Compulsory Voting:
Turnout, Information Acquisition and
Information Processing

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Eingereicht von

Herrn Steffen Bandlow-Raffalski (geb. Bandlow)

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1. Gutachter: Prof. Dr. Markus Tepe , Carl von Ossietzky Universität Oldenburg

Fakultät für Bildungs- und Sozialwissenschaften – Institut für Sozialwissenschaften

2. Gutachter: Prof. Dr. Eric Linhart, Technische Universität Chemnitz

Philosophische Fakultät – Institut für Politikwissenschaft

3. Gutachter: Prof. Dr. Torsten Selck, Carl von Ossietzky Universität Oldenburg

Fakultät für Bildungs- und Sozialwissenschaften – Institut für Sozialwissenschaften

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Table of Contents

List of Tables

iii

List of Figures

Part I: Introduction, Literature Review, and Theoretical Framework

1. Introduction

Elections are considered to be the most crucial way of political participation in modern mass-democracies (see for example Aldrich, 1993), but there is no fully sufficient (theoretical) explanation why some individuals turn out to vote and others do not (Aldrich and Simon 1986). Turnout, thereby, has been examined on the macro level (Jackman, 1987) considering, for example, the importance of institutional settings such as the electoral system (Blais and Carty, 1990b). At the same time, scholars concentrate on the individual or micro level considering, for example, differences in individual education (Wolfinger and Rosenstone, 1980) as a predictor for individual turnout. This study focuses on the investigation of the impact of compulsory voting laws on the individual voting behavior. Thus, it focuses on the influence of a macro level variable (electoral system) on the individual level.

Empirically, two things are striking when it comes to turnout. First, turnout declines in almost all western style democracies (Lijphart, 1997). Second, participation in elections is socio-economically biased (Verba et al., 1995, Bechtel et al., 2016, Mueller and Stratmann, 2003, Armingeon and Schädel, 2014, Nevitte et al., 2009, Kasara and Suryanarayan, 2015). Lijphart (1997) labels this a "democratic dilemma" because unequal participation might result in biased public policies in favor of those who vote. Thus, scholars like Dahl, Lijphart (1997) and Hill (2006) argue that compulsory voting could help overcome those problems by activating people who would otherwise abstain from voting in general or habitually. Furthermore, Lijphart (1997) claims that a secondary effect of universal turnout could be an increase in the information levels of individuals. Opponents, however, support the notion that since the individual voting propensity is positively correlated with individual information levels (Wolfinger and Rosenstone, 1980), the activation of habitual non-voters, who tend to be the less informed, could decrease the quality of the electoral outcome (Jakee and Sun, 2006). This raises the overall question about the relationship between individual information levels and compulsory voting laws.

Thereby, compulsory voting can basically be seen as a legal requirement for the eligible voters to attend the polling station on Election Day Birch (2009), which is often associated with punishments for any disobedience (Jackman, 2001, Hill, 2006). Since states that mandate their citizens to attend the polls in elections also cannot observe the actual voting decision in the voting booth, some authors prefer to distinguish between compulsory voting and compulsory balloting (Shineman, 2010, Shineman, 2012b, Shineman, 2012a). In general, however, the terms are often used interchangeably and refer to the basic definition of compulsory voting mentioned above[1]. This study refers to the legal obligation to attend the polls on Election Day as compulsory voting.

Insights on compulsory voting from former research

Initially, the discussion about compulsory voting begins with a normative debate which still goes on today. This normative debate covers different aspects. First, seeing voting as a right. This also includes the right not to vote (Lever, 2010, Katz, 1997) and seeing voting as a duty (Lijphart, 1997, Engelen, 2007) as a justification for the claim that voting should be compulsory. Second, different parts of the literature discuss compulsory voting with respect to democratic legitimacy. Advocates of CV argue that only universal turnout could produce fully democratic decisions and could help overcome the above mentioned election bias (Engelen, 2007, Lijphart, 1997). Opponents, however suggest that mandating citizens to vote could lead to an increase in uninformed and random voting (Jakee and Sun, 2006) and thus could hardly lead to an increase in democratic legitimacy (Katz, 1997).

Large parts of the empirical literature, however, focus mainly on the mobilization effect of compulsory voting laws. In general, various authors found empirical evidence for the notion that compulsory voting is positively correlated with turnout (Franklin, 2004, Katz, 1997, Jackman, 2001, Powell, 1980, Franklin, 1999). In fact, turnout is between 7 and 17 percentage points higher compared to voluntary voting countries (Jaitman, 2013:80). Panagopoulos (2008) explains this mobilization effect by pointing to the costs of non-voting added to the individual voting calculus due to compulsory voting. He argues that voting is expected if the costs for non-voting outweigh initial participation costs.

Furthermore, another line of research focuses on the effect of compulsory voting on policy outcomes in general and the notion that CV might lead to an increase in the support for left policies, in particular. Drawing on the above mentioned election bias, numerous scholars essentially argue that full participation would increase social justice (Birch, 2009) and would

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[1] This study discusses a possible distinction between compulsory voting and compulsory balloting at a later time.

be substantively more equal (Dahl, 1989, Lijphart, 1997, Hill, 2006, Franklin, 2004, Engelen, 2007). More specifically Bechtel, Hangartner, and Schmid (2016) find empirical evidence for an increase in the support of left-policies due to compulsory voting when studying the Swiss Canton Vaud. On the opposite, it has been claimed that, since large parts of the electorate are, on average, not very well informed about politics (Luskin, 1990, Gordon and Segura, 1997), compulsory voting could decrease the quality of political outcomes due to an increase of ill-informed voters in the electorate (Birch, 2009).

In addition to the effect of CV on policy outcomes, another strand of research concentrates on the effect of compulsory voting on party affiliation. In general, research has discovered that electoral institutions have a great impact on the party affiliation of individuals (Karp et al., 2008). With respect to compulsory voting, previous research found strong evidence for a positive relationship between compulsory voting and the strength of party identification (Birch, 2009). One reason for that is the notion that the act of voting is habitual. That is many voters by and large support the same party repeatedly. Thus, voting seems to reinforce party identification on a habitual level. Since compulsory voting increases voting, a reinforcement of party identification seems more than likely (Birch, 2009).

Another line of literature discusses whether compulsory voting affects individual levels of political sophistication. Most prominently, Arendt Lijphart (1997) supposes that compulsory voting could increase individual levels of political sophistication. Essentially he argues that since citizens are confronted with political content more frequently, they are probably more likely to reason more about politics (Lijphart, 1997). Principally, there are 3 different possible motives for this. First, because of the strong mobilization effect of CV-laws, parties do not have to worry about mobilizing the electorate anymore. Instead, they would have an incentive to concentrate more on providing substantial information, which should lead, on average, to a more informed public (Birch, 2009). Secondly, citizens know in advance that they are supposed to vote and could, therefore, put more effort in acquiring proper information (Birch, 2009). Thirdly, since turnout can be expected to be almost universal, it doesn't seem unreasonable to expect a wider public discussion about the elections. Thus, voters might benefit from the public discourse (Birch, 2009). However, opponents of compulsory voting state that CV-laws could also lead to a decrease in individual levels of political sophistication since compulsory voting is expected to especially activate citizens who would not vote under voluntary voting. Voluntary non-voters are often characterized as less informed and less interested in politics, therefore they might have no incentive to acquire political information

even if voting was compulsory (Jakee and Sun, 2006). An increase in uninformed voting, random voting or roll-off could be the consequence.

There are six different lines of empirical research in the literature trying to examine the possible positive effect of CV-laws on individual levels of political sophistication. In general, turning out in compulsory voting countries is assumed to be more likely since costs of non-voting offset initial participation costs (Panagopoulos, 2008), and thus alternates the individual voting calculus. Accounting for that, Victoria Shineman (Shineman, 2010, Shineman, 2012b, Shineman, 2012a) suggests that this also increases the probability of an informed vote. Since information costs are endogenous to initial participation costs, costs for not participating also reduce information costs. Therefore, informed voting is more likely when voting is compulsory (Shineman, 2012b:6). Previous research, however, has come to inconclusive results (Birch, 2009:62). For instance, various scholars compared average political knowledge scores across different countries in order to estimate the impact of CV-laws on levels of political sophistication within and over different countries. Some of them found positive evidence (Gordon and Segura, 1997, Berggren, 2001, Brockington, 2005), others found no strong positive relationship between compulsory voting and political sophistication (Ballinger, 2007, Birch, 2009) }. In addition, different scholars examined how the composition of the electorate is affected by compulsory voting making use of counterfactual survey studies (Hooghe and Pelleriaux, 1998, Mariën, 2007, Selb and Lachat, 2009, Czesnik, 2013). These studies suggest that compulsory voting adds less interested and less politically informed individuals to the electorate. In two small-N case studies, Shineman (2012b) and Milazzo (2009) found support for the assumed positive relationship between CV-laws and political sophistication. In a quasi-experimental design, Jaitman (2013) discovered a positive effect of compulsory voting on activating less skilled voters but provides no evidence on a possible alteration of sophistication levels. Loewen, Milner, and Hicks (2008) conducted a clever field experiment in order to test the impact of sanctioned non-voting in a Canadian Provincial election. They found no significant empirical evidence for the claim that CV-laws increase political sophistication. Victoria Shineman (2010) offers a controlled laboratory experiment in order to establish causality between CV-laws and political sophistication. Drawing on a decision-theoretic model, she finds that compulsory voting in fact increases informed turnout (Shineman, 2010). However, the decision-theoretic background raises the question whether this positive relationship can be explained by the decision-theoretical assumption or by the alteration of the voting rules. Therefore, this study will test the influence of CV-laws on individual voting behavior building on a game theoretic model.

