the coalition in the Orange Revolution (more details about the Orange Revolution will be discussed in Chapter 7). Those who voted other parties were coded 0. Ukrainian respondents were also asked two Likert scale questions that "General speaking, how is Ukraine doing today" and "How are you doing today," which were coded from -2 to +2 in *NationalEco* and

PersonalEco. Ukrainian people’s level of *Patience* was measured by a five-item ranked Choice task and, as is shown in Figure 3.2, most of them are really impatient.

The result is shown in Table 5.3. In this table, it is clear that both Ukrainian’s perceived national and personal economic change play an role in their vote choice. Moreover, the coefficient of the interaction between personal economic condition and patience is negative and significant, which support H_2 . In other words, patient people are less likely to use personal economic condition to evaluate the candidate, while the impatient ones are much more likely to support their incumbent because of personal gain. The result is robust after controlling for a series of sociodemographic background conditions.

Table 5.3: Patience and Economic Voting in the 2007 Election, *Ukraine2007*

	<i>Dependent variable:</i>	
	Voting BYuT or OU-PSD	
	(13)	(14)
NationalEco	0.246*** (0.078)	0.225*** (0.081)
PersonalEco	0.221*** (0.075)	0.176** (0.078)
<i>Patience</i>	1.479*** (0.480)	1.427*** (0.503)
NationalEco × <i>Patience</i>	−0.056 (0.174)	−0.069 (0.181)
PersonalEco × <i>Patience</i>	−0.472*** (0.164)	−0.434** (0.170)
Control Edu, Age, Male, Income, Ukrainian Identity		YES
Observations	3,892	3,885
Log Likelihood	−2,567.011	−2,402.347
Akaike Inf. Crit.	5,146.023	4,824.694
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

Again, Figure 5.3 shows the simulation result of both the interaction of perceived nationa/personal economic change and personal patience. For Ukrainian voters, per-

ceived national economic change is associated with the probability to vote for the incumbent (the left column in Figure 5.3), regardless of one’s level of patience. For personal economic change, however, impatient voters are much more likely to support the incumbent when there was personal gain, and oppose the incumbent if there was personal loss. The trend is reversed among their patient counterpart, holding other things equal. This pattern is much clearer than the evidence provided in Figure 5.2, and support the hypothesis H_2 .

Why can the interaction between national economic change and patience not provide an additional explanation on the vote choice? One possible explanation is that almost all respondents in *Ukraine2007* thought the national economy was getting worse (5958 in 6774, 87.9%). In such a scenario, personal economic change may serve as the base for individuals to calculate their welfare coming from vote choice. As is shown in this section, it is not those patient voters, but the impatient ones, who evaluate the incumbent according to the change of personal economic condition.

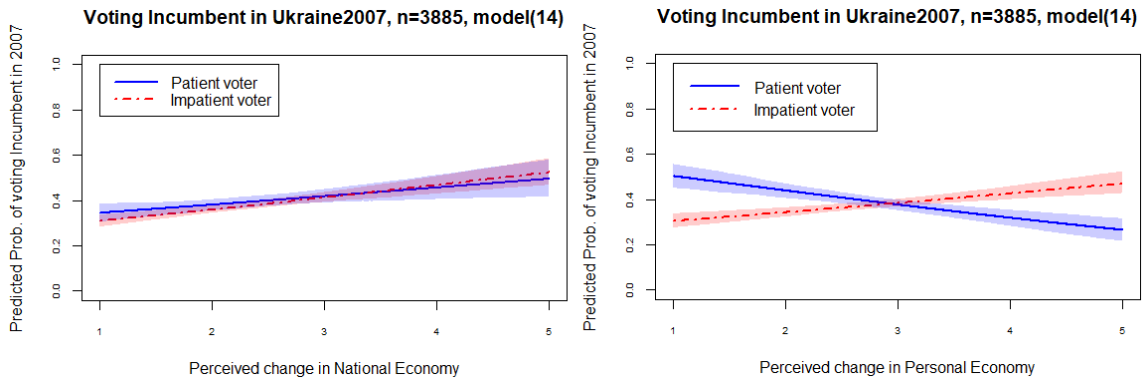


FIGURE 5.3: Impatient people are likely to evaluate the incumbent based on the personal economic change in *Ukraine2007*

5.5 Conclusion, limitation, and future work

Previous studies on the economic voting found that people are sociotropic voters, but researchers fail to distinguish between altruism and self-interest factors behind the sociotropic behavior. Chapter 5 suggests that an individual’s level of patience can be

seen as the foundation of self-interest rationality behind sociotropic voting, in which self-interested voter would be more sociotropic if they consider the future influence from current national economic change. Data from *CCES2014* shows that individual patience positively moderates the influence of perceived national economy on voting for the incumbent. *Ukraine2007* further support the hypothesis that impatient voters are much likely to be pocketbook voters.

Patience or discount factor, however, is the first step on linking self-interest and sociotropic voting. The discount factor is an instrumental variable, or a coefficient, but not the outcome itself. Self-interested individuals should first discount the future less, and they have to imagine the future of the national economy. In this chapter, I ignore the inclusion of prospective voting in the regression model owing to both theoretical and measurement concerns. The measure of prospective voting is to ask respondents to imagine the future of the national economy. But if the government is assumed to play the crucial role in the national economy in the past, then the future expectation would be the combination of the observation of the performance of the incumbent and the expected probability that the incumbent will be reelected. In other words, if an individual thinks the incumbent did well in its current term, he or she votes for the incumbent because of the expectation that the good performance will be continued in the future, which can be used to replace the measure of prospective voting. In this scenario, self-interested sociotropic voting may be regarded as a self-fulfilling prophecy. However, the expected future economic change should also include other external factors like the change of the global economy or military threat. That is why I only call the patience as the rational foundation since at least one more step is needed to build the causal mechanism.

Admittedly, the result in this chapter is hard to reconcile with previous findings linking cognitive capability and economic voting (Gomez and Wilson, 2001, 2006). Gomez and his colleagues find that sophisticated voters are much likely more to

follow their pocketbook record. My response to the difference with their works is three-fold. First, this chapter suggests the future exploration of how the cognitive resource is used. In the *CCEES2014*, the correlation between individual patience and self-report knowledge level is not high ($r = 0.184, n = 821, p < 0.001$), and in Fowler and Kam (2006)'s study there is no correlation between patience and political information ($r = 0.03, n = 350, p = 0.71$). Second, there is no theoretical linkage that sophisticated voters should emphasize more on the potential future outcome. It may be possible that they discount the future more just because they have figured out how politics is working. Third, the measure and usage of the political knowledge scale have been strongly criticized (Lupia, 2015). For instance, why should a voter who knows the chair of the Supreme Court also know the mechanism of the trickle-down economy? Lupia suggests that clearer theory is needed to link each item in the political knowledge scale to the target of interest.

Moreover, the result in this Chapter also speaks to the previous two patience-related studies in the field of political science. For Fowler and Kam (2006), Figure 5.1 shows that patient voters are much more responsive to the national economic condition in evaluating the incumbent. Therefore, it may imply that patient voters are much more likely to be motivated to go to the voting booth on the Election Day since they can anticipate the future benefit or future loss brought out by the incumbent. Meanwhile, my result is different from Jacobs and Matthews (2012)'s work for several reasons. First, their questionnaire asked respondents to evaluate a social welfare program which will impact *others*, not the respondents themselves. Second, the two financial reforms designed in their experiments were not very comparable, which may undermine the net effect of an individual's level of patience. In their experimental design, subjects in the first group were asked to choose between "cutting \$300 benefit a year from now one: and "cutting \$600 benefit a year after 5 years." In the second group, subjects chose between "cutting \$300 benefit a year from now one:

and "cutting \$600 benefit a year after 40 years." Since the recipients described in the second group can still receive \$ 300 benefit for 35 years, respondents may see that the financial condition of the welfare system in the second group is much stronger than the first one; in other words, respondents' time preferences on policy preference may be confound with what recipients can get before the reform.

Overall, Chapter 4 suggests how discount factors impact on preference formation, and Chapter 5 shows how discount factor influences vote choice. Once voters have the preference and decide who to vote for, Chapter 5 will examine how discount factors may change people's likelihood to go out and vote. Moreover, I will try to manipulate people's discount factor so as to construct the causal relationship between turnout and intertemporal choice.

Patience, turnout, and political opportunity structure

6.1 Introduction

Why do people vote? Starting from De Tocqueville in his *Democracy in America* (De Tocqueville, 1835, pp.548), it is assumed by many democratic theorists that an individual's level of patience plays a crucial role in political participation. Since the voting is a costly behavior on Election Day, an economic rational voter must put more weight on the future policy outcome after the election than the immediate cost of voting. In other words, it should be those who emphasize the future policy change that are more likely to turn out. Hence, de Tocqueville believes that it is those farsighted people who stabilize the functioning of democracy in America.

This straightforward hypothesis linking the intertemporal choice and turnout, albeit being widely believed, has not been empirically examined until recently. Based on developments in psychology and economics (Frederick, Loewenstein and O'donoghue, 2002; Loewenstein, Read and Baumeister, 2003), Fowler and his colleagues provide a decision-theoretic model suggesting a positive relationship between a voter's patience and turnout (Fowler and Smirnov, 2007), in which patience is formalized as

the individual's discount factor. They then provide some empirical evidence based on ANES data (1976-1988) and a survey of undergraduate students (Fowler and Kam, 2006). In a follow-up study using the data from National Longitudinal Study of Adolescent Health, Dawes and Loewen (2009) also provide preliminary evidence linking genes, patience, and turnout. Two subsequent studies with nationally representative *CCES2014* revealed similar positive correlation (Schafer, 2016; Hill, 2016).

The theoretical mechanism behind these positive correlations is simple: an individual must put more weight on the future policy outcome which will not be realized on Election Day without the voter's participation. Therefore, the expected utility from the future decides his or her willingness to invest in the voting now. By using Fowler and Kim's words: "*...no one has yet noted that the costs of voting are paid on or before Election Day, while policy benefits may not materialize until several days.*" In democracies, it takes weeks and even years for a policy statement to become a signed law: the elected legislators need to draft the policy proposal, send it to Congress, discuss it and negotiate in committee, pass it, and oversee the administrative branch to implement it. Fowler then summarizes patience as a *political virtue*, affirming its importance to the function of democracy.

Given the empirical evidence, two theoretical weaknesses have not been adequately addressed in the previous works. First, political opportunity structure matters and should interact with patience on explaining turnout. In formal models, the discount rate is usually used as an *instrumental variable* rather than the outcome itself. Even though a voter is farsighted and cares policy outcomes after Election Day a lot, if she sees no ideological difference between the available options on the ballot, voting is still a waste of time. In this scenario, the policy outcome had been determined even before the campaign. On the contrary, if the voter found a huge difference between the available candidates, her future will be severely influenced by the election outcome. In this case, her patience will emphasize the potential future policy change and therefore

motivate her to vote. In short, how much patience can influence turnout should be contingent on voters' perception of the (competitive) candidates and parties in that election. That is, political opportunity structure matters.

Second, *correlation is not causation*. As Cohen, Vigoda and Samorly (2001) noticed, an individual's level of patience is correlated with sociodemographic background, some of which may indirectly impact one's decision to vote. One study also finds negative or null effect between patience (measured by impulsive and aggressive personality) and turnout (Denny and Doyle, 2008). Unlike the relation between genes and behavior (See Fowler and Dawes (2008) for discussion), an individual's level of patience can be manipulated, and can also be properly trained (e.g. Dignath, Buettner and Langfeldt, 2008; Muraven, 2010). Therefore, it is theoretically and empirically feasible to estimate how the temporarily change of intertemporal choice influences one's willingness to vote. The exploration of causality can provide insight into policy design to counteract the declining turnout rate globally (e.g. Holbein, 2017).

Indeed, existing literature provides rigorous explanations of how institutions (Dalton, Klingemann and Blais, 2008), polarization (Plane and Gershtenson, 2004; Abramowitz and Saunders, 2008), and personal resources (Brady, Verba and Schlozman, 1995) shape turnout in both district- and individual-levels. However, the linkage of patience and turnout explored in this chapter is distinct from previous studies in many ways. Brady, Verba and Schlozman (1995) suggest that an individual's acquired civic skill - the ability to interact with other through the experience of working, church attending, and student government - is a strong predictor to an individual's turnout. In comparison with civic skill, patience focuses on how much an individual can foresee future outcomes, and can control her behavior now to maximize the lifespan utility based on her (ability of) calculation.

Besides, by exploring patience, this chapter can also investigate the group of voters who were susceptible to the polarized environment. Patience extends the time horizon

in the voters' mind and enables them to imagine how the world will dramatically change if different candidates won the election.

In this chapter, an analysis of a representative cross-sectional survey and a new survey experiment are provided to tackle these two weaknesses raised above. For the former, I will analyze the *CCES2014* to estimate the correlation between the respondent's patience, perceived ideological difference between the candidates, and a respondent's turnout. As is mentioned earlier, *CCES2014* is the first representative survey in the U.S. that includes a precise measure of the respondent's discount factor, which was also used by recent studies linking patience and turnout (e.g. Schafer, 2016; Hill, 2016). For the later, following the future-self connectedness mechanism behind an individual's patience discussed in Chapter 2, (Parfit, 1984; Bartels and Rips, 2010) and new study on perceived life expectancy (Payne et al., 2013), this chapter proposes a new treatment which can temporarily manipulate a respondent's level of patience *in both directions*. The survey experiment was then conducted right before the U.S. 2016 Presidential election to investigate how the change of patience may influence an individual's willingness to vote; meanwhile, respondents' perception of the two main presidential candidates was also recorded. To conclude, the experimental design can examine whether the change of patience will have a conditional effect on voter's turnout given different perceived political opportunity structure.

6.2 Foreseeing the political opportunity structure - A model

In the classic rational voting model, an individual's decision to vote is formalized as $V = P \times B - C$, while V is the decision to vote, P is the probability of being pivotal, B is the benefit received from the election outcome, while C is the cost of voting. Previous studies linking patience and turnout is to investigate the component inside B further. Since the policy outcome will not be realized right after the Election Day, people with higher level of patience are much likely to vote because they care

more about the future policy reward. In another word, $B = \delta_i \times K_i$, while δ_i is an individual's level of patience modeled as the discount factor, and K_i is the net policy outcome for the voter when the policies are carried out. Hence, previous studies find supportive evidence for $V \propto \delta$ (Fowler and Kam, 2006).

However, if δ matters, so should K_i . In psychology, goal-setting is one of the most important mechanisms linking the trait self-control and behavior. If the policy outcome is the goal that voters are looking for, what voters perceived should interact with patience on influencing their willingness to vote. To be specific, $K_i = |K_{1i} - K_{2i}|$, the perceived difference between the two candidates (K_1 and K_2) in the specific election by the voter, which I defined as the political opportunity structure. In this model, when there is no ideological or policy difference between the two candidates, $K_i = 0$; if the ideological difference is significant, K_i will increase. By taking the absolute value of the difference, I take into account both the net benefit and regret minimization. In fact, previous studies on both presidential elections and midterm elections found that political opportunity structure plays an important role for turnout (Plane and Gershtenson, 2004; Abramowitz and Saunders, 2008).

There are two major theoretical advantages to decompose B into $\delta_i \times |K_{1i} - K_{2i}|$. First of all, it predicts *when* the individual's level of intertemporal choice did not directly help promote turnout. If an individual suddenly became farsighted, but she found no difference between the candidates on the ballot, then why should she increase her willingness to vote? If we further take into consideration that voting usually is a habitual behavior (Plutzer, 2002; Aldrich, Montgomery and Wood, 2011) and that habit is a goal-oriented behavior (Aarts and Dijksterhuis, 2000) (not shown in the model above), it is even possible to predict that people with higher level of patience would *decrease* their voting intention when they see no difference on the future policy outcomes after the election carried by different candidates. In this scenario, turnout is a habit and a default tendency, but a higher level of patience is then used to

inhibit this habit owing to goal conflict in the specific election with fewer political opportunity (For the discussion between habit and habit formation, see Wood and Neal, 2007).