4

Alongside the inconclusive research results, the empirical literature on the relationship between compulsory voting and political sophistication drawing on survey data or case study designs may have too many methodological issues to really approach the core problem. Cross-country comparisons may face the problem of international heterogeneity or country-specific idiosyncrasy. Electoral institutions are mostly fixed within a country and change can hardly be investigated (Huber, 2012). Thus, a causal relationship between CV-laws and political sophistication levels can hardly be established.

Research questions

Building on the previous knowledge of the empirical literature concerning compulsory voting in general, and the research examining the relationship between CV-laws and political sophistication in particular, this study tries to add further understanding to the question why compulsory voting affects turnout, the composition of the electorate and the quality of information acquisition. Thereby, this study presumes that individual voting decisions are not only affected by compulsory voting laws as supposed by previous studies but also depend on the behavior of other actors in the electorate. Therefore, this study raises three distinct research questions: (1) How and to what extent does compulsory voting increase turnout? (2) How and to what extent does compulsory voting increase informed turnout? (3) Does compulsory voting affect individual information acquisition and processing in election campaigns?

Experimental Research Program

For the theoretical groundwork, this study draws on the calculus of compulsory voting approach provided by Panagopoulos (2008). This study tries to specifically and systematically test its predictions in two distinct formal models. In a third step, it also utilizes the basic assumptions of the calculus of compulsory voting approach in order to examine whether CV-laws affect the way individuals process information. For the empirical analyses, this study provides three different experimental research designs which will try to answer the associated research question.

In the first step, this dissertation will draw on a decision-theoretic model testing the impact of compulsory voting on the levels of turnout and information acquisition. Thereby, this study specifically draws on the decision-theoretic model and experimental implementation provided by Shineman (2010). This model systematically examines the effect of different levels of costs of not participating on individual turnout levels but does not systematically consider for different levels of law enforcement. In order to answer the questions of how and

to what extent turnout numbers and levels of information gathering are affected by CV-laws, this study replicates the baseline model provided by Shineman (2010) but expands it by also integrating varying levels of law enforcement. Even though a decision-theoretic model of voting could be inaccurate in terms of capturing the strategic element of voting, it provides a solid baseline test of the two main theoretical predictors that are supposed to explain the functioning of compulsory voting laws.

In order to account for the strategic nature of voting, the second experiment of this dissertation transfers the theoretical assumptions of the calculus of compulsory voting into a game theoretical model. It will be tested whether different levels of penalties and different levels of law enforcement still explain turnout numbers. Thereby, this study argues that voting can be generally seen as a provision of a collective good. As such it is also prone to the well-known "free rider-problem" (Olson, 1965). That is, in a situation in which a collective good can be provided without the need of all beneficiaries contributing to it, individuals have a strong incentive not to cooperate. In the second experiment, it will be examined whether the introduction of compulsory voting affects this general notion. The decision-theoretic and the game-theoretic models both provide a test of the theoretical assumptions provided in the calculus of compulsory voting approach. However, both models do not account for possible effects of compulsory voting on the way individuals' process information.

Thus, in the last step, this study utilizes, drawing on assumptions deducted from behavioral decision-theory, an information board experiment to test whether compulsory voting not only affects the quantity of acquired information, but also the quality of acquired information during an electoral campaign. Drawing on a process orientated theory of voting, provided by Lau and Redlawsk (Lau and Redlawsk, 2006), it will be examined whether compulsory voting could alternate information acquisition and processing of individuals in electoral campaigns. Table 1 summarizes the three parts of the study.

Table 1 Structure of the study

	Experiment I	Experiment II	Experiment III
Model of explanation			
Decision Theory	Turnout & Information Acquisition		
Game Theory		Turnout & Information Acquisition	
Behavioral Decision Theory			Quality of information acquisition and Information Processing

Note: This table provides the three experiments conducted in this study. Experiments I and II deal with the effect of compulsory voting on the individual decision to turn out, and the individual decision to acquire information. Experiment III focuses on the effect of CV-laws on the quality of individual information processing.

Conducting Experiments

Generally, experiments are especially useful in order to isolate specific institutional aspects – such as voting rules – and manipulate them in a controlled environment (Huber 2012:19). The main advantage of making use of experimental research designs is the controlled examination of the causal mechanism between two variables (Faas and Huber, 2010, Kittel and Morton, 2012) due to randomization (McDermott, 2002). Therefore, the usage of a controlled laboratory experimental research design seems very promising. However, there exists a tradeoff between internal and external validity (McDermott, 2002). While internal validity is considered to be very high in experimental designs, external validity is considered to be their big weakness. Artificial environments and all student samples often impede a transfer of experimental evidence to the general population. Nevertheless, experimental methods seem very suitable for studying the influence of CV-laws on individual behavior since the focus is on the individual level. Furthermore, it is not possible to observe a large group of similar people confronted with different voting rules without country-specific variables hindering the access of a causal explanation. Therefore, the study conducts a series of computer-based laboratory experiments. Whereas the first two experiments are classic incentivized behavioral economic experiments, the third leaves this framework and draws more on a political psychology framework.

Relevance and Contribution

Considering the previous literature, this study tries to add two main aspects to the existing body of research. Firstly, it adds a systematic test of the second predictor, levels of law enforcement, to the existing literature. Furthermore, although experimental evidence already

exists, this study argues that these findings are in need of further investigation because the decision-theoretic argument provided by Shineman (2012b) neglects the interdependent nature of elections and might, therefore, overestimate the effect of compulsory voting laws, especially on informed turnout. And so, this study will broaden the assumptions of the calculus of compulsory voting approach to a game-theoretic environment in order to test if the propositions will still hold. In doing so, this dissertation tries to reduce the discrepancy between the empirical observation of the primary effect of compulsory voting laws on turnout and the lack of understanding about the actual mechanisms at work on the individual level. Thereby, it also contributes to the well-established literature of voting and election research in general and rational choice theory of voting in particular.

Secondly, it tries to add further knowledge to the ongoing debate whether compulsory voting could lead to higher levels of informed voting or, on the contrary, to more ill-informed or random participation.

Reminder

This dissertation is organized as follows: The first part of the study defines the term of compulsory voting as used in this study, establishes the broader theoretical framework and reviews the corresponding literature. In particular, it will focus on the empirical literature concerning the link between compulsory voting and political sophistication. Additionally, the second chapter presents data from the Comparative Study of Election Systems (CSES) in order to get a first impression of the possible relationship between CV and political sophistication. Drawing on the classic calculus of voting approach, the first part ends with a description of the calculus of compulsory voting. Chapter 3 specifically reviews approaches concerning the explanation of turnout. In particular, it focuses on the calculus of compulsory voting approach offered by (Panagopoulos, 2008), which builds the foundation for explaining the impact of compulsory voting on turnout. Also, this study discusses approaches that provide assumptions on why compulsory voting could also lead to higher levels of information acquisition. Furthermore, they are crucial for the development of this study's analytical framework and contribute directly to the operationalization of how the impact of compulsory voting is measured.

The empirical Chapters Four, Five and Six provide the empirical examination of the three distinct research questions. These chapters are all similarly structured. First, they develop the analytical framework. Afterward, the chapters present the experimental procedures followed by the sections providing the empirical analysis. All empirical chapters end with a

short discussion and will give an overview of how each chapter's findings fit the overall framework and lead to the next research question.

The last chapter summarizes the empirical findings and discusses methodological, theoretical, normative and empirical implications with regard to the overall aim of this study.

2. Theory and Literature Review

2.1 Defining Compulsory Voting

Many studies have examined compulsory voting in the last decades. According to those studies, compulsory voting is generally understood as a state-enforced legal obligation to participate in elections (Birch, 2009) even though some scholars argue that this definition is rather inaccurate (see for example Shineman, 2010). Since the secrecy of the vote is essential in compulsory voting states as well, the state can only make attending the polls compulsory (Shineman, 2010, Lijphart, 1997). Therefore, compulsory voting is also referred to as Compulsory Attendance or Compulsory Turnout (Keaney and Rogers, 2006, Hill, 2006, Quintelier et al., 2011). Nevertheless, compulsory voting is the term that is used the most. Therefore, it will be used in this study as well.

2.1.1 Compulsory Voting: The Normative Debate

"His vote is not a thing in which he has an option ;(...)" (Mill, 1991)

Universal franchise is without a doubt a fundamental part of modern democratic states. However, low or declining turnout is not uncommon in western-style democracies. Thus, in modern democracies, everyone has the right to vote but not all citizens make use of their fundamental democratic right. The discussion whether compulsory voting could be an answer to problems associated with low or declining turnout divides political theorists. First and foremost, compulsory voting seems to be problematic from a democratic theory point of view. Are elections still free and equal if voters are obliged to participate? But at the same time, compulsory voting could be the answer to questions akin to: how legitimate are electoral outcomes where the larger part of the electorate decides to abstain? This chapter tries to summarize the main arguments of the normative debate surrounding compulsory voting. Three main

categories of arguments can be identified. First, voting as a right vs. voting as a duty, second the legitimacy of electoral outcomes, and third the effect on citizen engagement.

Rights and Duties

In "Considerations on Representative Government", John Stuart Mill already introduced arguments centered on whether voting is right or a duty (Mill, 1991). Considering the above statement, Mill favors the latter. Scholars advocating compulsory voting often argue that voting is a fundamental right and act in democracy (Birch, 2009). Thus, democratic rights and democratic duties go hand in hand. Citizens fulfill the majority of their democratic duties in modern democracies. For example, they have to pay taxes, serve in the military, take on jury duty, or partake in a census (Birch, 2009). Fulfilling the census can especially be compared to compulsory voting, as elections come close to a political census (Birch, 2009). Even though some of these duties might be individually perceived as a burden, their importance and their rightness are hardly challenged, because all citizens have to contribute if they wish to benefit from the community. This applies to elections as well. Citizens have to be a part of the collective decision-making process so they all can benefit from it. Thus, an obligation to vote can be defended on the grounds of equality (Birch, 2009).

Opponents of compulsory voting, however, claim that the basic right to vote always entails a right not to vote (Lever, 2010, Katz, 1997). Thus, imposing a legal obligation to participate in elections limits personal freedom (Birch, 2009). Drawing on a classical liberal point of view, individual rights can only be restricted if they harm others. Katz, however, argues that not voting does not have a negative effect on others. On the contrary, abstention enhances the influence of those who turned out (Katz, 1997). Furthermore, Shineman (2012b) proposes that compulsory voting strengthens the already existing feeling of having a moral obligation to vote (civic duty) and could, therefore, have a positive effect on voting in general or the quality of the individual participation in particular.

Legitimacy

In addition to the conflict between rights and duties with respect to voting, the legitimacy of electoral outcomes is discussed. Taking into account that almost all western-style democracies suffer from declining turnout (Lijphart, 1997), various scholars see compulsory voting as a suitable solution to problems accompanied with low turnout. For example, electoral decisions made by far less than half of the electorate. This automatically raises the question whether a candidate or a parliament elected by the entire electorate would be perceived as more legiti-

mate than one being elected only by a minor part of the eligible voters. In terms of equality and the rule of "one man one vote", one could perceive a government elected by the entire electorate as more legitimate. It follows that compulsory voting could strengthen the legitimacy of elected governments in the sense that the electoral outcome truly would represent the will of the entire electorate (Lijphart, 1997, Hill, 2006, Engelen, 2007).

Another important aspect is that compulsory voting could help to overcome the collective good problem inherent to voting (Hill, 2006). That is, a single vote hardly affects the electoral outcome (Downs, 1957). Thus, rational individuals abstain from voting. But if no one votes, democracy fails (Riker and Ordeshook, 1968) and individual and collective benefits would be even more minor than those produced by costly voting (Katz, 1997). It follows that being legally obliged to vote, could give rational individuals the security that all citizens vote and therefore also contribute to the public good (Katz, 1997, Hill, 2006). Hence, compulsory voting could lead to superior collective outcomes.

Additionally, some scholars argue that only compulsory voting could produce truly democratic outcomes because those outcomes need every citizen's opinion (Engelen, 2007, Birch, 2009, Lijphart, 1997). However, low turnout is considered to reinforce the socio-economic bias of elections (see for example Lijphart, 1997). That is, less wealthy and less educated citizens are most likely to abstain from voting. Thus, only a certain group of citizens influences the electoral outcome. It also follows that politicians have a strong incentive to make policies in agreement with the preferences of the active electorate, for example, employing low taxes and neglect adequate levels of redistribution. As a result, voluntary non-voters do not feel represented by mainstream politics anymore and will not consider voting since they cannot identify a candidate making policies in their regard. This is a vicious circle. Compulsory voting, however, might help break this pattern. Since the entire electorate is supposed to be activated to vote, parties and candidates might reconsider catering to the group of former alienated citizens in order to gain a majority. Therefore, they might provide policies in the interest of the former unrepresented groups (Chong and Olivera, 2008). Bechtel et al. (2015), for example, find that compulsory voting increases the support for left-policies, which are more likely to be supported by citizens that are in the need of those policies – less wealthy and less educated citizens. In other words, abstention will change electoral outcomes (Mueller, 2008). Following such a perspective, compulsory voting might be a necessary condition of good collective decisions (Birch, 2009). In sum, compulsory voting distributes the costs of voting equally among the voters, since turnout is supposed to be universal, and en-

sures that the elected government is aware of the preferences of all citizens (Birch, 2009). Therefore, compulsory voting can enhance democratic legitimacy.

The most crucial argument against compulsory voting with regard to legitimacy is that compulsory voting leads to a high number of random or uninformed votes (Singh and Thornton, 2013), and electoral outcomes would be more like a lottery (Jakee and Sun, 2006). It could follow that the quality of the electoral outcome, in fact, is lower compared to one in the voluntary voting mode since more uninterested voters attend the polls (Katz, 1997) in order to avoid the penalty attached to compulsory voting. Jakee and Sun (2006) provide a formal model of compulsory voting and find that, as the electorate increases, the election outcome becomes more and more random.

Public engagement

The third main aspect of the normative debate is the possible impact of compulsory voting on political engagement. Starting with the argument that voting, in general, is positively correlated with other forms of political participation (Pateman, 1970). Drawing on this, Arendt Lijphart and others have argued that compulsory voting could enhance individual interest and involvedness in politics and, thus, lead to a higher level of political sophistication (Lijphart, 1997, Lardy, 2004). Gordon & Segura (1997) in fact, found a small but statistically significant relationship between compulsory voting and levels of political sophistication. Furthermore, (Hill, 2006) and others suppose that compulsory voting could reinforce a norm of voting. Opponents of CV, however, claim that forcing individuals to participate in the election would rather enhance their disengagement and antipathy towards political participation (Birch, 2009).

However, opponents of compulsory voting argue that changing the voting laws will not solve the problem of individual disaffection with respect to politics (Birch, 2009). On the contrary, introducing compulsory voting in order to solve the problem of low or declining turnout might only help cure the symptoms by artificially increasing turnout. However, an increase in uninformed voting and random voting seems possible. Thus, full participation seems valuable at first glance but it would suppress abstention which also can be seen as a critical measure of disagreement with the current government without automatically increasing the quality of the participation (Franklin, 1999). Moreover, obliging citizens to vote could lead to even more disinterest and alienation. Compelling someone who is uninterested in something mostly leads to more frustration and disinterest or even opposition. In the case of

compulsory voting, this could mean not only opposition against the legal requirement but against politics in general.

Since the relationship between compulsory voting and individual information is at the center of this study, I will take a closer look at compulsory voting and political sophistication in the next Chapter.

2.1.2 Compulsory Voting: A short History

Compulsory Voting has a long history and is not a rare phenomenon. 32 countries make or have made use of compulsory voting laws (Quintelier et al., 2011). It dates back to medieval Switzerland (Birch, 2009). In modern elections, it first occurred in the seventeenth century in American colonies (Birch, 2009). Over time, compulsory voting laws developed differently in different regions of the world and can be categorized into two types: (1) Countries with a mainly Christian background, like Belgium or Australia, adopted compulsory voting laws at the end of the 19th century or the start of the 20th century, and was mainly implemented to preserve the influence of the conservative and religious elite in those countries (Quintelier et al., 2011). (2) Former colonies in Latin America preserved the voting laws which were implemented back under colonial rule (Quintelier et al., 2011).

Even though a number of states, such as Spain, Italy, and the Netherlands, abolished compulsory voting laws in the last decades, still to this day, one-fifth of the democratic states in the world employ compulsory voting (Jaitman, 2013).