Second, the decomposition predicts *who* are more responsive to the change of the political opportunity structure. Abramowitz and Saunders (2008) suggest that a polarized election may increase the turnout among those who have stronger party identification. This chapter tends not to challenge the motivation from the group attachment, but wants to suggest another psychological mechanism which helps capture how political opportunity structure impacts on turnout. In this model, people with higher level of patience are much likely to change their decision to vote according to the given political opportunity structure in each election ($1 \times |K_{1i} - K_{2i}|$), while the impatient voters would be indifferent to structure ($0 \times |K_{1i} - K_{2i}|$). One of the weaknesses in Fowler and Kam (2006) is that their subjects are from the same region (one university in California), which excludes the possibility to test the interaction between political opportunity structure and patience.

Following the discussion above, four testable hypotheses can be derived from the complex model:

H₁: Patient people have higher turnout.

H₂: People perceived larger difference between the candidates have higher turnout.

H₃: Interaction between patience and perceived difference between the candidates positively influences the turnout.

H₄: When people are treated to be more patient, they become much responsive to the perceived difference between the candidates on the decision to vote.

Among the four hypotheses, H_1 and H_2 are consistent with the previous studies, while H_3 is the main contribution of this chapter. The former three hypotheses can be falsified through the cross-sectional surveys including related items. H_4 further aims at establishing the causal mechanism behind patience and turnout. A survey experiment is required to manipulate respondents' level of patience.

6.3 CCES 2014 for testing H_1 , H_2 , and H_3

6.3.1 Measures

In *CCES2014*, 1000 respondents were asked about their level of patience, the perceived ideological difference between the candidates and parties, voting behavior, and socio-demographic background. The analysis is done by R 3.1.3, and the logit models are estimated by the *glm* function.

The main dependent variable, *Turnout*, takes the value of 1 if the respondent voted in the 2014 midterm election (including early voting) and 0 if not. In the dataset, 708 of them (70.8%) self-reported voting in the election, which is, unfortunately, higher than the real value (36.4% officially).

Two items are used to measure the respondent's level of patience *Patience*, one of the two major independent variables in my model. The discussion of this measurement can be found in Section 3.5.1.

Apart from patience, another independent variable in my model is the political opportunity structure *Oppo*. To be specific, the perceived political opportunity structure is measured by the abstract value of the ideological difference (in a 1=Very liberal to 7 = very conservative scale) between the two major candidate *in the House election in the respondent's district*. I choose the House election for the following reasons: First, the Senate election is less preferred since only one third of the Senate districts held election in 2014; therefore, only 450 respondents were available for the Senate election in *CCES2014*. Second, measuring voters' perception of the two district candidates to calculate the *Oppo* can be a better measure compared with

their perception of the two national parties. Previous studies of candidate positioning (e.g. Ansolabehere, Snyder Jr and Stewart III, 2001; Burden, 2004) suggest that House candidates usually follow the position of their national party, but meanwhile, they still need to accommodate themselves to the need of local voters. Moreover, the incumbent and the challenger has different strategies on nudging their policy stance in their district so as to increase the likelihood of winning. Thus, measuring *Oppo* through the House election can not only enhance the variance of the measurement, but also clarify the linkage between *Oppo* (goal), *Patience* (mechanism), and *Turnout* (goal-pursuit behavior) all at the district-level.

One potential limitation of measuring *Oppo* in House election is that many voters did not know the policy stance of their candidates. In *CCES2014*, 436 respondents (43.6 %) said they are "not sure" about the ideological location of one of the House candidates in their district. To deal with this issue, I will run two models, one for dropping all subjects who are "not sure", and the other for assuming the "not sure" answer to be 4 in the 1 to 7 scale (*Oppo_{All}*). If the respondents did not know the policy position of the two candidates, the perceived policy difference would be $|4 - 4| = 0$, indicating that the respondents did not expect any policy outcome from the election.

A series of control variables are added to the models. Following the classic SES model (Leighley and Nagler, 1992; LeDuc, Richard and Norris, 2014, Chp.4), the respondent's age, gender, the level of education (from 1=No High School degree to 6=post-graduate degree), party identification, and race (Black or African American = 1) are included. Moreover, Brady, Verba and Schlozman (1995) suggest the importance of personal resource including time, money, and civic skill to explain turnout. However, their study shows that income plays no role in explaining turnout, and *CCES2014* did not include the item related to civic skill except for the level of education and being a union member. Therefore, I add the binary item of having kids under 18 at home as the instrument for having less time, and being a union member

as the instrument for civic skill.

Besides, I also account for the closeness in the respondent's district into the model. Numerous studies suggest that the closeness between the candidates will increase the level of engagement for both the voters (e.g. Berch, 1993; Geys, 2006) and the candidates (Cox and Munger, 1989). Albeit the problem of endogeneity, I use the absolute difference of vote share between the two leading candidates in each district as the measure of closeness. Compared with the pre-election poll, I believe that the election outcome can still provide a systematic standard to capture how the respondents felt before the election. Respondent's self-report zip code, the district, and the election result of the district are matched for generating this variable. It is worth noticing that the correlation between closeness in the district and the respondent's level of discount factor is 0.018 ($p = 0.62$). Therefore, there is no *ex post* evidence in this chapter that the closeness will systematically change the respondent's level of patience. Consistent with previous works, there is a nearly significant correlation between closeness and turnout is -0.06 ($p = 0.084$).

6.3.2 Results

Table 6.1 shows the result of the seven logit regression models. Model 1 indicates that a voter's level of patience positively correlates with her turnout, which is consistent with H_1 and recent studies (Fowler and Kam, 2006; Schafer, 2016; Hill, 2016). Model 2 and 5 indicates that the voter's perceived ideological difference between the two House candidates in her district is also a strong predictor for turnout, which is unsurprisingly consistent with H_2 , regardless the "not sure" response is counted or not.

Model 3 and 6 in Table 6.1 both shows that the interaction between patience and perceived ideological difference will positively enhance turnout, which is consistent with H_3 . The correlations remain positive after controlling for a series of socio-

Table 6.1: Patience, Political Opportunity Structure, and Turnout in CCES2014

<i>Dependent variable:</i>							
Turnout in 2014 Midterm Election							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Patience</i>	0.52*** (0.16)		0.84 (0.53)	0.71 (0.58)		0.49** (0.23)	0.31 (0.25)
<i>Oppo</i>		0.38*** (0.11)	0.12 (0.16)	-0.09 (0.19)			
<i>Oppo</i> × <i>P</i>			0.60** (0.28)	0.59** (0.29)			
<i>Oppo</i> _{All}					0.70*** (0.07)	0.57*** (0.11)	0.40*** (0.12)
<i>Oppo</i> _{All} × <i>P</i>						0.30* (0.17)	0.32* (0.18)
SES, Resource, & Closeness				Yes			Yes
Obs.	768	336	262	261	895	691	688
Log L	-448	-109	-75	-65	-469	-350	-312
<i>VIF</i> _{MAX}			2.15	2.27		2.16	2.14

Note: *p<0.1; **p<0.05; ***p<0.01

demographic variables in Model 4 and 7, including the respondent's age, gender, the level of education, race, dummies for the party identification, closeness in the district, joining the union, and having kids under 18. After putting the interaction term, *Patience* itself is no longer predictive to turnout. In other words, it implies that the positive effect of *Patience* on turnout is largely passed through the perceived ideological difference.

To further illustrate the conditioning effect of *Oppo* on patience and turnout, Figure 6.1 shows the simulated distribution on respondents' probability of turnout from Model 4 in Table 6.1. The two lines indicate the predicted probabilities to vote given the specific level of *Patience* and *Oppo*, controlling all other variables at the

mean, while the shadowed area is the plus and minus one standard error.

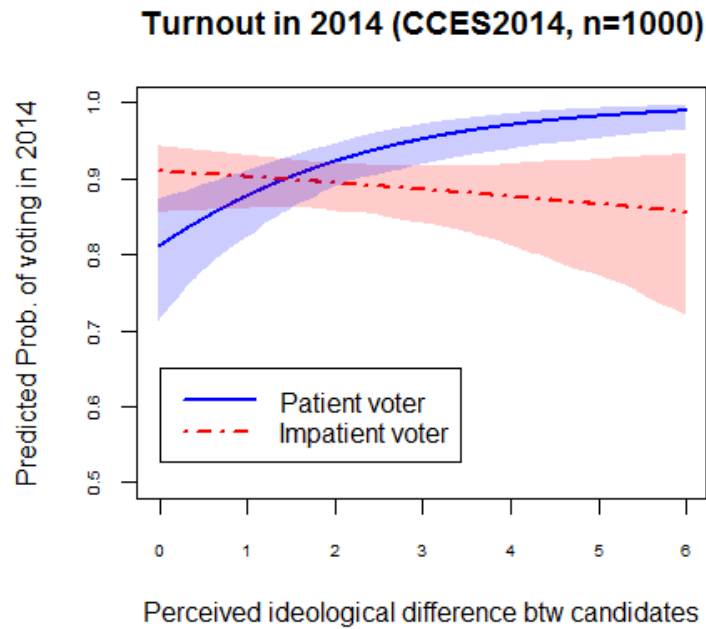


FIGURE 6.1: Patience, Political Opportunity Structure, and Turnout - A simulation

In this figure, it is clear that the political opportunity structure works *oppositely* for patient and impatient voters, which are consistent with all of the hypotheses in this chapter. Patient people are much likely to vote only if they perceive that the election outcome will bring dramatic policy change in the future; when the patient people are indifferent between the candidates, their turnout rate is lower compared with the impatient ones.

Among the impatient voters, perceived ideological difference did not influence their tendency to vote; in other words, they vote just because they did not care the future policy outcome of the election but for other reasons, such as punishing the incumbent for poor performance or scandal. However, I further test the interaction effect between (im)patience and closeness in the district, which did not reveal any meaningful trend or finding.

By comparing the two trends in Figure 6.1, patient voters are much susceptible to the change of political opportunity structure on their decision to vote. The simulation result in Figure 6.1 provides supportive evidence to H_3 . Furthermore, the result in Figure 6.1 shows that, after controlling for party identification, the perceived political opportunity structure is still influential to the patient voters.

6.3.3 Discussion

Results in Table 6.1 and Figure 6.1 make two important insights on explaining turnout. First of all, patience helps increase the turnout only if the perceived political opportunity structure is large enough. When there is no difference between the available options on the ballot, patience works in the opposite direction. This pre-condition is generally true in the context of the highly-polarized U.S. politics. However, this analysis presented further investigate the cognitive mechanism linking patience and turnout, and explore when and how patience works on the decision to vote. It also provides the evidence that turnout itself is still a goal-oriented behavior. When people care about the future policy outcome and set it as the goal, they can self-control themselves to spend their time in the voting booth so as to approach the goal.

Second, it is the patient people who are responsive to the political opportunity structure. Because patient voters care more about the change of the future policy outcome, they decide to invest their time and resource to reach the voting booth on the Election Day. In our dataset, impatient voters also have a very high self-reported turnout rate. However, their behavior cannot be explained by the political opportunity structure; they decided to vote for other reasons. This result implies that patient and impatient voters may be mobilized through different campaigning strategies.

6.4 Survey experiment for H_4

In the previous analysis, one major weakness is that correlation is not causation. If there is a causal story behind the Figure 6.1, it is possible to change an individual's willingness to vote by merely manipulating her level of patience.¹ To be specific, manipulation on the level of patience can help us distinguish the direct and indirect influence of patience on turnout: (1) If previous studies suggesting the direct impact of patience on turnout is correct, we should expect to find that people are much more likely to vote when they are treated to increase their patience, and vice versa; (2) If the moderation story implying indirect influence of patience is correct, subjects who are treated to increase their patience will enhance their turnout only if they had perceived enough difference between the candidates. Meanwhile, the patience-enhancing treatment would instead work in the opposite direction if the subjects failed to see the difference between the candidates.

6.4.1 *Future-self connectedness for manipulating patience*

In Chapter 2, I have discussed the relation between future-self connectness and intertemporal choice. At the end of Chapter 3, I also provided two studies showing the stability of people's level of patience. In this chapter, I propose Payne et al. (2013)'s life expectancy treatments to manipulate the respondent's level of patience. In Payne and colleague's survey experiment, respondents are asked to estimate how likely they will "live to 65/85/105 years old or older" or "die at 65/85/105 or younger" (also see the next section "Research Design"). Estimated and transformed through a Weibull function, they found that the respondent's average life expectancy in the "Live-to" group is about 85 years on average, while in the "Die-at" group it is around 75 years.

¹ Indeed, it is also feasible to manipulate an individual's perceived political opportunity structure. However, the aim of this chapter is to extend the previous findings linking patience and turnout. Moreover, the 2016 presidential election provides a highly intense political context so that voters must have acquired enough knowledge and information about the political opportunity structure, which makes it harder to be manipulated.

The difference is statistically significant, and the result holds under several robustness checks. The two question sets are called *Live – to* and *Die – at* treatment hereafter.

Admittedly, Payne and colleague’s treatments are not originally designed for the manipulation of the respondent’s level of intertemporal choice. However, based on the existing studies on the future-self connectedness and patience manipulation, I suggest that the *Live – to* and *Die – at* can work properly on temporarily changing respondent’s patience in both directions. First, the items ask respondents to imagine what would happen to herself in the (far) future, which is a common treatment to temporarily intensify the connection to her future-self. By using an undergraduate sample, Shu (2010) shows that the participants become patient when they are asked to imagine the future. Hershfield et al. (2011)’s morphing procedure also indicate that the participants become much more patient and prefer a long-term insurance plan when they see their uploaded portrait is edited to be aged. Therefore, I expect that the *Live – to* treatment can have a similar effect on increasing the respondent’s patience.

However, I expect that the *Die – at* treatment will decrease the respondent’s level of patience. Studies on future-self connectedness show that the participants become impatient after their connection to the future-self were disrupted, or after they perceived that the future-self is up to change (Bartels, Urminsky and Rips, 2010; Shu, 2010). For example, Bartels and Urminsky (2010) asked fourth year undergraduate students to read an article describing how the its life and career will change/not change after graduation; the students’ level of patience changed according to the degree of change outlined in the assigned article. One related study also shows that when the participants were treated to believe that the future is harder to control, their level of patience decreased, and vice versa (Lee, Malkoc and Rucker, 2013). Even though the respondents in my study were also asked to imagine the future in the *Die – at* group, because the future they were imagining is not a continuity of the current situation

(that is, being alive), this change of condition and disconnection from the current self would instead decrease the respondent's level of patience.

Moreover, my assumption that the treatment works also comes from the seminal works on framing effect (McNeil et al., 1982; Tversky and Kahneman, 1986). In these studies, subjects care more about the overall future outcome when being framed by survival rate in choosing between therapies, but focus more on the immediate risk when being framed by death rate.

Since Payne et al. (2013) had illustrated that the two framing could robustly change the participants' life expectancy, I reasonably expect that the *Live – to* and *Die – at* treatments should also manipulate the respondent's level of patience.

One additional advantage to apply Payne and colleague's treatment is that it is simple, cost-saving, two-directional, and able to be generalized. Even though Hershey et al. (2011)'s morphing procedure is highly preferred in the theoretical perspective, respondents in their research need to show up in the laboratory, or provide their own photos and then wait for several weeks. The procedure may restrain the number of respondents as well as the external validity of the result. Bartels and Urminsky (2010)'s treatment in the article related to the destiny after graduating from the college can be effective among senior college students, but its effect might disappear among older generations. In contrast, the Stroop task, unsolvable algebra problem, and many other manipulations used in the will-power experiments (e.g. Baumeister, Vohs and Tice, 2007; Gailliot et al., 2007b) render a powerful effect on decreasing the level of patience, but they only work in the negative direction and need detailed laboratory control, which cannot be done through online survey platform. I expect that the *Live – to* and *Die – at* treatment cannot be as powerful as the previous studies on manipulating the respondent's level of patience, but if they work, they should still influence the respondent's willingness to vote.