Table 2 Countries employing Compulsory Voting

Country	Date adopted	Sanctions
Argentina	1912	No
Australia	1924	Yes
Belgium	1893	Yes
Bolivia	1924	Yes
Brazil	1932	No
Chile	1925	Yes
Costa Rica	1936	No
Cyprus	1960	Yes
Dominican Republic	1966	No
Ecuador	1929	Yes
Egypt	1956 (men only)	Yes
El Salvador	1950	No
Fiji	1990	Yes
Greece	1929	No
Guatemala	1965	No
Honduras	1894	No
Laos	1989	N/A
Luxembourg	1919	Yes
Mexico	1917	No
Nauru	1965	Yes
Panama	1928	No
Paraguay	1967	No
Peru	1931	Yes
Singapore	1958	Yes
Switzerland (only Schaffhausen)	1903	Yes
Thailand	1997	Yes
Turkey	1982	Yes
Uruguay	1924	Yes
Venezuela	1958	No

Note: Table originally provided by Birch (2009)

As mentioned before, compulsory voting laws differ greatly throughout the states. Most crucially not all states employ sanctions. Table 2 summarizes compulsory voting in the world today.

2.1.3 Compulsory Voting: Empirical findings

With respect to compulsory voting laws, different aspects are discussed in the literature. Some scholars concentrate on the normative ramifications and others on empirical observations. According to empirical findings, unsurprisingly, compulsory voting indeed boosts turnout on a significant level. In fact, different cross-country comparisons found that turnout in compulsory voting regimes stands between seven and sixteen percentage points higher than in voluntary voting regimes (Lijphart, 1997, Powell, 1980, Jackman, 1987, Jaitman, 2013, Birch, 2009, Jackmann and Miller, 1995). Hirczy (1994), however, argues that cross-country comparisons do not provide causal insight on the turnout enhancing effect of compulsory voting. Implementing compulsory voting rules in some countries might only reinforce an already existing strong devotion to the norm of voting (Jackman, 2001). Thus, a causal effect of compulsory voting on turnout cannot be proven. Taking this into account, some scholars enabled within-country comparison studies in order to disentangle causal effects. Hughes and Graham (1968), for example, found that after introducing compulsory voting in Australia, turnout rates went up by 30 percentage points on average. Hirczy (1994), on the other hand, showed that after abolishing compulsory voting in the Netherlands, turnout dropped by 10 percentage points.

Apart from actual participation rates, a growing body of literature has supported the notion that countries compelling individuals to vote have considerably higher rates of invalid votes[2] (Birch, 2009). In a cross-country comparison, Reynolds and Steenbergen (2006) show that CV-countries have on average about 6 percent more invalid ballots. Especially for the Latin-American countries employing compulsory voting, it can be argued that invalid ballots are a form of protest, such as abstaining in western democracies (Birch, 2009). In general, it can be stated that compulsory voting is only one reason of the many for invalid balloting. Most of them are country specific.

Another aspect regarding balloting associated with compulsory voting is ballot-order effects such as random voting or donkey voting (Birch, 2009). It has been shown that ballot order effects can be crucial (Marcinkiewicz and Stegmaier, 2015), for example in Australia (King and Leigh, 2009). Additionally (Selb and Lachat, 2009) found that Belgian voters who only participate in elections because it is legally required vote less consistently regarding their preferences than individuals claiming they would also vote if it was voluntary. That is, voluntary voters in Belgium tend to vote less randomly. Obviously random votes could have seri-

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[2] This is discussed more thoroughly in one of the sections before.

ous ramifications for the quality and legitimacy of electoral outcomes. King and Leigh (2009), however, suggest that random votes constitute only 1 percent of the Australian vote share. Therefore, random votes can hardly be considered being harm to the electoral outcome. Furthermore, Brich (2009) shows that compulsory voting is even associated with higher levels of democratic legitimacy by drawing on CSES data.

In addition to considering compulsory voting and turnout rates only with respect to possible increases or decreases, some scholars point to the consequences of changing participation rates. Different studies regarding voting, in general, showed that voting is socio-economically biased (Verba et al., 1995). That is, the wealthier and more educated people are more likely to turn out and are therefore better represented (Lijphart, 1997, Powell, 1986). Compulsory voting, however, can help to diminish this bias. Since CV increases turnout overall social groups, representation is considered to go up (Lijphart, 1997). For the Belgian case, Hooghe and Pelleriaux (1998) find that an abolishment of compulsory voting would lead to an even stronger overrepresentation of the better-educated voters (Birch, 2009). Jaitman (2013) also finds support for the general notion that CV-laws reduce the socio-economic voting bias. In a natural-experimental design, she reports turnout rates from Argentinian Legislative-elections in 2009 focusing especially on older voters and individual skill levels. She shows that turnout rates are considerably high for unskilled voters due to compulsory voting (Jaitman, 2013).

As one consequence, compulsory voting rules are suspected to increase left party support (Bechtel et al., 2016), because voluntary non-voters are expected to be, on average, more dependent on social benefits. Normally left parties offer more policies in that direction. For the Australian case, for example, Jackman (Jackman, 1999) claims that the applied voting laws support left parties. This is in line with previous studies dealing with voting. In general, those studies already found that as turnout goes up, left party support increases (Pacek and Radcliff, 1995, Nagel and McNulty, 1996), although the relationship is far from being causal (Fisher, 2007). In fact, Van der Eijk and Van Egmond (2007) found empirical evidence for a negative correlation between increased turnout and left party vote share when investigating European Parliament elections. In their study, Bechtel et al. (2016) found that compulsory voting doubles the support for left policies in Swiss Canton referenda. They showed that compulsory voting leads to a noteworthy shift in the support for redistributive policy proposals Bechtel et al. (2016). For the Austrian case, however Hoffman et al. (2017) find no evidence for that claim. Birch (2009), in general, finds no clear evidence for a support of left policies due to compulsory voting.

Additionally, some scholars argue that compulsory voting strengthens partisan attachment. For instance, previous research on the relationship between CV-laws and party identification indicates a strong positive correlation (Birch, 2009). Australia, for example, is well-known for noteworthy levels of party identification which has been traced back to the legal obligation to vote (Mackerras and McAllister, 1999). Sing & Thornton (2013), however, suppose that, since compulsory voting forces voters to participate in elections that would not have voted under voluntary voting, partisan identification is used as a cue for making a voting decision. They argue that those voters tend to be more uninterested and uninformed, and therefore use partisan identification as a measure of convenience (Singh and Thornton, 2013). This is one reason why some scholars urge that compulsory voting could increase the vote share of rather small or even extreme parties (Mackerras and McAllister, 1999). In fact, Bernhagen and Marsh (2007) found evidence for this claim in full participation simulations. However, there is no substantial empirical evidence that compulsory voting advantages small or even far-right parties (Birch, 2009).

Nevertheless, opponents of compulsory voting often argue that mandating people to vote only makes the uninformed and uninterested turn out (Jakee and Sun, 2006, Singh and Thornton, 2013). Therefore, one possible downside of compulsory voting could be an increase in uninformed balloting or donkey votes. Furthermore, Jakee and Sun (2006) point to the danger of flawed electoral outcomes. One stylized fact about elections with asymmetrical information levels is that they are able to aggregate information (Feddersen and Pesendorfer, 1996). That is, even though not all individuals know what is best for them, electoral outcomes are compared with those if all individuals were fully informed (Feddersen and Pesendorfer, 1996). In other words, the candidate preferred by the majority wins most of the time. Yet if turnout increases due to compulsory voting and all uninformed individuals are forced to the polls, this equilibrium is in danger (Jakee and Sun, 2006).

2.1.4 Compulsory Voting: A working Definition

Empirically compulsory voting rules vary greatly (Panagopoulos, 2008), i.e. in terms of the level of institutionalization of the law, the level of punishment and the level of law enforcement (Panagopoulos, 2008). Most of the states using compulsory voting impose some sort of fine for people that fail to participate in elections (Jackman, 2001, Quintelier et al., 2011, Panagopoulos, 2008). Other states, however, do not. Moreover, compulsory voting can be categorized along its level of implementation. Not all states that make participation in elections a legal requirement have formally institutionalized those laws in their constitution. Ad-

ditionally, some states do not even make voting compulsory per se, but still impose an informal pressure on voters to participate anyway (Birch, 2009). Following this, Sarah Birch (2009) came up with a typology of compulsory voting. Here she (Table 3) distinguishes different compulsory voting types along the dimensions *Form of Obligation* and *Sanctions.*

Table 3 Conceptualizing Compulsory Voting

		Sanctions	
		Sanctioned	**Unsanctioned**
Form of obligation	**Formal**	Sanctioned electoral compulsion (e.g. Australia)	Unsanctioned electoral compulsion (e.g. Venezuela)
	Informal	Sanctions in the absence of formal compulsion (USSR)	No compulsion, little pressure to vote (USA)

Note: Table originally provided by Birch (2009)

Another possible distinction between different types of compulsory voting is the way of law enforcement. It ranges from strict to weak (Birch, 2009). In the formal literature, compulsory voting has been modeled in different ways. Victoria Shineman (2010) supposes a two-stage model. Various models characterize CV as a law forcing all eligible voters to vote (Borgers, 2004, Jakee and Sun, 2006). Shineman, however, argues that this an inaccurate way of defining compulsory voting (Shineman, 2010). Instead, she suggests that compulsory voting is only state-enforced obligation to participate in elections (Shineman, 2010). In fact, she models the voting decision as a two-stage process and distinguishes between (compulsory-) balloting and (compulsory-) voting. Balloting refers to the first step of participating which is getting to the polls on Election Day. On the other hand, voting refers to the specific act of handing in a ballot. Since marking a ballot in the voting booth is free, not voting is still possible even though participation is legally required (Shineman, 2010, Lijphart, 1997). Therefore, Victoria Shineman (2010) claims compulsory balloting to be a more accurate description of compulsory voting laws. It could follow that, instead of investing more in information or casting more informed ballots due to compulsory voting laws, voluntary non-voters could just hand in invalid ballots. Thus, the additional costs for non-voting would possibly increase turnout in general but would not affect the basic voting calculus when it comes to balloting.

At first glance, empirical research supports the notion that compulsory voting increases invalid balloting. For instance, various scholars support the notion that CV-countries have

higher levels of invalid balloting than voluntary voting states (see for example Hirczy, 1994, Jackman, 2001, Reynolds and Steenbergen, 2006). In particular, Reynolds and Steenbergen (2006) show that CV-countries have on average about 6 percent more invalid ballots than voluntary voting countries. Especially in the case of Latin America, it is argued that invalid balloting is comparable to high levels of intentional abstention in voluntary voting systems[3] (Birch, 2009).

Drawing on IDEA (International Institute for Democracy and Electoral Assistance) data, this study can also find support for the general impression that compulsory voting is associated with higher numbers of invalid ballots, but observed differences are not as strong as expected. The International IDEA Voter Turnout Database provides continuously updated turnout data from around the world[4]. Thus, it normally includes over 2700 different cases covering presidential, parliamentary and European Union elections from about 200 different countries. In order to give a brief overview of the differences between numbers of invalid turnout in democracies with compulsory voting and voluntary voting laws, this dataset is adjusted. First, all elections before the year 2000 were excluded from the dataset. More importantly, all states considered as undemocratic[5] were withdrawn from the selection. Thus, all countries with scores of 5.5 and higher on the combined Freedom House measure, included in the original dataset, are no longer considered in this analysis. In order to get comparable cases, this study only focuses on parliamentary elections. Therefore, no data regarding presidential or European Union elections were considered. Thus, the reduced dataset now includes 530 different elections coming from 156 countries[6].

Comparing numbers of invalid balloting between compulsory and free voting systems reveal that numbers of invalid balloting are indeed higher when electoral participation is required. On average almost 7 percent of the ballots cast in compulsory voting countries are spoiled[7], whereas only roughly 3 percent of the tickets in voluntary voting systems are invalid. Regarding the level of vote-ticket spoiling, results agree with the associated literature

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[3] This can also be considered as a form of political protest.

[4] The database provides turnout data starting from 1945. Data can be downloaded here: http://www.idea.int/vt/index.cfm.

[5] The data set entails two different measures regarding political rights and civil liberties taken from the Freedom House website (https://freedomhouse.org/report-types/freedom-world#.VSJHqI6L3So). Initially each country is rated on scale from 1 to 7 on both scores. The International IDEA database then provides a combined measure considering the means of the individual measures to determine the level of freedom in the different countries.

[6] The International IDEA database not only includes sovereign states. Therefore this dataset includes some cases that cannot be considered as sovereign states as well, e.g. Monaco. However, all elections are parliamentary elections and can be compared to a certain extend. Furthermore, this data should only illustrate the difference in invalid balloting between compulsory and voluntary voting systems and is by no means in the center of attention of this study.

[7] If the ticket spoiling happens intentionally or by mistake cannot be revealed drawing on this data.

(Reynolds and Steenbergen, 2006). Additionally, Table 4 provides the numbers of a simple T-test. Results underpin the notion that the mean of invalid balloting differs significantly with respect to the employed voting rules. However, even though differences are indeed significant, they are not as severe as expected.

Table 4 Invalid balloting in Voluntary and Compulsory Voting countries

		Voluntary vote			Compulsory vote			T-test	
Variable	*N*	*Obs.*	*Mean*	*SD*	*Obs.*	*Mean*	*SD*	*Score*	*p*
Invalid Votes	400	314	2.86	0.19	86	6.67	0.73	-7.19	0.00

Note: Table shows the mean numbers of invalid balloting compared by voluntary and compulsory voting states.

This becomes even more evident when comparing the distribution of invalid balloting between the different voting types graphically (Figure 1). The box-plot shows that, on average, invalid balloting is slightly higher in compulsory voting countries. But there are some cases in which the level of invalid balloting in voluntary voting states is over the mean of the compulsory voting systems. In other words, both plots are not as divided as expected. Note also, that almost all outlier cases come from Latin America and that compulsory voting is only considered to be one explanation for the high numbers of invalid balloting regarding that region in particular (Birch, 2009). In contrast, numbers of invalid balloting do not vary as strongly in Europe. In Belgium for example, on average, invalid votes lay between 4 and 7 percent.

Figure 1 Comparing invalid voting by different voting laws
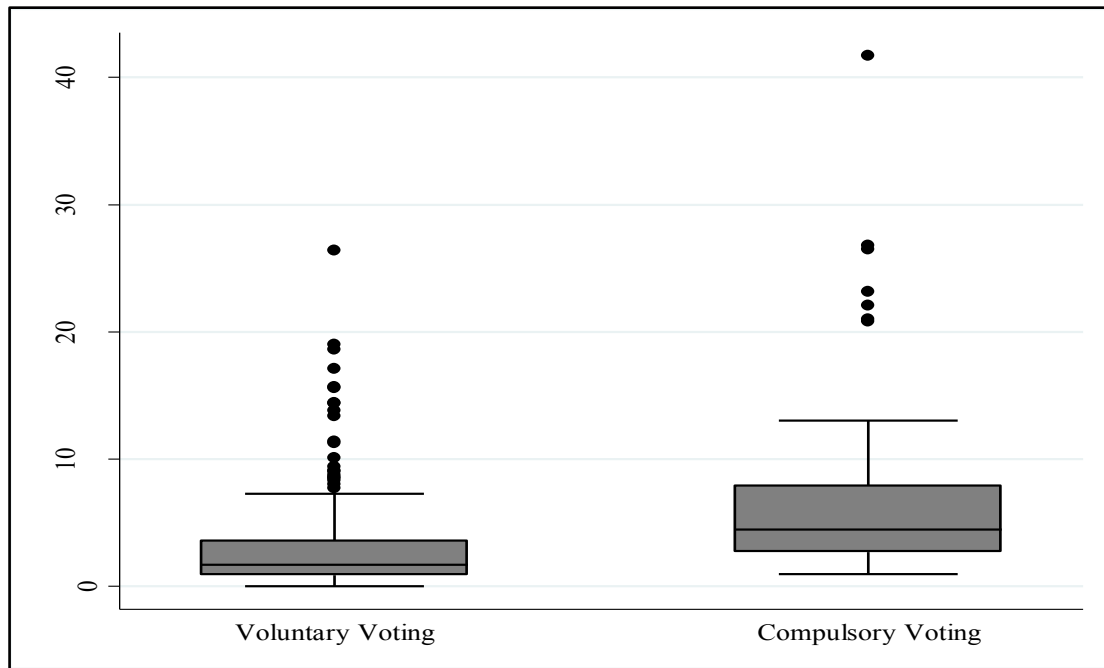
Note: Box-Plots show numbers of invalid balloting compared by different voting laws.

Although the empirical literature finds evidence for higher numbers of invalid ballot-ing in compulsory voting countries, and this study was able to reproduce those findings draw-ing on IDEA data, different scholars suggest that voting institutions are not causally linked with invalid balloting (Birch, 2009). Especially with respect to Latin America, the impact of CV should not be overestimated (Power and Garand, 2007). Power and Roberts (1995), for example, indicate that, in the case of Brazil, ballot spoiling can be linked to a variety of fac-tors including social, political and economic reasons (Birch, 2009). Comparing various Latin American states, Power and Garand (2007) additionally suggest that voting institutions, such as CV, can only be considered alongside other predictors. For the Australian case, MacAllis-ter and Makkai (1993) claim that next to institutional factors, ballot complexity is mainly re-sponsible for slightly higher rates of invalid balloting.