6.4.2 Research design and data

Overall 471 subjects are recruited from Amazon Mturk web service during October 17-24, 2016, two weeks before the 2016 U.S. Presidential Election Day. They were offered \$1.25 to complete a mere 30-item questionnaire named "How people make decisions in everyday life." All subjects are at least 18 years old, with IP address located in the U.S., and with 95% approval rating or higher for previous tasks on the Amazon Mturk site. This research is sponsored by the Department of Political Science at Duke University with IRB approval D0864.

Subjects were first asked to report their routine political behavior including news consumption, political interest, and political discussion. All of the questions ask what they have done *before*. They were then asked to locate their ideology on a 0 to 100 liberal-conservative scale. Similarly, they then located the Democratic and Republican Party's ideological position on the same scale. I assume that the manipulation of the level of patience will not influence the perceived ideological difference, but I still put these items before the treatment to prevent any spillover effect.

Subjects were then randomly assigned to three different groups. In Treatment Group A, subjects were asked three questions about how likely they think they will "live to" be 65/85/105 years old (See the figure below). In Treatment Group B, subjects were asked three questions about how likely they think they will "die at" 65/85/105 years old or younger. Respondents in the Control Group answered nothing. The treatment is shown in Figure 6.2.

After the treatments, all subjects were asked about their likelihood to vote (from Extremely likely to Not likely at all, five-point scale). After that, all subjects were asked about their level of patience through a six-item choice battery edited from Karoly (1993). The design of the items used here is similar to the discount rate choice battery in economics (Frederick, Loewenstein and O'donoghue, 2002; Hardisty et al., 2013). This design includes more items than that in *CCES*2014 because the

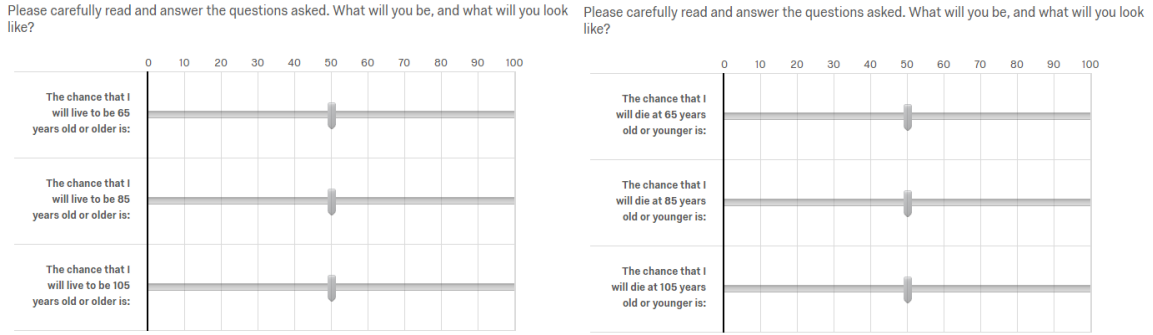


FIGURE 6.2: The *Live – to* and *Die – at* treatment

available space is the representative survey is much limited.

In the following questions, you will be asked to choose the payment option that you would prefer in each of 5 different conditions. Note that each of the 5 conditions will pay \$100 in 30 days (option A) or \$100+\$x in 60 days (option B), where x differs under each condition. For each question you will select the payment option (A or B) that you would prefer if you are chosen to receive the amount of money.

You are asked to choose between:

	A	B	
To gain \$100 now	<input type="radio"/>	<input type="radio"/>	To gain \$105 in 30 days
To gain \$100 now	<input type="radio"/>	<input type="radio"/>	To gain \$120 in 30 days
To gain \$100 now	<input type="radio"/>	<input type="radio"/>	To gain \$150 in 30 days
To gain \$100 in 30 days	<input type="radio"/>	<input type="radio"/>	To gain \$105 in 60 days
To gain \$100 in 30 days	<input type="radio"/>	<input type="radio"/>	To gain \$120 in 60 days
To gain \$100 in 30 days	<input type="radio"/>	<input type="radio"/>	To gain \$150 in 60 days

FIGURE 6.3: Six-item ranked Choice task

In the end, all subjects were then asked about their gender, age, race, and level of education. All subjects were debriefed about the manipulation of patience at the end of the survey.

6.4.3 Demographics and randomization check

Overall, 455 in 471 completed the survey (96.6 %). Table 6.2 shows the socio-demographic background of the respondents to be analyzed. Among the respondents, 154 were assigned to the Control Group, 150 to the *Die – at* Group, and 151 to the *Live – to* Group. ANOVA test shows that there is no difference among subjects in the three groups on their age ($p = 0.976$), gender ($p = 0.675$), educational level ($p =$

0.069), race ($p = 0.178$), self-reported ideology position ($p = 0.809$), political interest ($p = 0.525$), political knowledge ($p = 0.766$), and news consumption ($p = 0.564$). In short, the result confirms truly random assignment.

Table 6.2: Socio-Demographic Background of the MTurker Subjects

Variable	N	Mean	St. Dev.	Min	Max
Age	454	38.81	11.38	19	79
Male	452	0.53	0.50	0	1
Edu (1=High school, 7=PhD)	455	4.22	1.22	1	7
Black	455	0.07	0.50	0	1
Self-Reported Lib.-Con. Position (0-100)	452	40.12	27.91	0	100

6.4.4 Treatment check

I firstly replicate the result of Payne et al. (2013) to check if respondents in the two treatment groups have a different level of life expectancies. Following the same Weibull transformation procedure (which assumes that the likelihood for everyone to live to 122 is zero), the average life expectancy in my *Live – to* Group is 83.06 with variance 11.17 (median is 82.66), while in my *Die – at* Group is 72.78 with variance 12.29 (median is 71.96). Two-tail t-test shows that the difference is statistically significant ($t = 7.582, df = 294.5, p < 0.001$). This result perfectly replicates Payne’s seminal work which also based on MTurk samples. In their study, the life expectancy in the two groups are around 85 and 75, respectively.

Besides, it is possible that the treatment effect is heterogeneous for different generations. To verify this possibility, I run a simple regression model by using the life expectancy as the dependent variable, and adding the interaction between the treatment and the respondent’s age (mean-centered) as the independent variable. However, regression shows that the estimated coefficient of the interaction term is insignificant ($p = 0.314$). It indicates that the treatment effect is quite stable for different generations. Moreover, the randomization check also shows that the distri-

bution of age is the same among the three groups. Therefore, the treatment effect may not come from the uneven distribution of respondents' age.

6.4.5 Manipulation check

Next, I test whether the two frames may influence respondent's level of patience toward different directions. All subjects answered a six-item ranked Choice task as was shown in Figure 6.3. Following the hyperbolic discounting model (Frederick, Loewenstein and O'donoghue, 2002), participant's subjective time preference can be estimated by two parameters, α and β : α is the level of present-bias measured by the first three items since the first three items ask the respondent to compare two outcomes happening now and after 30 days. Moreover, β is the traditional long-term discount factor captured by the latter three items, asking respondents to compare what happens in 30 days and in 60 days. There are numerous ways to transform an individual's answers into a specific number of discount factor (or at least a range). However, since the number of the items used in this research is small, I simply assumed that respondents who chose straight B as 1 (always preferred later and larger reward, no discounting) for both α and β , ABB as $\frac{100}{105}$, AAB as $\frac{100}{120}$, and AAA as $\frac{100}{150}$. If a respondent gave the same pattern of answer on the first and later three items, her value of α and β would be the same. Among all respondents, the correlation between α and β is high ($r = 0.767$).

After the transformation, we can compare the respondents' level of patience among the three groups. Figure 6.4 shows the distribution of the respondents' present-bias and long-term discount factor in the Control Group and Treatment Group A and B. The dot is the mean value, while the errorbars indicate plus or minus one standard error. Compared to those in the Control Group, respondents who were framed with the *Live – to* items are slightly much patient, and those who were framed with the *Die – at* items are slightly less patient. The difference between the *Live – to* and

Die – at group are significant in both α and β measures based on two-tail t-test: $p = 0.07$ for α and $p = 0.10$ for β .

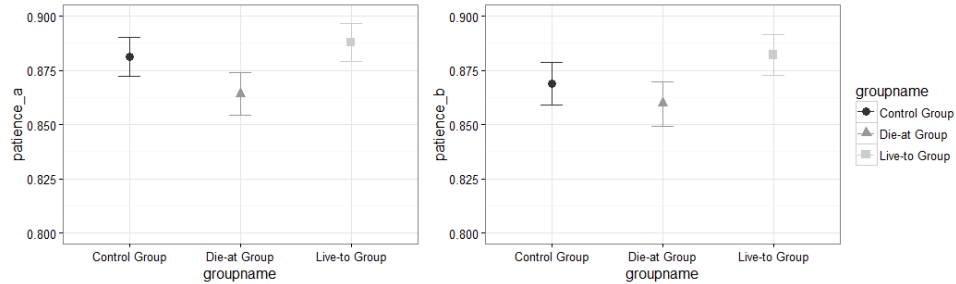


FIGURE 6.4: Distribution of the respondents' discount factor in different groups

To sum up, Payne et al. (2013)'s two treatments on life expectancy are successfully replicated in this study. Besides, the *Live – to* and *Die – at* treatments indeed make people to temporarily increase and decrease their level of patience, respectively, which are verified through the widely-used discount factor measurements. Since the respondents' patience are manipulated by the two treatments, the next step is to examine if people will change their voting intention after the treatments.

6.4.6 Testing the direct linkage between patience and turnout

Figure 6.5 shows the distribution of subjects' voting intention in the Control and the two treatment groups, respectively. The dot is the average in each group, while the errorbars show a range of the plus or minus one standard error.

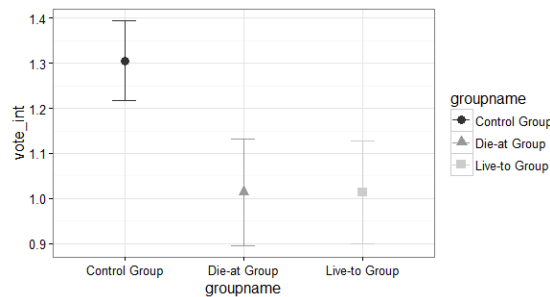


FIGURE 6.5: MTurk subjects' voting intention in the control and two treatment groups

Surprisingly, the two treatments *both have negative impact* on the MTurk subjects' voting intention. In this figure, the difference between the Control Group and "Live-to" is significantly negative ($p = 0.044$), and the Control Group and "Die-at" is also significantly negative ($p = 0.049$). In other words, no matter when a subject temporarily *increases or decreases* her level of patience, in average, she will be less likely to vote. This result is inconsistent with H_1 , and fails to establish a direct causal story linking patience and turnout that previous studies suggested.

Patience is moderated by the political opportunity structure

If there is a direct effect of patience on turnout, why did subjects in the *Live – to* group - who were treated to be more patient - also decreased their willingness to vote? The political opportunity structure story suggested by the analysis of *CCEs2014* implies that many subjects in the *Live – to* group may fail to see the difference between the two major parties. In other words, the effect of manipulating patience is *heterogeneous* among different voters.² Even though I assume that the 2016 Presidential election was highly polarized, some survey also revealed that about 60% of U.S. citizens dislike the two presidential candidates;³ many young voters,⁴ black voters,⁵ and even Ron Paul, the former Representative of Texas,⁶ believed that there is no meaningful difference between the two leading presidential candidates. If these cynical voters were patient, and they also behave following the trend shown in Figure 6.1, then they would choose to stay home on Election Day, and they would be less willing

² A recent study also uses experiments to explore the heterogeneous effect of self-control for people with diverse backgrounds. See Hoel, Schwab and Hoddinott (2016).

³ <http://www.nbcnews.com/politics/2016-election/poll-majority-americans-dislike-hillary-clinton-donald-trump-n578926> Access: May 3, 2017

⁴ <http://www.motherjones.com/environment/2016/08/millennials-clinton-trump-climate-energy> Access: May 3, 2017

⁵ <http://thehill.com/blogs/in-the-know/in-the-know/291272-rapper-killer-mike-clinton-trump-the-same-thing> Access: May 3, 2017

⁶ <http://thepulse2016.com/brittany-klein/2016/03/02/ron-paul-there-is-absolutely-no-difference-between-hillary-and-trump/> Access: May 3, 2017

to vote when treated to be more future-oriented.

In Table 6.3, four regression models are used to further examine the heterogeneous treatment effect. In this table, the first, second, and third model suggest that the two treatments, which increases and decreases subject’s patience respectively, on average, both have a negative impact on the voting intention. The negative impact remains significant after the perceived ideological difference, and a series of personal background variables are taken into account. If the influence of the ”Die-at” treatment fits the theoretical prediction between patience and turnout, the impact of the ”Live-to” treatment is abysmal.

Table 6.3: Patience manipulation, Perceived Ideological Difference, and Voting Intention

<i>Dependent variable: Likely to vote -2 to +2</i>				
	vote_int			
	(1)	(2)	(3)	(4)
”Die-at” Group	-0.292*	-0.319**	-0.317**	-0.307**
	(0.152)	(0.145)	(0.144)	(0.144)
”Live-to” Group	-0.292*	-0.290**	-0.312**	-0.299**
	(0.152)	(0.145)	(0.144)	(0.144)
Pcvd. Diff.		0.014***	0.013***	0.009**
		(0.002)	(0.002)	(0.004)
”Die-at” × Pcvd. Diff.				0.003
				(0.005)
”Live-to” × Pcvd. Diff.				0.009*
				(0.005)
Age, Gender, Education, Race, Party ID			YES	YES
Observations	455	450	446	446
R ²	0.011	0.089	0.137	0.143
Adjusted R ²	0.006	0.083	0.121	0.124
F Statistic	2.475*	14.611***	8.653***	7.279***

Note:

*p<0.1; **p<0.05; ***p<0.01

In the second and third model, the subject’s perceived ideological difference be-

tween the two major parties play an independent and strong impact on the voting intention, which is consistent with previous studies. The comparison between the first and the second model indicates that the perceived ideological difference itself can account for a big proportion of variance on explaining the voting intention.

Model 4 provides some, albeit weak, evidence for supporting the heterogeneous effect hypothesis. In the last column, the interaction between the "Live-to" treatment and perceived ideological difference significantly increases the subject's willingness to vote. In the most extreme scenario, if a voter perceived the ideological difference between the two parties is the maximum value 100, the effect of the "Live-to" treatment to that voter would be $-0.299 + 0.009 \times 100 = +0.6$ then the same voter in the Control Group, which the voting intention is *increased*. However, opposite effect does not exist in the interaction between "Die-at" treatment and perceived difference.

Besides, it is worth noticing that the patience and perceived ideological difference are not correlated with each other. Based on the responses in the Control Group, the correlation between present bias α and perceived difference is -0.09 ($p = 0.265, n = 152$), and with long-term discount factor β is -0.12 ($p = 0.138$). The zero correlation rules out the possibility that the interaction effect between the two patience treatments and perceived ideology comes from the higher order confounding effects.

Figure 6.6 shows the simulation result generated from the model 4 in Table 6.3. The x-axis is voter's perceived ideological difference between the two parties, while the y-axis is the simulated level of voting intention. The solid and dash lines are the predicted value of voting intention, while the shaded area is a plus and minus one standard error.

In Figure 6.6, for the "Live-to" group, subjects who are indifferent between the two major parties, increasing their patience will significantly lower their willingness to vote, which is consistent with H_3 . Meanwhile, subjects who perceived the huge

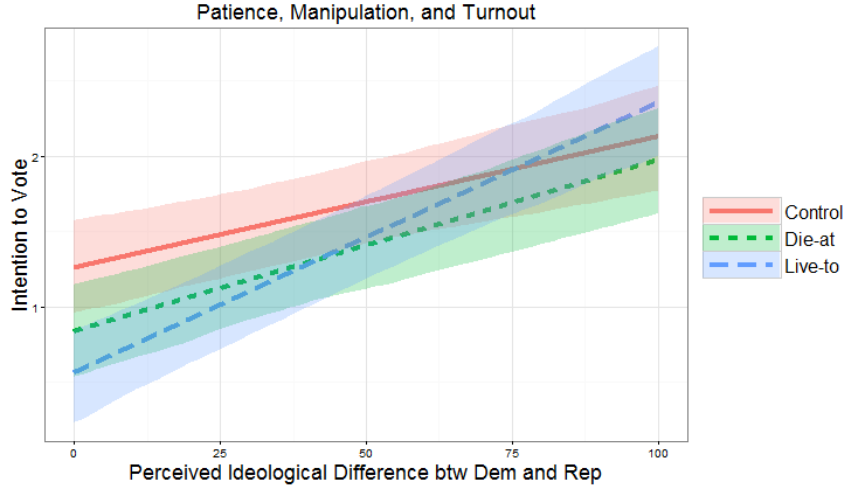


FIGURE 6.6: Both treatments reduce the intention to vote among the indifference voters

difference between different election outcomes, increasing patience will also enhance their voting intention. Thus, the moderating effect of political opportunity structure on linking patience to turnout is supported by the subjects in the "Live-to" group, which is consistent with H_4 . Among the MTurk subjects used in this study, the median of perceived ideological difference is 42, while the 75% percentile is 64. The distribution may be the reason why the average treatment effect of the "Live-to" group is negative: their perceived ideological difference between the two major parties is not large enough, so they decrease their voting intention because their high patience helps them reveal the smaller policy outcome coming from the future. However, the opposite pattern is not found in the "Die-at" group. Subjects who are treated to be impatient are less likely to vote, regardless of the perceived ideological difference. The survey experiment provides more nuances to be studied in the future.

6.4.7 Additional evidence

In the simulation of Figure 6.1, the self-report turnout rate among the impatient voters is about 80% regardless of the perceived ideological structure. If patience makes people see the future policy change and motivates people to vote now, what is

the motivation for impatient voters to go to the booth?

Following the rational calculation, one possible explanation is that the cost of voting might be smaller among those impatient voters; therefore, the immediate cost is endurable. To test this hypothesis, I again exploit the *CCES2014* dataset. All respondents are categorized into four groups based on the binary-coded patience/impatience \times voters/non-voters. In *CCES2014*, two items asked respondents about the cost of voting: the length of waiting in line and the same-day registration. The result shows that "impatient-voters" are much more likely to register on Election Day (23.5%) compared with those "patient-voters" (7.14%). However, there is no evidence that impatient-voters spent less time on waiting in line than the patient ones. To sum up, the argument on the cost side of the calculus of voting is partially supported.

Another possible explanation for the impatient-voters is that they wanted to punish the incumbent by their votes. Hence, their expected outcome will be announced right after the Election Day and need not waiting longer. To test this hypothesis, I use the respondent's job approval attitude toward their House representative in the district as well as President Obama in 2014. However, there is no evidence that impatient-voters viewed their House representative much negatively than the patient-voters (59.8% and 58.0%, respectively), nor was there a difference in the attitude toward the President (with approval rate 41.9% for impatient voters and 41.2% for patient-voters). Unfortunately, *CCES2014* may not be enough to examine the relationship between punishing incumbents and impatient voting. Future work may focus on why impatient voters also have some degree of turnout.

6.5 Conclusion

Based on the analysis of a representative survey and a newly-designed survey experiment, Chapter 6 extends previous understanding linking patience and turnout.

In *CCES2014*, patient voters are much likely to vote only if they perceived enough ideological difference between the candidates in the 2014 House Election. In the survey experiment, increasing a subject's level of patience would instead decrease her willingness to vote if she sees no difference between the two major parties.

Additional evidence also shows that impatient voters are much likely to register on the Election Day, an indicator of lowering the cost of voting. In short, patience is a political virtue not simply because it increases turnout as is described by previous studies (Fowler and Kam, 2006), but because it increases people's responsiveness to the changing political opportunity structure.

One contribution of the chapter is to bring the time element into the rational choice model of voting with more nuances. On the one hand, this chapter replicates previous findings linking patience and turnout and then clarifies that the effect is actually contingent on the perceived political opportunity structure. On the other hand, this chapter replicates previous findings linking perceived political opportunity structure and turnout and then identifies that it is the patient people, instead of the impatient ones, that are susceptible to the difference between the candidates. This chapter does not merely combine the two previous studies on explaining the turnout but also deepens our understanding the psychological and economic mechanism behind the decision to get-out-and-vote.

If the effect of intertemporal choice on the turnout is contingent, should we still regard patience as a "political virtue," and try to increase the level of patience among the citizens? The results shown in Figure 6.1 and 6.6 would still indicate a *positive* answer. If we can increase the level of patience among all citizens, they will be more responsive to the given political context. This responsiveness would motivate parties and politicians to strategically position themselves and provide distinguishable policy manifesto. As a result, the whole political spectrum will be more diverse and representative, which ultimately benefits the function of democracy.

Exploring the relationship between intertemporal choice and turnout may also provide insights to the age-old study on habitual voting. First of all, patience plays a major role in forming habit (Aarts and Dijksterhuis, 2000; Wood and Neal, 2007). Thus, an individual's level of patience may help explain why some forms of personal experience in her early life (high school GPA, church attendance) but not the others (high school activities) that form the habitual turnout (Plutzer, 2002). The phenomenon may link to the positive correlation between patience, academic achievement (Tangney, Baumeister and Boone, 2004), and religion (McCullough and Willoughby, 2009).

Moreover, if an individual's level of patience help forms the habitual voting in her early life, and patience also increases the responsiveness to the perceived political opportunity structure, then it may help us understand how habitual voters respond to the changing environment. For example, Aldrich, Montgomery and Wood (2011) and Plutzer (2002) both found that geographic mobility would, in average, slightly decrease the turnout. Following the moderation effect evidenced in this chapter, I would argue that the comparison between the old and new residence matters, especially for the habitual voters. If the new environment is much polarized, habitual voters would be much likely to vote; if the new environment is less polarized, the turnout rate among the habitual voters should decrease more than the impatient counterpart. This testable hypothesis will be put to future work.

Besides, the experimental result revokes the argument considering patience as an instrumental variable. Existing studies linking patience and behaviors (e.g. Chabris et al., 2008; de Ridder et al., 2012; Hardisty et al., 2013) usually make a strong assumption of what life goal people ought to achieve, such as safe driving, quitting smoking, and academic performance. However, this chapter questions whether people indeed perceived improved future outcome if they changed their immediate decisions; self-control should be goal-oriented.

In the end, Chapter 6 proposes an easy-to-implement treatment on manipulating patience in both directions. Even though the magnitude of the manipulation is not big, the two treatments still bring out unignorable effect on the MTurk subjects' voting intention before the 2016 Presidential Election. A similar procedure can be implemented to explore the relationship between patience and other decisions and behaviors. Future work may focus on the strength and robustness of this treatment.

Patience, dynamic of protest, and Ukraine's 2004 Orange Revolution

In Chapter 4, 5, and 6, I have shown that the intertemporal choice will impact on how people think, make vote choice, and get-out-and-vote. In this chapter, I will turn to another costly political participation - protest.

7.1 Introduction

On 21 November 2004, large-scale electoral irregularities favored the incumbent party broke out in the runoff of Ukraine's 2004 Presidential election. When the more and more evidence showed that the election was stolen, the opposition candidate Yushchenko's campaign team and youth organization mobilized about 25,000 activists to the Maidan Nezalezhnosti (Independence Square hereafter) and were ready to start a long-term street occupation by setting tents (Shukan, 2010). Even though the number of activists being mobilized was larger than the previous demonstrations like "Ukraine without Kuchma" in 2001 or "Rise Up, Ukraine!" in 2002, the campaign team could not ensure that the protest would grow and became self-enforcing (Beissinger, 2011). The previous two demonstrations also mobilized tens of thousands

of people for months but ended up with violence and arrests.

It was different at this time. Even though it was snowing heavily outside, people kept showing up and gathering to the Independence Square and nearby streets. In a documentary filmed by a Ukrainian-American during the Orange Revolution,¹ a restaurant in Kyiv accommodated 50 people in the first night of the protest, then the number grew to 300, 800, 1300, 2500, then 3000 from day to day. The scale of the protest and the increasing number of the protesters on the streets was crucial for Yushchenko to start the negotiation with President Kuchma and the incumbent party's presidential candidate Yanukovich throughout the early December.² Despite for the possibility of violent repression and the involvement of the military, Yushchenko estimated that 300,000 protesters were standing on the Independence Square. According to a nationally representative survey conducted three weeks after the runoff, 13 percent of citizens above 17 years old participated in pro-Yushchenko demonstrations, which means 4 million Ukrainian adults (Way, 2010). Even though the Supreme Court announced that the runoff election would be re-run on 26 December, which can be seen as a temporary victory for Yushchenko's team, many protesters still sit in the Independent Square until the Orange camp eventually clinched the victory in early January.

For the critical mass demonstration like the Orange Revolution, the core activists, early comers, and the later comers are of equal importance for a movement to succeed (Beissinger, 2011). The core activists prepared the necessities (tents, food, music, and socks in this case) for the long-term occupation and shaped the discourse and slogans, but they needed more people to join the rally. When the electoral fraud was witnessed and became a focal point for the demonstration, the early comers showed up to prove

¹ "Orange Revolution Documentary Film THE ORANGE CHRONICLES short version" by Damian Kolodiy, <https://www.youtube.com/watch?v=iOYzIqJQu74>, Access: 23 May 2017

² "Viktor Yushchenko The Orange Revolution" by The Freedom Collection, <https://www.youtube.com/watch?v=TQVWcMJpFng>, Access: 22 May 2017

that the demonstration was not purely driven by partisanship but was for everyone, and stimulated the self-reinforcing process. The later comers then strengthened the demonstration and proved to the authority that people would not give up and return home within a few days. It was the combination of the three that makes authoritarian overturn possible.

However, who are the core activists, early comers, and later comers in the mass protest? Even though 84% of Ukrainians agreed that they have the right to protest against electoral fraud publicly (Kuzio, 2006*b*), why did some people join the protest in the earlier stage, while some other people participated later? For those Ukrainians who went to the Independence Square right on the evening of the runoff election, they should expect to stand in the snow for days or even months, based on the previously failed occupations. Moreover, standing up first to protest against the fraud was dangerous: President Kuchma was associated with the assassination of a journalist. Besides, during the 2004 campaign, opposition presidential candidate Yushchenko was mysteriously poisoned. Nevertheless, if no one appeared except for the activists on the first evening, the Orange Revolution could be easily smeared by the government-controlled media as a meeting of sore losers and fail to establish its legitimacy and morality; it would have followed the destiny of the previous two protests.

This chapter aims at explaining why people choose to join the mass demonstration at different points of time. Previous studies on protest participation usually focus on the social network (Opp and Roehl, 1990), expected public good (Muller and Opp, 1986), political efficacy (Opp and Kittel, 2010), personality (Brandstätter and Opp, 2014), and a series of socio-demographic background. Other studies formalize the protest against the government as a repeated prisoners' dilemma game and a problem of collective action (Axelrod, 1981; Weingast, 1997; Ostrom, 1998; Acemoglu and Robinson, 2001). One weakness of these studies is to (implicitly) treat one protest as a time point, and all actors simultaneously decide to join or not. Even though Opp

and his colleagues conducted a 10-years panel survey including four major protests, the protests were still treated as a one-time point rather than an accumulated and dynamic process within each protest. This one-shot assumption is not true for the recent mass demonstrations: the 2004 Ukraine Orange Revolution took 62 days, the 2011 Belarusian protest took 86 days (and failed), the 2014 Taiwanese Sunflower Movement took 23 days, and the 2011 Egyptian revolution took 17 days. People may decide to join other people on the street at different points of time, and different points of time would bring different levels of cost and benefit into the rational calculation.

Inspired by the works in behavioral economics, formal theories, and psychology, this chapter suggests that *an individual's level of patience* plays a significant role in explaining the time points to join the mass demonstration. Patience influences how ordinary people calculated the immediate cost and expected future benefit for joining the protest at different time points. If an individual joins the protest in the early stage, he or she may expect to stand in the freezing cold winter for weeks or even be arrested for the possible overturn of the authoritarian regime. However, joining the protest earlier may attract more people to come, which ultimately increase the probability of success. Therefore, individuals who discount the future benefit less - which may originate from a democratic system, the rule of law, or fair election (Diamond, 1999; Ostrom, 1997) - should be much more likely to join the protest in the early stage. When the demonstration went further to the later stage, since the future outcome may be closer and the probability of being punished is lower, people with a moderate level of patience would also join the protest. This argument will be further formalized in the next section.

Investigating the relation between intertemporal choice and the dynamic of protest can contribute to many aspects, theoretically and empirically. First, it may provide a psychological mechanism explaining how people decide to participate in the protest at different points of time. Second, the psychological mechanism can be further used

for civic empowerment and mobilization. Patience is considered as temporally stable but can also be trained, and recent studies on patience and self-control show that an individual's ability to delay discounting can be trained and extended (e.g. Holbein, 2016; Wu, Cheng and Chiou, 2017). Third, Wilson (2011) noticed that the discount factor is widely used in the formal models derived by political scientists, but the empirical investigation on the impact of the discount factor on the behavior is scarce. In a recent work modeling people's decision of protest in a repeated game, Meirowitz and Tucker (2013) directly pinpoint that "*...to the extent we can successfully estimate individual discount rates, we should be able to get a good predictor of who protests.*" Therefore, if we can find a positive and robust relationship between protest and intertemporal choice, we can not only verify previous formal models linking discounting factor and protest but also render policy suggestion for the democratic consolidation.

The remainder of this chapter is organized as followed. Section 7.2 will provide a mathematical model formalizing why intertemporal choice may influence people's decision to join the protest at different points of time, and why those with a higher level of patience tend to join in the early stage. In Section 7.3, the theoretical prediction will be falsified by the *Ukraine2007* ($n = 6774$) (Lehmann, Muravyev and Zimmermann, 2012), a face-to-face interview conducted by Institute for the Study of Labor, IZA. The representative ULMS 2007 includes a measure of patience and a series of item asking when the Ukrainian respondents participated in the Orange Revolution. In the end, Section 7.4 concludes my findings and discusses its possible linkage to education, group identity, and the macro-level political cleavage.

7.2 Patience and protest: A model and literature review

First, I assume that there is a country with N citizens. A demonstration can succeed if more than the critical mass T citizens goes into the street (Marwell and Oliver, 1993).

In the society, there are two groups of citizens - the core activists C ($C < T$), and the ordinary people $N - C$. It is reasonable and meaningful to distinguish between the activists and the ordinary individuals in the mass demonstration since there are always debates over whether the mass demonstration is elite-driven or not. For the case of Ukraine Revolution, Lynch (2010) analyze how the pro-democracy activists in Ukraine tried and failed since 2000 or since the collapse of USSR, how Yushchenko and Yulia Tymoshenko chose to join or not to join each movement, and how the pro-Yushchenko ally could be formed before the 2004 Presidential Election. Furthermore, Shukan (2010) analyzed the documents provided by Yushchenko and Tymoshenko's campaign team to show how the activist groups set a quota for mobilization, organized, collected and distributed resource, and shaped the discourse before, during, and after the Orange Revolution.