Since differences in the numbers of invalid balloting between compulsory voting states and voluntary voting countries are not as strong as expected, and the relationship be-tween voting institutions and ballot spoiling are far from being causal, this study abandons the two-stage modeling of compulsory voting suggested by Victoria Shineman (2010). Empirical-ly compulsory voting itself is best modeled as a two-stage process. But on average invalid balloting is only slightly higher in CV-countries. More importantly, numbers of voters spoil-ing their ballots in compulsory voting countries are still much lower than the number of voters that intentionally abstain in voluntary elections (Birch, 2009). Taking a closer look at the Netherlands underpins this notion. Yet invalid balloting was never really an issue, and it too dropped after the abolishment of CV, the decline was only minor compared to the fallback in

overall turnout. In fact, the turnout rate dropped by almost 16 percent, whereas invalid balloting declined from almost 3 percent to 0.7 percent (Birch, 2009). Thus, it can be concluded that invalid balloting is empirically less important. Instead, the exceptionally high turnout rates of compulsory voting countries compared to the only slightly higher numbers of invalid balloting in those countries suggests that most voluntary non-voters would rather attend the polls and cast a valid vote than decide to intentionally spoil their ticket. It follows that a significant part of the electorate is seriously affected by compulsory voting rules. Therefore, this study acknowledges that modeling CV as a two-stage procedure captures the actual voting process more accurately, but it might overestimate the importance of invalid balloting. Instead, this study tries to explain how compulsory voting affects the great majority of voters attending the poll without spoiling their tickets. Hence, this study defines compulsory voting as a one-stage process. This obviously has the disadvantage of possibly including a number of individual random voting decisions since subjects lack the opportunity of handing in blank ballots, but it will help to get an explicit picture of how CV affects the actual voting decision.

2.2 Political Sophistication

Different levels of knowledge regarding politics are considered to be a valid predictor of individual turnout (Verba and Nie, 1972, Wolfinger and Rosenstone, 1980, Inglehart, 1979). Therefore, political sophistication basically refers to an individual level of knowledge about politics (Luskin, 1990). In addition to the observed correlation between political sophistication and turnout, other aspects can be recognized. Table 5 summarizes different findings with regard to the effects of political sophistication.

Table 5 Different lines of research regarding political sophistication

Effects of political sophistication	Findings	Source
Interest	Participate more in elections and other politics-related activities	Inglehart (1979), Verba and Nie (1972)
Ability	Being aware of ones´ political interest and capable of pursuing it	Chong et al. (1983), Converse (1975)
		Chaiken and Baldwin (1981)
	Not easily persuaded;	Iyengar et al. (1982)
	Less susceptible to agenda setting and priming by the media	
Motivation	Issue orientation	Miller and Miller (1976), Wyckoff (1980)

Note: The table compilates different definitions of political sophistication.

Besides these specific effects of political sophistication, a main body of literature attempted to decipher how politically sophisticated the public is. Robert Luskin draws a rather pessimistic picture and argues that the mass public, in general, can be considered to be politically unsophisticated (Luskin, 1987). Determinants of political sophistication are thereby diverse. The main categorization points to three arguments: (1) opportunity, (2) ability and (3) motivation (Luskin, 1990, Gordon and Segura, 1997). To get politically sophisticated there has to be informed that one can obtain. Hence individuals need to have the opportunity to get informed. Furthermore, they need a minimum level of comprehension in order to process this information. Thus, individual level characteristics are determinants, such as, for example, education, income or occupation of political sophistication (Gordon and Segura, 1997). Last but not least, individuals need to have a minimum level of motivation in order to become informed. Even if basic information about politics is provided and individuals can be considered to be capable to process some of the information, gathering information is costly. This could have negative effects on the individual willingness to become informed. Information costs are influenced by some contextual factors, for example, the political institutions in general and the electoral system in particular (Gordon and Segura, 1997). Previous research has shown, for example, that national competitive elections increase party competition and turnout (Jackman, 1987, Jackmann and Miller, 1995, Blais, 2000), and are thus expected to increase political sophistication as well (Gordon and Segura, 1997). Moreover, electoral systems that create disparities between votes and actual seats in the parliament do not incentivize individu-

als to inform themselves properly, since outcomes are hard to predict and even harder to influence (Jackman, 1987, Jackmann and Miller, 1995, Gordon and Segura, 1997). Nevertheless, in general, it can be concluded that voting institutions can have an impact on individual levels of political sophistication.

2.2.1 Linking Political Sophistication and Compulsory Voting

As shown above, political sophistication can be influenced by various aspects. With regards to the aim of this chapter, a closer look at contextual factors seems promising. For example, these factors can be political institutions such as party systems or electoral systems. Several scholars refer to the possibility that distinct political institutions can affect citizens´ levels of political sophistication (Gordon and Segura, 1997, Berggren, 2001). In particular, they argue that political institutions can reduce information costs for political information (Boudreau, 2009). The introduction of compulsory voting rules could constitute such a contextual factor in which information searches could become less costly. The reasoning is pretty straightforward. Compulsory voting rules make voting more likely. Therefore it could be more likely that uninformed voters find it rational to invest in political information (Shineman, 2012b) because compulsory voting links information costs to the general voting costs. Therefore, if individuals are willing to pay the costs of voting, they should be expected to invest in costly information as well (Shineman, 2012b). This approach is promising, and first results show a slight trend in favor of the general argument (Carreras, 2016), especially in studies employing controlled laboratory experimental designs (Shineman, 2010, Großer and Seebauer, 2013), and mixed findings in studies using field experimental designs (Loewen et al., 2008, Shineman, 2012a). On the other hand, there are scholars pointing to a possible downside of compulsory voting. Obviously, compulsory voting boosts turnout. Thus, individuals, who would normally abstain under voluntary voting rules, would be forced to participate. Reasons for not voting are, for example, a lack of political interest or political sophistication. Hence, being obliged to vote could bring the less informed to the polls (Singh and Thornton, 2013, Chong and Olivera, 2008). From this, it could follow that individuals cast random or uninformed votes, or use convenient shortcuts like party identification (Sniderman et al., Lupia, 1994, Lupia and McCubbins, 1998). Following this point of view, it seems obvious that it is not the alternation of the voting rules, but rather the preliminary individual level of political expertise that determines the quality of the vote decision.

Previous studies find rather mixed results on the relationship of compulsory voting and political sophistication. Table 6 provides an overview of the existing literature.

Table 6 Empirical findings in the literature on Compulsory Voting and Political Sophistication

Approach	Authors	Data Base	Method/Design	N	Effect of CV on Pol. Sophistication	Findings
Counterfactual survey studies						
	Hooghe and Pelleriaux (1998)	Survey Data from BES[8]	BES data from 1991. Counterfactual approach.	2667	(+/-)	Abolishing CV would lead to more inequality in pol. participation biasing in favor of more educated citizens. But CV also adds uninformed voters to the electorate;
	Czesnik (2013)		Polish National Election Study (PNES) 2001	1060	(+/-)	Introducing CV in Poland would increase turnout substantially but would also add a serious fraction of uninformed citizens to the electorate.
	Mariën (2007)	Survey Data from BES	BES data from 1991-2003. Counterfactual approach.	2194	(+/-)	Abolishing of CV laws would increase the weight of more educated citizens, But CV also adds uninformed voters to the electorate; CV seems helpful in order to overcome problems of low and biased turnout in the US.
	Selb and Lachat (2009)	Survey Data from BES	BES data from 1995. Counterfactual approach.	3668	(-)	CV adds uninformed voters to the electorate. On average CV increases the chance that the electoral outcome does not reflect voters preferences
Cross-country comparison						
	Carreras (2016)	America Barometer Survey (2004-2014)	Multi-level analysis	189.840	(+)	CV is associated with an increase in efforts to obtain information.
	Gordon and Segura (1997)	Euro-Barometer 1989	The survey used in this study is the 1993 version of Euro-Barometer 31	11.528	(+)	Political information is higher in CV countries than it is in VV countries. In sum: contextual factors affect the individual willingness to acquire information.
	Berggren (2001)	Euro-Barometer 1989	Multivariate statistical analysis	8551	(+)	The arrangement of electoral systems shapes the provision of political information. CV systems could, therefore, be able to produce more high-quality free information. Thus CV and pol. sophistication is positively correlated. The effect is not significant.
	Brockington (2005)	/	Multi-level Model	/	(+/-)	CV increases individual ability to answer general questions regarding politics but decreases individual ability to name specific candidates

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[8] Belgian Election Study (BES).