However, it would be insufficient to merely focus on the activist groups when analyzing the mass demonstration. As is discussed earlier, on the evening of the runoff Election Day in 2004, the Yushchenko's campaign team mobilized only 25,000 activists, but the number of protesters who stood in the snow was ten times more than that activists. In a national representative survey conducted by the National Academy of Sciences of Ukraine in early 2005 (Stepanenko, 2005) (NASU 2005 hereafter), 45% of the respondents believed that the Orange Revolution was a "conscious struggle of the people" or "spontaneous people's protest", while only 23.9% and 12.4% thought the revolution was "prepared with Western support" or "by political opposition". Therefore, the core activists and ordinary people are both critical in the analysis of political participation, and I meaningfully distinguish them for the analytical reason above.

All citizens had a net democratic benefit D if the demonstration against the large-scale electoral fraud succeeded. D serves as a public good such as a fair electoral system and the rule of law, which is non-excludable and non-rivalrous. Undoubtedly,

people joined the protest for a variety of reasons. However, for the case of Orange Revolution, Fournier (2010) conducted surveys during the period and revealed that one primary reason for people to go to the street is for "restoring order (*poriadok*).” During the protest, the sticker saying "We will not give Ukraine to bandits (*Ne viddamo Ukrainy bandytam!*)” was plastered all over Kyiv. Besides, NASU 2005 shows that most Ukraine people believed that the Orange Revolution was a protest "against the authorities" (41.9%), while only 5.2% thought it was "a choice between the West and Russia".³ Even though the motivation for joining the protest varies, this simplest assumption D for all citizens is not unreasonable.

The mass demonstrations can then be divided into four stages. In Stage I, large-scale electoral fraud had not happened, and it was the stage for the activist groups to emerge, network, organize, and practice. In short, the number of activists C is assumed to be determined exogenously in Stage I. Most importantly, the activist groups may prepare the prerequisites which make the mass demonstration possible. For example, Tymoshenko and other opposition lawmakers tried to occupy the UT-1 television station in September 2002. According to Lynch (2010)'s analysis, all the central television stations reported the event, which was the first time many Ukrainians heard of such an action opposing the President since President Kuchma controlled all mass media. Before the runoff election in 2004, Yushchenko's campaign team worked with the youth organizations to create "volunteer popular brigades (*dobrovolny narodny druzhyni*)" which oversaw all polling stations and counted the votes (Shukan, 2010). These actions can mitigate the severe problem of information transparency in the authoritarian setting, and make fraud able to be witnessed by all citizens.

When large-scale electoral fraud surfaced, for simplicity, I separate the following mass demonstrations into two stages. Stage II is the early stage which started on the day of electoral fraud; Stage III is the later stage, when the demonstration had existed

³ The respondents can list three thoughts in the survey

for several days and the later comers knew that there were already many protesters on the street. The number of people joining in the protest in Stage II is k_2 , and the number of individuals joining in Stage III is k_3 . In Stage IV, the result of the protest will be announced. If the protest succeeded, all citizens would receive D and 0 if it had failed. However, the probability of success is decided by the ratio of the total number of protesters and the threshold of critical mass, which is $\frac{C+k_2+k_3}{T}$.

It is costly to join in Stage II and III, which is defined as $-S$ for all protesters in each stage. Protesters had to stand in the street in the snowy days with wet socks. Unfortunately, alcohol was banned by the core activists. Police officers trooped around the tents, and rumor of military intervention was rampant. On the night of November 27, Yushchenko and Tymoshenko warned the protesters that police would bring down the tents at 2 AM. It did not happen in the end, but all protesters stayed awake for the whole night. It was worse for Ukraine without Kuchma in 2001 and Rise Up, Ukraine! in 2002, which ended up with violence and arrests.

The ordinary people have different level of patience, δ ($0 \leq \delta \leq 1$).⁴ δ is defined as how much an individual discount the future outcome in the next stage. For people who participated in the protest in Stage II, their expected benefit on the night of the electoral fraud was $(\delta_{k_2})^2 \times D \times \frac{C+k_2+k_3}{T}$, while the expected cost is $-S - \delta_{k_2} \times S$. For those who joined in Stage III, the expected benefit was $\delta_{k_3} \times D \times \frac{C+k_2+k_3}{T}$ with expected cost $-S$.

Since the democratic benefit D is a public good, an individual had good reason to stay and home and enjoy a glass of Vodka for the winter. An individual's decision to join the protest or not will be influenced by his level of patience, the number of protesters in each stage, and the benefits and costs. For the ordinary citizen i at the time of Stage II, if he calculate the payoff strategically, he would join the protest if $(\delta_i)^2 \times D \times \frac{C+k_2+k_3}{T} - S - \delta_i \times S \geq (\delta_i)^2 \times D \times \frac{C+k_2+k_3-1}{T}$. For the same citizen at the

⁴ The reason why $0 \leq \delta \leq 1$ can see Chapter 2

time of Stage III, he would join the protest if $\delta_i \times D \times \frac{C+k_2+k_3}{T} - S \geq \delta_i \times D \times \frac{C+k_2+k_3-1}{T}$. If i chose not to participate in the protest, the probability of success at the end Stage IV might slightly decrease by $\frac{-1}{T}$, but he did not need to suffer from $-S$ or even $-S - \delta_i \times S$.

Lamma 1: People who joined the protest in Stage II have higher level of δ than those in Stage III

The proof from the super-simplified model is below: for a rational citizen to join the protest in Stage III, his level of patience will be at least $\delta_{k_3} \geq \frac{S \times T}{D}$. For him to join in Stage II, his level of patience will be at least $\delta_{k_2} \geq \frac{S \times T(1 + \sqrt{1 + \frac{4D}{S \times T}})}{2D}$. Since $\frac{D}{S \times T}$ is positive, $\delta_{k_2} > \delta_{k_3}$, which means that people who joined the protest in Stage II have higher level of δ than those in Stage III.

One major weakness for the calculation above is that the number of protesters in each stage are canceled out with each other in the decision-making process, which would not be the case. To relax this assumption, we can assume that the probability of success is not a linear function but a parabolic one, such as $(\frac{C+k_2+k_3}{T})^2$. In this scenario, the lowest level of patience for people to join in Stage II will be $\delta_{k_2} \geq \frac{S \times T^2(1 + \sqrt{1 + 4D \frac{2(C+k_2+k_3)}{S^2 \times T^2}})}{4D \times (C+k_2+k_3)}$, while join in Stage III will be $\delta_{k_3} \geq \frac{S \times T^2}{2D \times (C+k_2+k_3)}$. Since $\sqrt{1 + 4D \frac{2(C+k_2+k_3)}{S^2 \times T^2}} > 1$, $\delta_{k_2} > \delta_{k_3}$. Besides, this scenario also shows how the initial preparation by the activist group C works. If C is larger, both δ_{k_2} and δ_{k_3} will decrease, indicating that more people may join the protest if the core activist group can contribute more at the beginning. Besides, δ_{k_2} and δ_{k_3} are both a function of k_2 and k_3 . If we take the first derivative of k_2 and k_3 on δ_{k_2} and δ_{k_3} , it will be negative in all cases. Therefore, the number of protesters in Stage II and Stage III will help each other to mobilize more people to come, which can be seen as the cascading effect for mass mobilization. However, it would be worth noticing that the k_2 and k_3 are

decided by the distribution of the level of patience among all citizens.

In the end, if people did not think strategically but only consider their own actions, they would join in Stage II if $(\delta_i)^2 \times D \times \frac{C+k_2+k_3}{T} - S - \delta_i \times S \geq 0$ and join in Stage III

if $\delta_i \times D \times \frac{C+k_2+k_3}{T} - S \geq 0$. Under this assumption, $\delta_{k_2} \geq \frac{S \times T(1 + \sqrt{1 + \frac{4(C+k_2+k_3)}{S \times T}})}{2D \times (C+k_2+k_3)}$, while

$\delta_{k_3} \geq \frac{S \times T}{D \times (C+k_2+k_3)}$. Since $\sqrt{1 + \frac{4(C+k_2+k_3)}{S \times T}} > 1$, $\delta_{k_2} > \delta_{k_3}$ in any condition, indicating

that those who joined in Stage II must have a higher level of patience than those in Stage III.

To sum up, the discussion above shows that ordinary people with different level of patience may join the protest at various points of time; how people view the future plays a significant role in the fate of mass demonstration. The four-stage model also extends previous studies which assume the mass demonstration to be a one-shot game and all people behaving simultaneously (e.g. Weingast, 1997; Acemoglu and Robinson, 2001; De Mesquita, 2013).

Before the empirical analysis, some evidence had shown that patience, or the perception of future, is an essential factor for people to join the mass demonstration like the Orange Revolution. In NASU 2005 (Stepanenko, 2005), about 20% of the Ukraine respondents pointed out that Orange Revolution was a protest "for the next generation." In the documentary *THE ORANGE CHRONICLES* mentioned earlier, a grandma wearing down jacket who was interviewed on November 23 claimed that "...For me, it is all the same. I've lived my life. However, for the happiness of my children and grandchildren, I came here. Moreover, I will not leave until the government is changed." In the political rap *Razom Nas Bahato* (Together we are many)⁵ which became the unofficial anthem for the Orange Revolution for the first day, the lyrics kept reminding the protesters that "...what you wanna say to your daughters and sons? You know the battle is not over until the battle is won!" The

⁵ <https://www.youtube.com/watch?v=PZLmE1OW2nU> Access: 20 May 2017

idea and framing of time are common in the protest, but whether it can help us understand people's decision to join awaits examination.

7.3 Data and measure

The Ukrainian data comes from *Ukraine2007*, a face-to-face interview conducted by Institute for the Study of Labor, IZA. A critical feature in *Ukraine2007* is that the questionnaire not only asked whether the respondent participated in the Orange Revolution, but also when they got involved. This question is important because there were also protests before and after the period of the Orange Revolution. Starting from early 2004, student activists like *Pora!* already organized and protested against the president Leonid Kuchma. Before the runoff election, election irregularities in the first-round and presidential candidate Yushchenko's mysterious poisoning episode also caused sporadic protests. On 8 December, the former members of the Central Election Board resigned, and Kuchma signed a new law to limit his power, and the protesters ended the blockade of all administrative buildings. Still, many protesters stayed in the Independence Square and nearby street until Yushchenko eventually won the rerun runoff election on 26 December.

Therefore, Ukrainians who decided to participate in the protest at different time points might have hold different motivations. For those who protested before the runoff election fraud, they were a much more likely to be idealists who held strong ideological stance. These activists may not have been captured by the PD game model since their ideal surmounted the cost. When the election fraud surfaced, it sent a signal to the ordinary people that the incumbent did not care about those activists and still wanted to steal the election. The ordinary people faced a collective action problem because the government was able to violently punished the protesters (and it was freezing outside). After the Supreme Court had announced that the runoff must have to be repeated, the Orange Revolution was formally justified; those who

came out to the street after the announcement faced smaller uncertainty compared to those who protested before. *Ukraine2007* makes it possible to test this compound dynamic of protests across the progress of the Orange Revolution.

7.3.1 DV: Measure of the time to participate in the Orange Revolution

In *Ukraine2007*, subjects were asked whether they participated in the Orange Revolution, and when they participated by the items followed:

During the presidential election process in October-December 2004, the so-called Orange Revolution took place in Ukraine. We would like to ask you some questions about these events. Of course, these questions are somewhat sensitive, but please keep in mind that your answers will be kept anonymous and confidential. Since it is vital for researchers and policymakers to have a detailed picture of the political motivations of Ukrainian citizens, we very much hope that you will be able to answer these questions.

I64. Were you personally involved in such political activities surrounding the three elections? Yes/No

I65. Please try to remember when you started participating in these political activities. Was it

1 before the first election round (before Oct. 31, 2004)

2 between the first and the second election round (Nov. 1, 2004 Nov. 21, 2004)

3 soon after the second election round (Nov. 22, 2004 Dec. 8, 2004)

4 soon before the third election round (Dec.9, 2004 Dec. 26, 2004)

5 after the third election round (after Dec. 26, 2004)

In the dataset, 405 in 6774 (6.0 %) claimed they had ever participated in the Orange Revolution. The percentage is smaller than in Way (2010)'s study which is 17%. There are several possible reasons to explain this gap. One primary reason could be that Yushchenko and Tymoshenko's performance during 2004-2007 was not as good

as expected, so some revolutionaries might have felt shameful to reveal their past participation. It is also possible that the respondents were tired and wanted to avoid answering more questions. In *Ukraine2007*, the items related to the Orange Revolution are numbered 1720 and more, indicating that the respondents had answered over 1700 items before this section! (But all of the previous items were not related to politics; they asked questions which relates to employment and lifestyle, which includes the measure of intertemporal choice discussed in Section 3.5.3). However, this chapter aims to examine whether patience influences the decision of participating in the protest, and I do not see a theoretical reason of how intertemporal choice may influence the answer, and how the gap may bias the analysis.

Among the 405 revolutionaries, 77 (19.0 %) joined the revolution before the first election, 94(23.2 %) between the first and the runoff, 100 (24.7%) immediately after the runoff (when the Orange Revolution formally started), 55 (13.6%) before the runoff repetition (after the supreme court's decision and protesters' exit from the governmental buildings), and 8 (2.0%) after the final election.

The reason for Ukrainian to participate in the protests before the runoff may come from Yushchenko's poisoning episode before the election, anti-Russia movement, or anti-Kuchma movement since 2000. Nevertheless, the possibility that participants failed to recall the exact date of participation cannot be ruled out, especially since this survey was conducted two years after the Orange Revolution.

For further analyses, respondents who participated the Revolution before the large-scale election fraud were combined, and those who came out into the street after the Supreme court's announcement were also combined. On 3 December, Ukraine's Supreme Court announced that a re-run runoff had to be held on 26 December because of the overwhelming election fraud. This resolution was seen as a pathway to victory for the Yushchenko camp. Meanwhile, Yanukovich stated that he ceased claiming the victory to avoid social conflict. On 26 December, the runoff election was

monitored intensively by both local and international observers. With no grave concern throughout the voting process, Yushchenko won the election by 8% (52%:44%), and the Election Commission declared the result on 5 January 2015.

7.4 Descriptive analysis

Figure 7.1 shows the distribution of subjects' level of patience in each group (the measure and calculation of patience can be found in Chapter 3, pp. 35-37), in which the blue lines are the distribution of the non-participants, while the red lines indicate the distribution of protest participants in each period. The errorbars are the 95% confidence intervals.

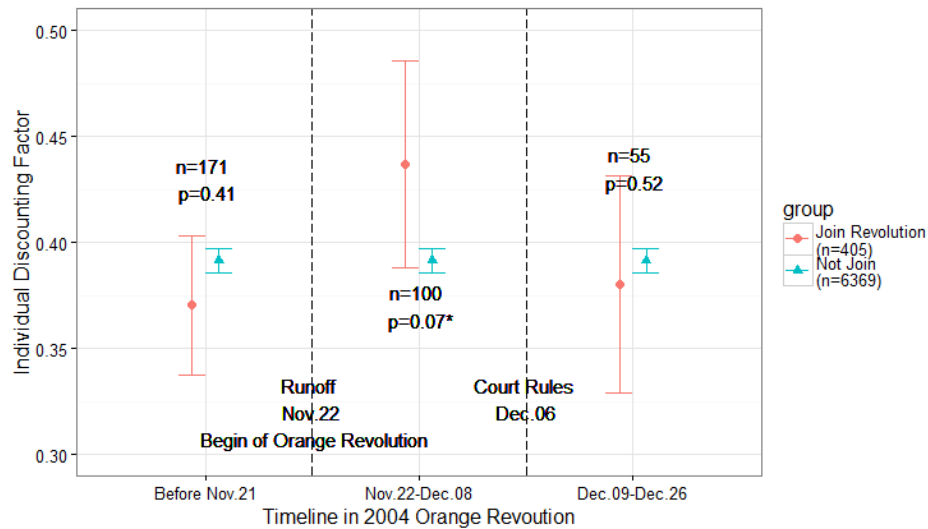


FIGURE 7.1: Level of Patience among different stages of Orange Revolution participants

Consistent with Lamma 1, it is clear that the Ukrainians who joined the protest in the second period in Figure 7.1 have a higher level of patience. Two-tail t-test suggests that the difference reaches a statistically significant level ($p = 0.07$). These protesters also have a statistically higher level of patience compared with those before the election fraud or after the Supreme court's announcement ($p = 0.052$ and 0.057 , respectively). Therefore, even though all protesters joined the same protest,

their level of patience makes them calculate the decision about WHEN they joined. This distribution is consistent with the theoretical analysis of the difference between participants in Stage II and Stage III.