Approach	Authors	Data Base	Method/Design	N	Effect of CV on Pol. Sophistication	Findings
Cross-country comparison (continue)	Bilodeau and Blais (2011)[9]	/	Self-reported levels of political sophistication	/	(-)	No significant difference between levels of political information.
	Ballinger (2007)		Comparison of British and Australian with respect to their level of pol. knowledge	/	/	No significant difference between levels of political information.
	Birch (2009)	CSES Module 2[10]	Multivariate Statistical Analysis	34 Surveys	(-)	No significant impact of CV on levels of pol. Knowledge even though there is a weak positive correlation
Case studies						
	Milazzo (2009)	Swiss Election Study (1995)	Survey data and matching methods	3900	(+)	Political issues are discussed more frequently in Swiss Cantons employing compulsory voting. Discussion of political issues serves as a proxy for levels of political sophistication
	Shineman (2012b)	1999 European Election Study (EES)	Comparing Austrian provinces	501	(+/-)	Exposure to compulsory voting laws caused citizens to increase their political interest and attention to political news, as well as their level of information about party platforms; Compulsory voting had no effect on citizens' ability to identify the left-right ideological position political parties.
Experiments						
	Loewen et al. (2008)		Field experiment	121	(+/-)	No evidence that the treatment increased political knowledge or discussion; a small increase in attention to news among subjects who said they already intended to vote before the treatment.
	Shineman (2012a)		Field experiment	349	(+)	Subjects in the treatment group displayed significantly higher levels of election-specific political information in the post-election survey.
	Shineman (2010)		Laboratory Experiment	18	(+)	Comparative statics suggest that information acquisition and informed voting are both higher when non-participation penalties are introduced.
	Großer and Seebauer (2013)		Laboratory Experiment	220	(+)	Compulsory voting slightly increases informed voting

Note: / refers to missing information or information that could not be obtained from the original source. + & - refer to the direction of the effect of CV on Pol. Sophistication.

[9] Originally this study is written in French, thus results come from different sources LOEWEN, P. J., MILNER, H. & HICKS, B. M. 2008. Does compulsory voting lead to more informed and engaged citizens? An experimental test. *Canadian Journal of Political Science,* 41**,** 655-672, SHINEMAN, V. 2012b. Isolating the Effect of Compulsory Voting Laws on Political Sophistication: Exploiting Intra-National Variation in Mandatory Voting Laws Between the Austrian Provinces. *Available at SSRN 2147871.*.

[10] Comparative Study of Electoral Systems (CSES) survey project. Module 2 includes 38 sates. Six of them (Australia, Belgium, Brazil, Chile, Mexico and Peru) exercise mandatory voting.

Some studies using a counterfactual approach (Hooghe and Pelleriaux, 1998, Mariën, 2007, Selb and Lachat, 2009, Czesnik, 2013). In different surveys, they asked people in voluntary voting countries whether they still would vote if voting was a legal requirement (Czesnik, 2013), or individuals in compulsory voting countries if they would still participate in elections if CV was abolished. Overall, there was no evidence for a positive effect of compulsory voting on individual information behavior (Czesnik, 2013, Hooghe and Pelleriaux, 1998). Instead, they suggest that compulsory voting adds more politically unsophisticated individuals to the electorate (Hooghe and Pelleriaux, 1998, Mariën, 2007, Selb and Lachat, 2009). In addition to the mixed findings, counterfactual studies are limited regarding causal explanations. Individuals answering a survey tend to misreport their actual behavior (Jackman, 1999, Shineman, 2012b). Moreover, even if respondents answer survey questions according to their actual behavior, Morton and Williams (2010) suggest that this is not the same as making an actual choice.

Studies using cross-country comparisons based on survey data also found rather mixed evidence for such an effect (Ballinger, 2007, Engelen, 2007). On the one hand, Gordon & Segura (1997) and Berggren (2001) all show that average levels of political sophistication are higher in countries with compulsory voting. Additionally, Brockington (2005) finds that the ability to answer general information questions is higher in compulsory voting countries. Results of the same study, however, suggest that compulsory voting is also associated with a decreasing capability of naming specific candidates (Shineman, 2012b). On the other hand, Ballinger (2007) finds no significant differences in the levels of political informedness comparing British and Australian voters. Moreover, Bilodeau and Blais (2011) compare frequencies and levels of political discussion in different European countries without finding significant differences between voters in voluntary voting countries and compulsory voting countries (Shineman, 2012b). Birch (2009) also conducts a comparative study on the relationship between compulsory voting and political sophistication. Therefore, she uses data from the Comparative Study of Electoral Systems (CSES). Results suggest only slight differences between levels of political knowledge in compulsory voting countries and voluntary voting countries. In fact, almost 62 percent of the respondents in compulsory voting systems have a high level of political knowledge, whereas about 59 percent of the respondents in voluntary voting systems have high levels of political knowledge (Birch, 2009). However, the effect is not statistically significant in the multivariate analysis (Birch, 2009). In addition to the mixed results created by those studies, large cross-country comparisons could suffer from international heterogeneity or country idiosyncrasy (Shineman, 2012b). The way a specific popula-

tion perceives a specific piece of information differs greatly. It is hardly possible to make re-silient comparisons about various information levels without taking specific institutional or cultural contexts into mind. Thus, cross-country comparisons provide a good overview of different levels of political sophistication in different countries but provide only little insights on the possible impact of compulsory voting laws on individual information levels.

Making use of experimental methods, however, might help overcome this problem. Randomized assignment of individuals to the treatment and control groups ensures individual characteristics to be equally distributed over both groups. Thus, it can be argued that those specifics no longer bias the outcome in a systematic way (McDermott, 2002). Loewen et al. (2008) conducted a field experiment in Canada to investigate the possible effect of compulso-ry voting on levels of political sophistication, but also only found weak evidence. However, those findings could also result from a lack of statistical power (Shineman, 2012b) (Shineman 2009:10). Shineman (2010), instead, provides evidence from a controlled laboratory experi-ment based on a decision-theoretic model, and from another randomized field experiment as well (Shineman, 2012a). In her computer-based laboratory experiment, she finds that compul-sory voting in fact increases informed turnout without increasing uninformed voting (Shineman, 2010). The randomized field experiment, conducted in a San Francisco Municipal Election, in fact, revealed a statistically significantly higher level of campaign relevant knowledge in the experimental groups treated with compulsory voting, alongside a strong mobilization effect (Shineman, 2012a).

Three possible theoretical explanations of how compulsory voting may affect levels of political sophistication can be identified – (1) shift in the social norm of informed voting, (2) a shift in the information environment, and (3) a shift in the individual voting calculus due to compulsory voting rules.

Shineman (Shineman, 2012b) argues that compulsory voting may lead to a shift in the social norm of information acquisition. The social norm of voting presented in the D term of the expansion of the classic voting calculus equation. In their seminal work, Riker and Or-deshook (1968) claim that voting itself produces a benefit and thus explains empirical high turnout rates more accurately than basic instrumental approaches. With respect to compulsory voting, it could be the case that introducing a law of participation produces an intrinsic benefit of being informed.

With respect to the information environment, it is argued that compulsory voting leads to a change in the information provided by political elites (Shineman, 2012b) (Shineman 2009:6). Parties or candidates want to get elected into office. Therefore, they prefer the strate-

gy which guarantees the optimal return compared to their efforts. That is, targeting the decisive voters. Obviously, nonvoters cannot be decisive per se. Furthermore, research regarding individual turnout has shown that nonvoters are more often than not less educated, low-income earners, and members of an ethnic minority (Bechtel et al., 2016). Thus, in voluntary voting systems, the group of nonvoters is mostly not a target of political parties. Compulsory voting, however, forces the group of nonvoters to the polls. Therefore, parties have to consider them. This would change electoral campaigns. Also, classic nonvoters are considered to be less attached to parties or candidates and are therefore more likely to swing (Shineman, 2012b, Singh and Thornton, 2013). Moreover, parties and candidates would no longer have to be most concerned with mobilizing serious parts of the electorate, but could rather concentrate their campaign on issues.

2.2.2 Empirical Levels of Political Sophistication

Similar to the comparative study conducted by Sarah Birch (2009), this study also provides insights from a cross-country comparison regarding the effect of compulsory voting on overall political sophistication scores. Therefore, this study draws on CSES data coming from the Module 2[11] which covers the years 2001-2006. The dataset consists of 41 cases. Following Birch (2009), France 2002, Kyrgyzstan 2005, Russia 2004, and Taiwan 2004[12], were excluded from the analysis since they can be considered as presidential elections only. Furthermore, Hong Kong 2004 was also not included because it is not a sovereign state (Birch, 2009). In the case of two countries, more than one election or survey was originally included in the dataset – two Portuguese elections (2002 and 2005) and two surveys regarding the German election (2002). Only the Portuguese election of 2002 and the German telephone survey[13] were included in the analysis. Thus, the dataset consists of 33 country observations. Six states can be considered as compulsory voting states (Australia, Belgium, Brazil, Chile[14], Mexico and Peru). In only four of those six states is not voting effectively sanctioned (Australia, Belgium, Chile, and Peru).