The model in this chapter did not assume the level of patience that core activists in Stage I exhibit. Interestingly, Figure 7.1 indicates that those who joined the protest before the runoff election, who should be the core activists, did not have a higher level of patience. According to social construal theory (Liberman and Trope, 1998), idealists should have a higher level of patience since they can use their ideology to imagine what would or should happen in the future. However, that is not the case in the Orange Revolution.

Critics may be concerned over arbitrarily separating the massive protest into two or three stages, and I wholeheartedly agree with this concern. In *Ukraine2007*, the respondents were also encouraged to recall the exact day for them to join and leave the Orange Revolution. Unfortunately, the non-response rate is too high - only 114 in 405 respondents gave the exact dates. Therefore, this small response rate severely limits the possibility for further analysis.

7.5 Multinomial regression analysis

Since the dependent variable is the points in time to join the revolution or not, multinomial regression will be used to control for the potential influences from the covariates.

7.5.1 Covariates

The most important covariate for joining the protest is the personal network (e.g. Finkel, Muller and Opp, 1989; Schussman and Soule, 2005). In *Ukraine2007*, Ukrainian respondents were also asked that if they knew that their friends or colleagues also participated in the Orange Revolution. Their responses were coded 1 for knowing, and 0 for not knowing. Overall, 21.3% of respondents (1443 in 6774) knew

that their friends had joined the protest. Unfortunately, the item failed to distinguish between whether the respondents made their decisions to protest before or after they knew their friends' decision. Since the analysis of the network is beyond the scope of this chapter, I simply add this binary variable to capture the influences of the personal network.

The second group of covariates is ethnic identity and policy preference. For ethnic identity, respondents who self-identified as Ukraine scored 1, others as 0 (including Russian, Byelorussian, and Jewish). Albeit Stepanenko (2005)'s survey showed that only 5% of Ukrainians believed that the Orange Revolution is "a choice between the West and Russia," other studies still show that EU-integration was a critical issue throughout the campaign (Shukan, 2010). In *Ukraine2007*, respondents were asked: "*In your opinion, which state union would be better for Ukrainian people to live in, the European Union or in the union with Russia, Belarus and Kazakhstan.*" The responses are coded 2 for "In the European Union," 1 for "Rather in the European Union," 0 for "No union with any other country," -1 for "Rather in the union with Russia, Belarus and Kazakhstan," and -2 for "In the union with Russia, Belarus and Kazakhstan." I expect that these two variables can help capture the influence of policy preference on the decision to protest. Moreover, these variables may help explain why some Ukrainians were core activists and chose to protest even before the large-scale fraud in the runoff.

The last group of covariates is the traditional "resource" model. Respondents' age (in 2007), gender (female=1), and level of education (0 12 grade) are included in the regression analysis. Previous studies on self-control and patience show that age, gender, and education may influence one's patience (e.g. Schmidt, Lamm and Trommsdorff, 1978; Mello and Worrell, 2006). Controlling for this socio-demographic background can help clarify the effect of patience on joining the demonstration at different points of time.

The descriptive analysis of *Ukraine2007* can be found in Section 3.5.3 and Table 3.5. Table 7.1 shows the descriptive statistics and correlations of the variables used in the regression analysis. In Table 7.1, patience is not correlated with joining the Orange Revolution when we combine all stages. Patience is negatively correlated with age and female, which is consistent with the previous study in Ukraine one year before the *Ukraine2007* (Klochko and Ordeshook, 2005). However, Klochko and Ordeshook only collected student samples. In comparison, *Ukraine2007* provides a valuable opportunity to extend the representativeness of the sample and help us further understand how intertemporal choice influences other preferences and behaviors.

Table 7.1: Pearson's R correlation of *Ukraine2007*

	Patience	Join_O	Fri_J	Uk_ID	EU_att	Age	Female
Joined O' Revolution	0.00						
Friends also joined	-0.01	0.41*					
Identified Ukrainian	-0.01	0.06*	0.08*				
Preferred EU	0.05*	0.17*	0.25*	0.23*			
Age	-0.10*	-0.05*	-0.09*	-0.08***	-0.25*		
Female	-0.07*	0.00	-0.02	0.00	-0.03*	0.08*	
Education	0.02	0.06*	0.07*	0.03*	0.12*	-0.30*	0.01

Note:

*p<0.05

Besides, knowing that friends also joined the Orange Revolution is positively correlated with one's willingness to join, but not with patience. The null finding may mitigate the problem of endogeneity that one may discount the future less because of perceived cooperation, as was suggested by Klochko and Ordeshook (2005). In the end, people's preference over EU integration was also strongly correlated with joining the Orange Revolution. Therefore, it is necessary to include ad control this vital issue during the campaign.

7.5.2 Regression result

Table 7.2 provides the analysis of multinomial models explaining who and when Ukrainian participated in the Orange Revolution. The base group for comparison

is the non-participants, while each column is the estimated coefficient for the participants in each stage of the protest. The *nnet* library conducts the analysis in R 3.1.3.

In the second column of Table 7.2, consistent with the Lamma 1, those who joined and created the revolution were those who had a higher level of patience, even when we control for the impact of the respondent's personal network, national identity, and personal resource. However, the similar effect does not appear in the core activists and latecomers in column 1 and 3, respectively. This result echoes the distribution in Figure 7.1, indicating that protesters' personality may influence how they calculate the cost and benefit for joining the protest, and therefore influences when did they participate in such a history-changing mass mobilization.

Besides, those early comers in column 2 are also who are captured by the PD game models. Weingast (1997) suggested that citizens will cooperate and punish the government when the government transgresses the human right if they "discount the future less" and "know others will also react." In column 2, both patience and the perception that friends also joined the protest are the most important determinants for Ukrainian to join the Orange Revolution right after the large-scale electoral fraud were revealed on 21 November 2004. These citizens successfully solved the problem of collective action as is suggested by the formal models.

However, those people in column 2 only accounted for part of the protesters in the Orange Revolution. In column 1, the core activists - who protested before the fraud - did not have a higher level of patience. Instead, they held the most robust attitude toward EU integration. The result is not surprising since Yushchenko and his campaign team are the leading promoters of the pro-European stance. Even though the youth organization Pora! claimed that it aimed at protecting the democratic process and legitimacy of the election, it is believed that pro-European attitude also motivated the young people to organize and protest against Kuchma and Yanukovich

Table 7.2: Multinomial regression explaining participating in the Orange Revolution, *Ukraine2007*

	<i>Dependent variable:</i>		
	<i>Before_runoff</i>	<i>After_fraud</i>	<i>After_court</i>
	<i>Not – join</i>	<i>Not – join</i>	<i>Not – join</i>
Level of Patience	–0.415 (0.393)	0.857** (0.433)	–0.234 (0.666)
Friends also joined the protest	2.975*** (0.224)	3.997*** (0.427)	3.481*** (0.443)
Identified as Ukrainian	0.003 (0.266)	0.236 (0.374)	0.532 (0.494)
Ukraine should be closer to EU	0.277*** (0.064)	0.245*** (0.083)	–0.018 (0.104)
Female	–0.054 (0.167)	–0.152 (0.213)	–0.049 (0.287)
Age	0.004 (0.005)	0.0001 (0.007)	0.011 (0.009)
Level of Education	0.115 (0.080)	0.100 (0.103)	0.494*** (0.173)
Constant	–6.263*** (0.957)	–8.055*** (1.278)	–12.390*** (2.045)
Akaike Inf. Crit.	2433.705	2433.705	2433.705

Note:

*p<0.1; **p<0.05; ***p<0.01

before the runoff election (Kuzio, 2006b). Several days before the runoff election, the documentary director of the Orange Revolution⁶ interviewed a protester who had already stayed at the Independence Square, saying that “...the young people of Ukraine vote against Yanukovich, not for Yushchenko, but against Yanukovich, for we want to be a European country...and not in the Soviet Union republic...”

Besides, the third column in Table 7.2 shows that those who participated in the Orange Revolution after the Supreme court’s announcement were those with a higher level of education; meanwhile, they did not have a higher level of patience, nor were they pro-European. This result is entirely different from previous study which only

⁶ See footnote 7.1.

sees the protest as a whole (Beissinger, 2011). Instead, Table 7.2 further evidenced that people joined the protest at different stages owing to the different weights toward the future. Regarding the impact from education, I did not have a theory for this distribution, but my guess is that the court justified the revolution so that people with higher education were much likely to join and pursue the rule of law.

It is worth mentioning that the *age* variable is not significantly correlated with joining the Orange Revolution in all stages. This result is counterintuitive at first sight since it is widely recognized that youth organization plays a significant role in the protests for years (Kuzio, 2006a). Actually, in *Ukraine2007*, the average age for Orange Revolution participants was significantly younger than the non-participants (40.45 to 44.09, $p < 0.001$ by T-test). If we only put the age variable into the multinomial regression model, young people are significantly much more likely to join the Orange Revolution before and immediately after the runoff ($p < 0.05$ in Stage I and $p < 0.01$ in Stage II), which is consistent with the previous observations. However, the negative correlations disappear when the variable "friends also joined the protest" is added to the regression model. Goldstein (2007) illustrates how the Internet and mobile phone helped the spread of information and organizing the protest during the Orange Revolution, which implies that young people who mostly used the technology were much likely to perceive that his or her friends also joined the protest.

7.5.3 *Reverse causality?*

An alternative explanation for the finding linking patience and protest is that those who participated in the Orange Revolution became more patient since they won eventually. For example, Duan, Wu and Sun (2017) show that people who received power tend to discount the future less in an experimental setting. Klochko and Ordeshook (2005) also provide a theoretical model suggesting that people may increase their level of patience through interaction and learning across time.

However, I would like to argue that this is not the case for the analysis above. In Chapter 3, I have shown in Study 1 and 2 that people's level of patience will not be easily changed by the changing political context. In Chapter 6, I also show that the closeness of election did not correlate with the U.S. voters' level of patience. If patience increased owing to the success of the movement, we should observe that all participants of the Orange Revolution should have a higher level of patience. Especially, the core activists and Yushchenko's campaign team in Stage I should enjoy the biggest increase in their level of patience. Nevertheless, such distribution does not appear in Figure 7.1. Moreover, studies show that the measure of patience is quite stable across time (e.g. Kirby, 2009; Martínez-Loredo et al., 2017). Therefore, I would like to argue that it was an individual's level of patience that influenced how he or she decided to join the Orange Revolution at different stages.

7.6 Conclusion and future works

By exploiting the *Ukraine2007* and investigating the case of Ukraine's Orange Revolution, this chapter extends previous understanding of protest participation. People may join the mass demonstration at different points of time owing to their rational calculation, which is based on how much people discount the future outcome. Even though previous studies provide ample evidence linking protest with personality (Brandstätter and Opp, 2014), the perception of others (Opp and Kittel, 2010), political efficacy (Muller and Opp, 1986), and socio-demographics (Dalton and Klingemann, 2007), they usually treat the protest as a whole and neglect the nuance between the core activists, early comers, and late-comers. Thus, the findings in Chapter 7 are essential since recent mass demonstrations usually took weeks and even months. This analysis also extended previous studies on Orange Revolution which categorized the respondents by their action rather than by the timeline (Beissinger, 2013).

The result in this chapter provides a significant implication to the core activists who have prepared for the "focal point" to shake the politics. The result in the multinomial regression implies that more people will join the protest at the early stage if they were disposed to be more patient. At the end of the literature review, I have provided numerous discourses in the Orange Revolution that emphasized the concept of future such as "your sons and daughters." If the early comers are crucial for the following cascade, the core activists may try to include the framing of the future for attracting more early comers.

The result also speaks to previous studies on the theories of democratic consolidation. In Weingast (1997)'s repeated PD model, patience and the belief of others' cooperation are both the necessary condition for citizens to cooperate against the government's transgression of human right. However, no empirical evidence had ever provided to falsify the previous prediction. In Table 7.3, the early comers, who tend to have a higher level of patience and are more likely to be influenced by their friends' behavior, closely fit Weingast's prediction. However, the same model failed to explain the participants in Stage I and III. Why did the idealists not have a higher level of patience? Future work may focus on how the activists see the future.

Besides, this result may provide a psychological mechanism behind the socio-demographic background on explaining protest participation. Based on the World Value Survey datasets from 1999 to 2002 in 50 countries, Dalton and Klingemann (2007) suggest that education and group membership are the two most important individual-level determinants for explaining protest behavior. For explaining how education promotes joining the protest, the authors assert that education may bring "political skills" and is evidence of a "personal resource." However, the logic linking (higher) education and political skill is vague. What kind of political skill could an undergraduate student majoring in electrical engineering learn during the completion of his degree? One recent study points out that the training of patience at school

is the main reason why education increases turnout rate (Holbein, 2016).⁷ Another experimental study shows that people temporarily increase the level of patience when their group identity is mentioned (Benjamin, Choi and Strickland, 2007). Therefore, it is possible that education and group membership increase the protest behavior just because they increased the level of patience among the citizens.

In the end, even though both patience and the perception of others are necessary, further analysis of the multinomial regression shows that their interaction is not predictive of the protest behavior. In the PD game, an individual will choose to cooperate if and only if the person is patient enough *and* believe that others will work together. However, the interaction between the two factors in the regression model did not provide extra motivation for Ukrainian people to join the Orange Revolution at any stage. What is the motivation behind a farsighted individual who will protest given he had perceived that others would not cooperate? Is he a privileged member or ideology-driven? Future work may further investigate how patience influences the preference formation process and decision-making in politics.

⁷ Alternative explanation can see Sondheimer and Green (2010). Also, previous studies suggest the bi-directional influence between patience and academic performance (e.g. Bauer and Chytilov, 2010; Castillo et al., 2011; Mello and Worrell, 2006).

Patience and democratic consolidation: country-level analysis

In Chapters 4, 5, 6, and 7, the empirical evidence shows that intertemporal choice plays a vital role in our understanding of political participation. Citizens who discount the future less are less polarized on the issue of redistribution, are more likely to evaluate the incumbent based on national economic conditions, are more responsive to the political opportunity structure, and are more likely to show up when democracy is in peril. In contrast, myopic citizens are more likely to be polarized, care about their pocketbook, turn out for reasons other than ideology, and be absent from protests.

Overall, the level of patience among citizens should significantly influence how well democracy works. If the majority of citizens are myopic, the most straightforward strategy for vote-seeking candidates and parties is to engage in vote buying and clientelistic patronage in order to win the election (Scott, 1969; Magaloni, 2006). Vote buying and clientelism will benefit voters' pocketbooks at the expense of national economic growth and mobilize turnout regardless of the policy platforms of the candidates or parties. Meanwhile, myopic voters (and politicians) care less about long-term

economic reforms. In contrast, if the majority of voters were farsighted enough, the incumbent would be encouraged to propose painful and long-term economic reforms, as suggested by Stokes (1996). In the long run, a country with patient citizens is likely to have better national economic performance and programmatic policy linkage.

To test this country-level hypothesis, I need to acquire country-level data on the patience of voters. In this chapter, the data, including the level of patience among people in different countries, is drawn from Wang, Rieger and Hens (2009). In that project, undergraduate students are recruited from the departments of economics, finance, and business administration in 45 countries ($n = 5530$). Wang and her colleagues measure the level of patience by means of two matching task items: (1) \$100 now = \$() one year from now; (2) \$100 now = \$() 10 years from now. Participants' subjective time preferences can be estimated by two parameters, δ and β in a hyperbolic discounting model, where β is the level of present bias, and δ is the traditional long-term discount factor, both of which represent the personal level of patience. Specifically, $\delta = (\frac{Q_1}{Q_2})^{1/9}$, and $\beta = \frac{100}{\delta Q_1}$. In their work, only the mean and median values of δ and β are provided for each country.

8.1 Patience and GDP

One may question the representativeness of undergraduate economy majors for each country. Indeed, we can hardly use the opinions or tendencies of these students to infer the behaviors or opinions of the whole country. However, if these students are biased in a specific direction, that bias may exist in every country. In other words, I follow the assumption of Wang, Rieger and Hens (2009) that the relations between countries that we calculate based on economy-major students can roughly reflect the relations we would find if we used representative datasets.

Figure 8.1 shows the correlation between the level of patience in a country and its economic development. The measure of the economic performance is GDP per

capita in 2008, the year before Wang’s paper was published. The GDP data are from the World Bank.¹ Clearly, there are significant positive correlations between the two discounting factors δ and β and GDP per capita, with $r = 0.43, p < 0.01, \text{and } n = 37$ and $r = 0.45, p < 0.01, \text{and } n = 37$, respectively.

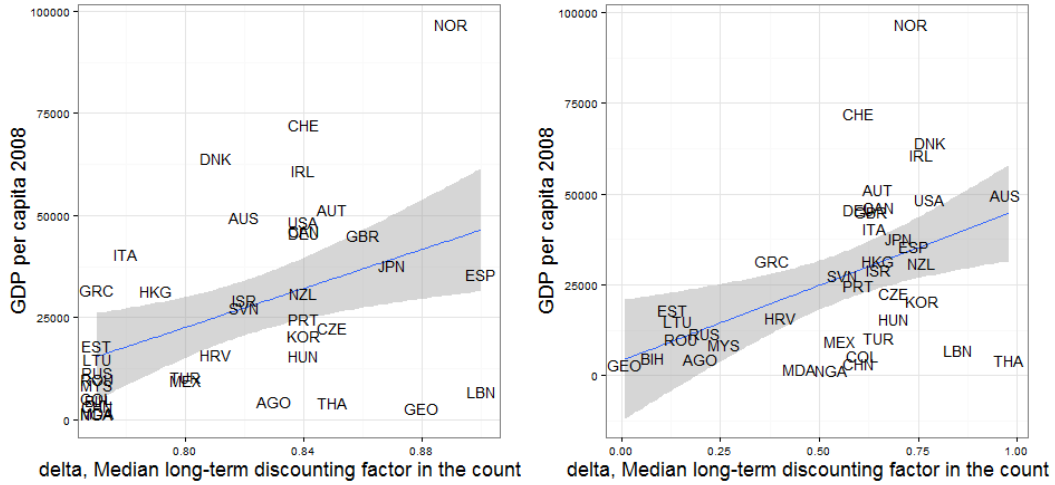


FIGURE 8.1: Intertemporal Choice and Economic Development, Country-Level

The underlying mechanism provided in this dissertation is that patient voters are much more likely to hold the incumbent accountable in terms of the national economy. If voters care more about the national economy because of their long time horizons, then parties and candidates have a stronger motivation to improve the national economy.

8.2 Patience and clientelism

Figure 8.2 shows the relationship between people’s level of patience and the level of clientelism in that country. The measure of party strategy was created by the Democratic Accountability and Linkages Project (DALP), which surveyed 1400 experts in 88 countries over the 2008–2009 period and created a clientelistic effort scale ranging from 4 to 20 for each country (Kitschelt, 2012). Figure 8.2 presents the negative

¹ <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?page=1>. Search date: September 1, 2015.

correlations between clientelistic effort and the two discounting factors, δ and β , with $r = -0.29, p = 0.08, \text{ and } n = 35$ and $r = -0.30, p = 0.07, \text{ and } n = 35$, respectively.

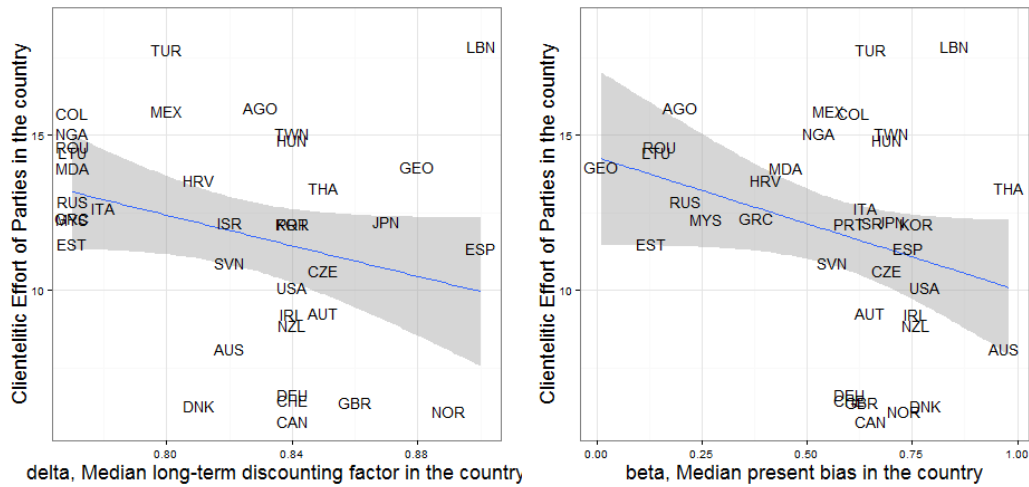


FIGURE 8.2: Patience and Clientelistic Linkage Strategy, Country-Level

Following the results in the previous chapters, the negative pattern shown in this figure can be explained by the fact that impatient people are much more likely to follow pocketbooks based on non-ideological issues, which creates opportunities for clientelistic patronage. In countries where people are farsighted, people care more about the national economy, so clientelism is less effective.

8.3 Patience and democratic consolidation

Figure 8.3 shows the scatterplot between intertemporal choice and the level of democracy, as measured by the Polity IV score.² In this figure, Polity IV 2012 data are used. The present bias of a country is positively correlated with the level of democracy ($r = 0.423, p < 0.01$), while the long-term discounting factor is not ($r = 0.189, p = 0.26$). Therefore, we find some evidence linking the level of democracy and people's level of patience.

To further explore the relation between intertemporal choice and democratic consolidation, Table 8.1 shows the simple regression results for explaining the Polity IV

² <http://www.systemicpeace.org/inscrdata.html> Access: October 15, 2015.

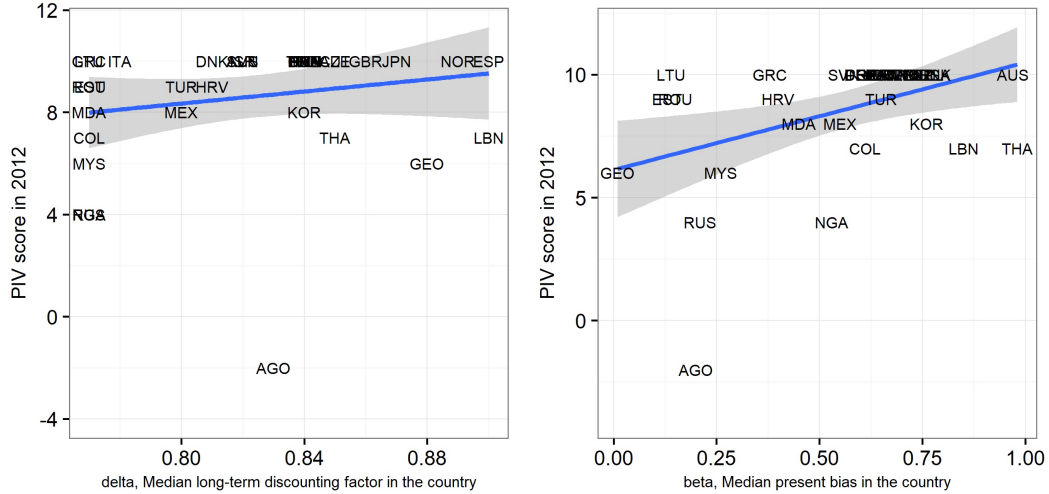


FIGURE 8.3: Patience and level of democracy, Country-Level

score in 2012. Model (1) shows that present bias can help explain the level of democracy of a country in 2012. In Model (2), I include GDP in 2008 to control for the possible influence of economic growth on democratic development. I also include the Polity IV score in 2002 to control for the original level of democracy in each country. Interestingly, the level of present bias among citizens remains positively correlated with the level of democracy in 2012. In other words, given the level of democracy of a country in 2002, the level of patience of its citizen can indeed improve its democracy after ten years. The economy matters, and so does patience.

However, since this cross-country dataset is only one shot, it is impossible to draw causal inferences based on available data. Moreover, the relationship between intertemporal choice and economic development may theoretically go in both directions. Patience makes people future oriented and sociotropic, and the rewards of an improved national economy – an increase in the pocketbook over the long term – would, in turn, increase the patience of individuals. Nevertheless, the combination of individual- and country-level results may help explain why voters around the world “emphasize different indicators at different times”(Lewis-Beck and Paldam, 2000).

Owing to the limitations and the possible bias of the datasets, it is perhaps not

Table 8.1: Intertemporal Choice and Level of Democracy

	<i>Dependent variable:</i>	
	Polity IV score in 2012 (-10 +10)	
	(1)	(2)
Long-term Discount	-1.718 (11.143)	-3.692 (10.944)
Present Bias	4.510** (1.846)	3.090* (1.728)
GDP in 2008		0.00004** (0.00002)
Polity IV 2002		0.040 (0.032)
Constant	7.460 (8.710)	8.412 (8.621)
Observations	37	37
R ²	0.180	0.392
Adjusted R ²	0.131	0.315
Residual Std. Error	2.308 (df = 34)	2.049 (df = 32)
F Statistic	3.725** (df = 2; 34)	5.148*** (df = 4; 32)

Note: *p<0.1; **p<0.05; ***p<0.01

necessary to perform a deeper country-level analysis. At the very least, Chapter 8 provides preliminary evidence on the aggregate level that people's level of patience can improve democracy through preference formation, voting, turnout, and protest behavior.

Conclusion: calm down and make democracy work

“Patience is bitter, but its fruit is sweet.” (Jean-Jacques Rousseau, 1711)

For thousands of years, the importance of intertemporal choice has been crystallized in proverbs and scripts passed down from generation to generation. A century ago, economists created the mathematical term “discount factor” to model how people (irrationally) discount outcomes that happen in the distant future. Five decades ago, psychologists and educational researchers revealed that a child’s tendency to wait for one more marshmallow is predictive of her future achievement and academic performance. Meanwhile, formal theorists started using discount factors to find solutions to the tragedy of the commons. Two decades ago, behavioral economists and public health researchers linked temporal discounting to a wide range of personal behaviors from risky driving to drug use. At the same time, psychologists developed different scales and treatments to explore how people think of the future (and the past). In the recent years, neuroscientists and doctors have relied on fMRI, patients with brain

damage, and genetic analysis to confirm the mechanism of temporal discounting. This dissertation shows that intertemporal choice can also help explain how people think and behave in politics. People’s opinions and participation will accumulate and determine the world they live in.

Figure 9.1 shows the number of patience-related articles cited in this dissertation by publication year and field. In this figure, political theorists use the discount factor across the time span. The study of intertemporal choice has boomed in psychology and behavioral economics after 2000, while political behaviorists and neuroscientists have expressed interest in intertemporal choice in recent years.

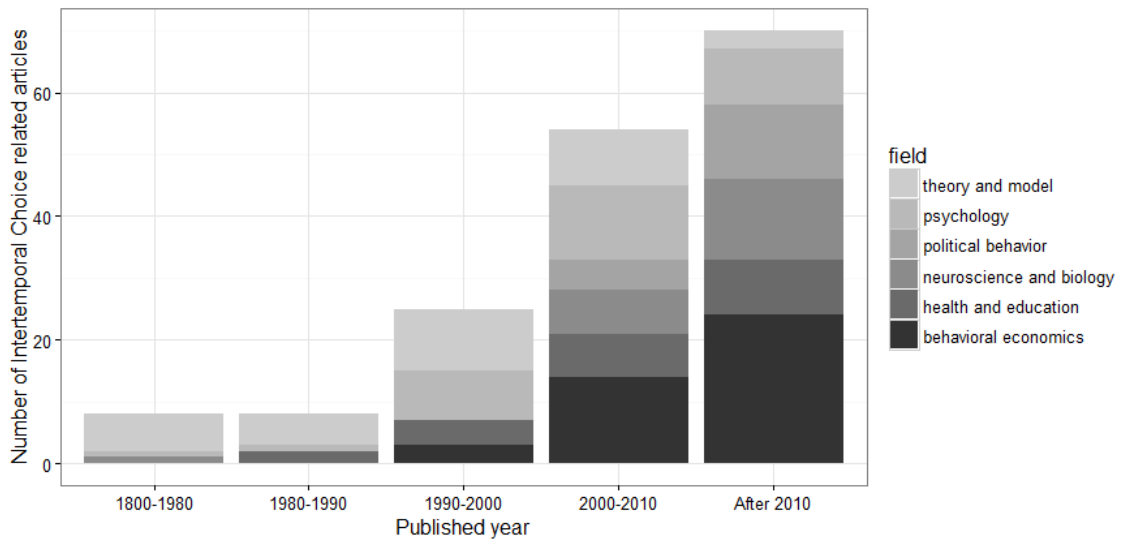


FIGURE 9.1: The number of intertemporal-choice-related articles cited in this dissertation by fields

9.1 Intertemporal choice and political science

This dissertation makes several contributions to political science knowledge. First, intertemporal choice is no longer an abstract constant mentioned only in introductory game theory classes. Intertemporal choice is now an individual-level attribute that can be measured, manipulated, and trained (Chapters 2, 3, and 6). The political science literature worried about the gap between the discount factor used in formal

models and its empirical falsification (e.g. Loewenstein and Elster, 1992; Wilson, 2011); keywords related to temporal discounting did not appear in the Handbook of Political Behavior or even in textbooks of political psychology. This dissertation tried to bridge this gap using measures developed in many disciplines and through empirical analyses of three democracies.

Second, this dissertation reiterates that intertemporal choice can enrich our understandings of political behavior. People do not treat their lives or their countries as single-shot games, which is implicitly assumed in many political theories and analyses. Once voters extend their time horizons beyond Election Day, individual differences in temporal discounting define their rationality. Chapters 4 and 5 show that future-oriented people focus more on the national economy and are less polarized in their preferences for redistribution. Seemingly irrational conducts can be explained when people discount the future less and treat the world and their lives as repeated games.

Chapters 6 and 7 show the power of intertemporal choice for explaining classic questions in political science – why do people vote and why do they join protests. In a democratic regime, political participation is always a costly long-term investment. Therefore, it is rational for citizens to calculate the intertemporal costs and benefits of participating in the democratic process. Contrary to the existing literature, this dissertation suggests that the relation between intertemporal choice and political participation is not linear. Chapter 6 shows that farsighted voters are much more likely to vote only if the candidates on the ballot are ideologically different enough. If this is not the case, farsighted voters are less likely to vote. Chapter 7 shows that patience drives people to protest only when electoral fraud has just happened; it fails to explain the decisions of core activists and of latecomers. This is why intertemporal choice matters to students of political behavior – it sheds light on how people make decisions in different scenarios at different time points, which is what the democratic process is about.

Third, the results of this dissertation highlight on an underlying mechanism to self-enforcing democracy. Przeworski (1991) indicates that democracy has to be self-enforcing, since no third party can enforce a contract requiring the ruler to hold elections. Fearon (2011) further suggest that citizens need shared knowledge from a public signal to hold incumbents accountable. In Fearon’s model, citizens who discount the future less are more likely to join a protest (see Proposition 2). Moreover, Fearon’s model suggests, “*protest by all those who see bad times would not be enough to make rebellion sufficiently safe, so individuals must expect that some share of those who experienced good times will be protesting as well.*” The empirical analysis in this dissertation supports both arguments. In Chapter 7, evidence from the *Ukraine2007* dataset shows that future-oriented Ukrainians and those whose friends joined were much more likely to protest against electoral fraud. In Chapter 5, people who discount the future less are much more likely to evaluate the incumbent based on changes in the national economy rather than on their pocketbooks.

In other words, farsighted people are much more likely to hold the government accountable, be less polarized, be responsive to the political opportunity structure, and to protest against government wrongdoing. These mechanisms will encourage politicians and parties to pursue better performance, build up programmatic policies, and diversify their policy stances – all of which will benefit the functioning of democracy. Limited evidence from Chapter 8 indicates that people’s patience correlates with the level of democracy, and patience can explain improvements in democracy in a country (in Table 8.1).

This positive feedback loop echoes de Tocqueville’s argument that patient people stabilize democracy in America. The results conflict with the argument of Hoppe (2001) that regular elections in democratic regimes will make politicians and citizens myopic. Chapter 3 suggests that Taiwanese people do not change their patience after the critical presidential turnover in 2016. Recent work by Shefer et al. (2017) also

shows that politicians are, in fact, much more farsighted than ordinary people.

As a result, a country with a sufficient number of patient voters can sustain a functioning democracy in equilibrium, which was indicated by Weingast (1997) in his two-level game. Overall, these mechanisms enrich the argument that “*Patience is a political virtue.*”

9.2 Future works

9.2.1 *Measurement and manipulation*

All studies suffer from some limitations. In Chapter 3, I provide evidence of the robustness and weakness of the ranked choice task scales I used in the *CCES2014*, *Taiwan2016*, and *Ukraine2007* surveys. The number of items in the ranked choice tasks is limited, which may not allow for a precise measurement of people’s level of temporal discounting. This problem can be solved by means of a newly developed adaptive choice task (Mahalingam et al., 2016), which I briefly introduced in Chapter 3. With advances in survey technology, the application of adaptive choice tasks to nationally representative samples may be feasible in the near future.

The manipulation of the level of patience in Chapter 7 is not strong. Even though life expectancy batteries can significantly change people’s level of patience in both directions, the size of the change is deplorably small. As I discussed in Chapters 2 and 3, it is not easy to manipulate people’s discount factors – genes and brain function partly determine people’s level of patience. Numerous treatments have been suggested to temporarily change people’s state of self-control, such as the Stroop test, ice cream, unsolvable algebra problems, and recalling sad and happy moments in life. Some of them may be applied to further explore the causal mechanism between intertemporal choice and political participation if they are able to be included into national-level questionnaires.

One issue related to manipulation of patience is distinguishing between state and trait temporal discounting (e.g. VanDellen, Hoyle and Miller, 2012). In most of the

chapters, except for Chapter 6, I focus on the relationship between a trait-like intertemporal choice tendency and political participation. I believe that an individual's level of patience in ordinary times is predictive of her political participation and policy attitudes. However, most of the treatments mentioned above aim to manipulate the "state self-control". Even though a causal relationship between the manipulation of the state self-control and political participation can be found, its generalizability to the "trait self-control" remains a concern.

9.2.2 Social discounting rate?

When I started my dissertation work four years ago, I planned to propose a new measure, the "social discount factor." Since MEL measurements are context independent, they may fail to capture how individuals calculate and make decisions under certain conditions, such as making choices in public affairs. A citizen's level of temporal discounting may be influenced by those he or she works or lives with. Using Anderson's phrasing, some citizens may not have a clear picture of an imagined community; they cannot spontaneously imagine what other citizens are doing at the same time (Anderson, 2006, Chp. 2). In other words, the political context may impact the state self-control, especially when citizens are making decisions about public affairs.

Indeed, previous studies show that an individual's discount factor may change after interactions with other members of the group. Klochko and Ordeshook (2005) suggest a mathematical model in which players adjust their discount factors after interacting with other players. However, the authors do not provide empirical evidence of how interaction changes the discount factor. In the second chapter of their book, the authors reveal only that Ukrainians who have studied abroad have different discount factors than those who did not. Additionally, Denant-Boemont, Diecidue and IHaridon (2017) conducted a series of experiments to show that people always make

more patient and consistent decisions when they are in groups. The results of their experiments reveal that participants become more patient even in the final round of a redistribution game.

Four years ago, I hypothesized that the strength of an individual's national identification may impact his social discounting rate, which should be more predictive of political behavior than a context-independent MEL measurement. As shown in Study 2 of Chapter 3, framing national identity fails to change people's level of patience. Even when I categorize the MTurk respondents based on their levels of patriotism, no correlated pattern was found.

Regarding the measurement issue, the goal of creating a context-dependent intertemporal choice measure will suffer from the problem of multidimensionality. It is methodologically and empirically improper to ask respondents to "imagine you are working with a random person in your country and making a future plan." Based on my in-depth interviews with respondents in the United States and Taiwan ($n = 6$), such item descriptions are too vague to provide meaningful responses. One interviewee told me that he would never work with a random person to make a future plan. Another interviewee asked me to specify a scenario, such as at school or in an office.

I am not the first to try to combine temporal discounting and perceptions of others in the same measure. Jones and Rachlin (2006) and colleagues created an experimental procedure called "social discounting" to quantify the social distance between individuals. They asked respondents to imagine a list of friends (relatives excluded) and then rank them from closest friend to mere acquaintance. Participants were then asked how much they were willing to forgo a moderate outcome so that a specific person on the friend list could receive \$100. The more a participant is willing to sacrifice for her friend, the closer she feels to her. In fact, they did not combine perceptions of others and temporal discounting in the same measure.

Interestingly, their research group recently found that both intertemporal dis-

counting and interpersonal discounting share the same neurocognitive mechanisms (Hill et al., 2017). Medial temporal lobe and limbic activity will increase in both scenarios. If an individual tends to discount the future less, he or she is also likely to discount others less.

In this dissertation, I am closer to a traditional spillover assumption: if an individual discounts the future less in one domain, he is likely to show the same tendency in other domains (Loewenstein and Elster, 1992, pp.53). The ranked choice tasks I used in *CCES2014*, *Taiwan2016*, and *Ukraine2007* are assumed to capture the general tendency of an individual to discount future outcomes in daily life, including outcomes in politics. This assumption can and should be challenged if a better measure is to be developed in the future. It is plausible that people discount their personal and political affairs differently. For instance, the core activists I discussed in Chapter 7 may care more about the future of their country than about their personal welfare. This is why so many activists live on a basic income and have “problematic” lifestyles. In another example, let us consider the time horizons of immigrants. Immigrants may put more weight on their future career but less weight on the future of their countries of origin. The politics of the countries of origin may have a smaller impact on the immigrant’s career in a foreign country. Therefore, those who plan to move abroad should have different discount factors for public and private affairs. The empirical falsification of these hypotheses requires better measures of both temporal discounting and the context.

9.2.3 Religion, intertemporal choice, and political participation

De Tocqueville believed that regular elections make citizens and politicians myopic, but the religious freedom promised by a democratic regime extends people’s time horizons (Loewenstein and Elster, 1992, Chp.3). Although this dissertation did not find evidence linking elections and patience, I believe that intertemporal choice

may serve as a mediator between religion and political participation.

The literature shows a modest relation between patience and religion. Psychologists have suggested that religion can promote self-control (McCullough and Willoughby, 2009). Studies of undergraduate students on the east coast of the United States (Carter et al., 2012), west coast of the United States (Fowler and Kam, 2006), in the Netherlands, and in Italy (Paglieri et al., 2013) all find positive correlations between temporal discounting and belief in certain religions.

Benjamin, Choi and Fisher (2010) primed respondents to increase the salience of their religion, but respondents' levels of patience remained unchanged. Similarly, Harrison and McKay (2013) fail to find a relation between priming religious identity and becoming more patient. These two experimental studies imply that religion as a whole may not be the main reason why religious people are more patient on average.

Meanwhile, political scientists have long debated about the heterogeneous effects of religion on political participation. Brady, Verba and Schlozman (1995) suggested that the civic skills acquired in the workplace, organization, and church specifically increase citizens' political participation. Brady and his colleagues also show that the "experience" of church attendance matters, and they linked low levels of Latino political participation to their predominantly Catholic affiliation (Jones-Correa and Leal, 2001). In South Asia, Cutts et al. (2007) found that Hindu and Sikh believers have higher levels of turnout, while Muslims are less likely to vote than non-believers, holding many socio-demographic variables constant. In Muslim-majority countries, Sarkissian (2012) shows people who engage in daily prayers are less likely to participate in politics, while active engagement in Muslim organizations is associated with higher levels of civic participation.

What people acquire from church attendance and from scripture matters, but what is it exactly? I suggest that the element of intertemporal choice, which people learn through religious activities and from scriptures, promotes political participation.

When people are inspired to be future oriented by religion, they are much more likely to act as suggested in this dissertation. If the religion they practice focuses the past and the present – as does Buddhism in the study by Zimbardo and Boyd (2008) – then the positive correlation between religion and political participation may disappear.

Focusing on the time-specific dimension of each religion may also help explain the inconsistent correlations between religion and preferences for redistribution, as shown in the cross-country study by Alesina and Giuliano (2011). It may also help explain the negative correlation between religion and altruistic behavior among children (Decety et al., 2015).

9.2.4 Education, intertemporal choice, and political participation

The literature in political science has suggested a robust correlation between education level and political participation at the individual level. At the country level, however, the expansion of higher education is usually accompanied by a decline in the turnout rate.

In recent years, using propensity score matching and United States–based surveys, Kam and Palmer (2008) failed to find a correlation between higher education and political participation. In analyzing a natural experiment concerning the draft and school attendance in Vietnam, Berinsky and Lenz (2011) failed to find a relationship between school attendance and political participation. Empirical analyses reveal an inconsistent link between education overall and its effect on political engagement.

Thus, I hypothesize that patience-related training in school may help strengthen the relationship between the educational level and political participation. In other words, patience is the mediator linking education and political participation. For example, Holbein (2017) followed a group of students who were randomly assigned to the Fast Track program when they were in the elementary school. The Fast Track program was designed to train students to “*become a nondisruptive and nonaggressive*

member of a classroom.” Holbein found that students who received that training twenty years ago have higher turnout rates than their classmates *at the same school*. In Senegal, Kuenzi (2006) found that people who received “non-formal” education have higher turnout than those who received formal education.

The Fast Track and Senegal cases imply that a degree may not be a proper operationalized variable to capture the patience-related training that people receive through education. In other words, if we can identify course designs or activities that increase people’s future-orientation at each level of education, we may be better able establishing the causal relationship between education and political participation.

9.2.5 Conflict, natural disaster, and democratization

Chapter 8 provides preliminary evidence linking patience among citizens with the consolidation of democracy over time. Even though no causal relationship can be found, owing to data quality and limitations, some hypotheses can be further explored.

Intertemporal choice may provide the psychological mechanism behind democratic consolidation in areas affected by warfare or violent repression. Voors et al. (2012) found that people in Burundi who experienced civil war became less patient and had lower levels of social trust. (Interestingly, their tendency to help others increased after the civil war.) Therefore, citizens in these areas may be prone to clientelism and pocketbook voting, as predicted in this dissertation.

Additionally, democratic consolidation could be much more laborious in countries or areas that face more natural disasters. Cassar, Healy and Von Kessler (2017) used GIS to identify damage from the 2004 tsunami in Thailand combined with nationally representative surveys. The results show that people who experienced a tsunami became less patient afterward. Li, Li and Liu (2011) conducted two survey waves in Wenchuan, China, before and after a severe earthquake struck in May 2008. The

within-subject design reveals that people discounted the future more after experiencing the earthquake. A follow-up study (Li et al., 2012) shows that the impact of the earthquake on temporal discounting lasted for three years.

Indeed, the occurrence of a natural disaster may be unpredictable, but geography and earth science can explain their distribution. If natural disasters systematically decrease levels of patience, then people in these areas may find it harder to invest their time and resources in political participation. This hypothesis is compatible with Healy and Malhotra (2009), who find that people prefer costly after-disaster spending rather than cost-saving preventive spending. It may also help explain the finding by Obradovich (2017) that voters in areas influenced by climate changes are much more likely to vote down the incumbent.

9.2.6 Intertemporal choice and the electoral linkage

It is worth exploring whether voters can express their discount factors through elections. Shefer et al. (2017) find that legislators discount the future less than ordinary people, which they summarize as the phenomenon of “*nonrepresentative representatives*” in their article’s title. Do voters prefer candidates with similar time discounting tendencies? This hypothesis seems plausible, since present-biased voters may prefer the present-biased policies on which a candidate campaigns.

This voter-candidate linkage is important for our understanding of the development of capitalist democracy. (Beramendi et al., 2015, , chp1) suggest that political debate in advanced democracies is two-dimensional: strong/weak state intervention and investment/consumption public policies. Investment policy includes education, childcare, and R&D, which prioritize long-term returns, while consumption public policies include direct welfare transfers or unemployment subsidies, which yield short-term returns to voters.

I hypothesize that voters who discount the future less should prefer investment

policy because it will yield larger returns in the future. In contrast, present-oriented voters should prefer consumption public policies because their rewards show up immediately. The logic is similar to that of pocketbook voting in Chapter 5. At the aggregate level, a correlation is expected between budget allocations among policies and the average discount factor among voters in the country.

It is possible to conduct a simple experiment asking participants to allocate budgets for different policy categories and to explain their allocation preferences based on their level of patience. It is also possible to test whether voters prefer candidates whose time-related policies are closer to their temporal discounting tendencies. Introducing the time dimension into the study of political behavior and participation will allow many new hypotheses to be set and explored.

In the end, thank you for your patience.

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Biography

Austin Horng-En Wang is Doctor of Philosophy in the Department of Political Science at Duke University. Starting from Fall 2018, he will serve as an assistant professor in the Department of Political Science at University of Nevada, Las Vegas.

Wang was born on June 10, 1987, in Austin City, Texas. He was named Austin from his parents Yeh-lih Wang and Fenfen Hsueh who studied Political Science and Electrical Engineering, respectively, at the University of Texas at Austin. Wang received Bachelor of Science in Electrical Engineering and Master of Arts in Political Science from National Taiwan University, Taipei, Taiwan, in 2009 and 2012.

During the six years at Duke, Wang published five peer-reviewed journal articles and two book chapters. The two patience-related publications can be found in Chapter 4 and 5 of this dissertation (Wang, 2018, 2017*a*). Wang also investigates the change of national identity (Wang, 2017*b*), the “scale effect” of Duverger’s Law (Wang, 2015), and the ballot position effect under SNTV system (Wang, 2014). His two book chapters focus on how online voting advice application may improve the quality of democracy (Wang, 2013, 2016).

Wang’s researches also appeared in the mass media frequently. His studies of patience and Asian politics were on Washington Post and The National Interest (e.g. Chen et al., 2017). Wang is also co-founder of WhoGovernsTW.org since 2014, a political science popularization website written in Traditional Chinese. Some articles on it have been translated into eight languages and included into textbooks.