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[11] The Comparative Study of Electoral Systems (www.cses.org). CSES MODULE 2 FULL RELEASE [dataset]. June 27, 2007 version. doi:10.7804/cses.module2.2007-06-27.These materials are based on work supported by the American National Science Foundation (www.nsf.gov) under grants SES-0112029 and SES-0451598, the University of Michigan, and the many organizations that fund election studies by CSES collaborators. Any opinions, findings and conclusions or recommendations expressed in these materials are those of the author(s) and do not necessarily reflect the views of the funding organizations.
[12] Two Taiwan elections (2002 and 2005) were removed for this study.
[13] The telephone survey-date has the advantage of greater variable coverage. Moreover, the mail-back survey suffers from a low return rate.
[14] Chile abolished compulsory voting in 2012.

Unlike the aforementioned study, the analysis conducted in this chapter also accounts for the turnout rates in the different elections. Therefore, it provides a cross-country comparison of general levels of political sophistication and turnout in voluntary and compulsory voting countries. To do so, this study generates a political sophistication score building on three distinct political information items asked in the CSES surveys. These items varied between countries but were designed to be of equivalent difficulty (Birch, 2009)[15]. In order to derive a country-specific political sophistication score, the three information items were combined for each country. The aggregated raw right answers were added up per country. Wrong answers were added up as well. Additionally, as is conventional, "don´t know" answers were also treated as wrong answers (Birch, 2009). Afterward, right answers were divided by wrong answers in order to derive a country-specific index. This index reflects the country-specific political sophistication score building on aggregated individual level data and ranges from zero to ten with a mean of 1.77. On average, the level of political sophistication is rather low in the observed countries. This is in line with the general notion that, on average, voters can be considered as being not very capable when it comes to politics (Converse, 1964, Campbell, 1960, Berelson et al., 1954). Figure 2 however, compares political sophistication scores and turnout rates. With respect to turnout, it can be argued that almost all CV-countries behave in an expected way. That is, they have the highest turnout rates in the dataset and are therefore clustered on the far right of the scatterplot. However, Mexico is a curious case. Even though the state formally requires citizens to participate in national elections, there are no penalties attached for disobedience[16]. Hence, the lack of penalties may explain the very low turnout[17].

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[15] See also BROCKINGTON, D. 2005. Compulsory Voting and Political Information. A Cross-National Examination. *Annual Meeting of the American Political Science Association* Washington DC. and GRÖNLUND, K. & MILNER, H. 2006. The Determinants of Political Knowledge in Comparative Perspective. *Scandinavian Political Studies,* 29**,** 386-406. for further details.

[16] The Electoral Commission of the UK Parliament provided worldwide research report regarding compulsory voting in 2006. For information regarding Mexico see page 8 of that report. It is available under: http://www.electoralcommission.org.uk/__data/assets/electoral_commission_pdf_file/0020/16157/ECCompVotingfinal_22225-16484__E__N__S__W__.pdf

[17] Since it is not the aim of this study to specifically explain why compulsory voting is effectively increasing turnout in one empirical case and not effective in the other, the Mexican case is not investigated further.

Figure 2 Comparing Turnout and Levels of Political Sophistication in the CSES data-set
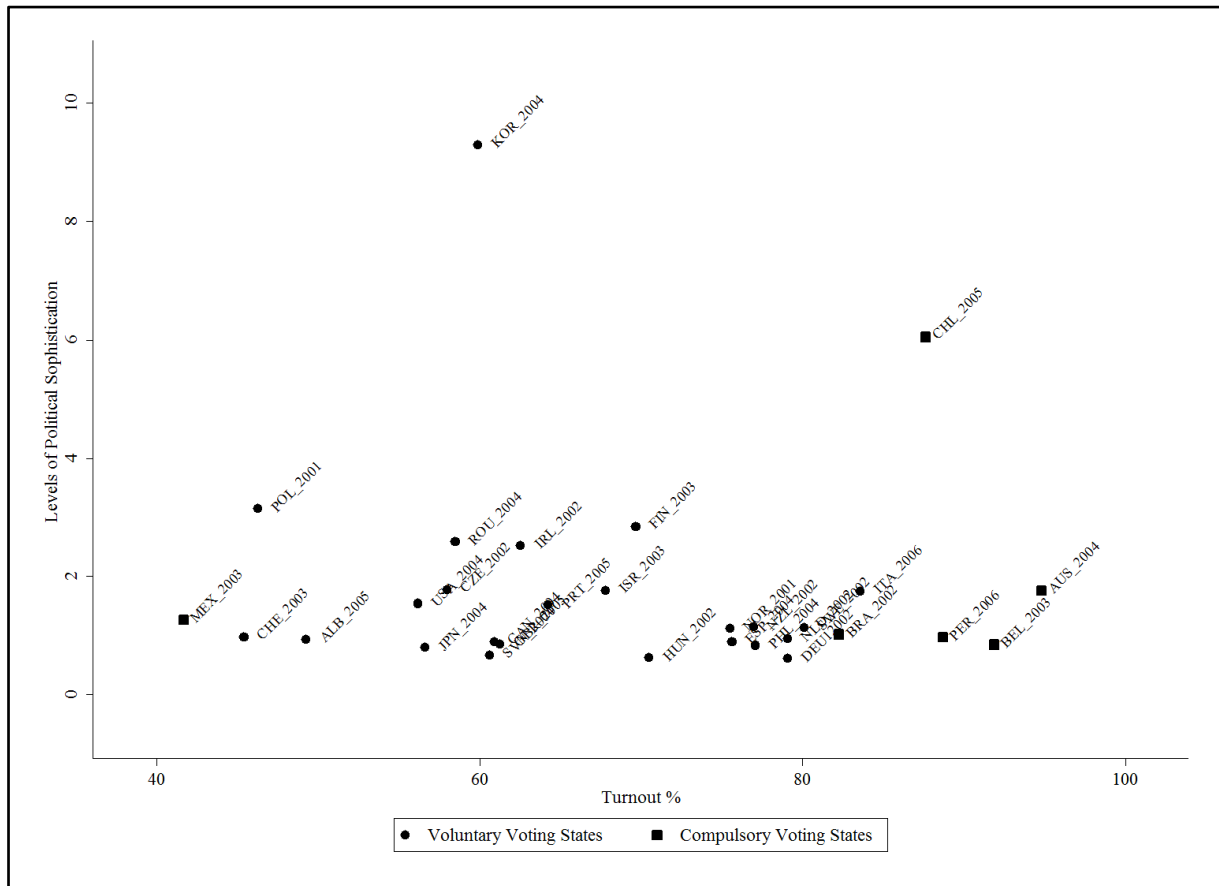
Note: Observations with square markers show turnout data and political sophistication scores for countries employing compulsory voting. AUS refers to parliamentary elections in Australia in 2004. BEL refers to data from the Belgium parliamentary election in 2003. BRA refers to elections in Brazil in 2002. Mex refers to Mexican elections 2003. PER refers to elections in Peru in 2006. Observations with a circle marker show data from voluntary voting countries

Regarding the political sophistication scores, it can be observed that almost all CV-countries lay close to the overall mean of political sophistication. Therefore, the scatter plot indicates that there is no positive relationship between compulsory voting and overall levels of political sophistication. However, the score of Chile is exceptional. With a score of over 6 on the computed political sophistication measure, Chile is the country with the second highest political sophistication levels in the dataset. This is particularly striking since the enforcement of compulsory voting laws in Chile is low. Moreover, voting registration is even free. Thus, it seems surprising that the level of political sophistication is considerably high. It follows that analyzing CSES-data reproduces the inconclusive findings provided by the above reviewed

empirical literature. Thus, the explanation of the relationship between compulsory voting and individual levels of political sophistication remain puzzling.

3. The Calculus of Compulsory Voting

3.1 Ways of explaining in Turnout in the Voluntary Voting mode

Turning out in elections is the most basic form of politically participating in a democracy. Thus, many studies have tried to examine why people decide to vote or not (Blais, 2009). There are different ways of approaching turnout. First, it can be analyzed on the aggregate level. Here, one basic aim is to explain overall turnout. Various authors have focused on cross-country variation in turnout over the years[18] (see for example Powell, 1980, Powell, 1986, Powell, 1982, Crewe, 1981, Jackmann and Miller, 1995, Jackman, 1987, Blais and Carty, 1990b, Black, 1991, Franklin, 1996). Many of those studies identify similar aspects explaining variations in turnout, yet there is no fully sufficient explanation for different turn-out rates in different states (Blais, 2000). In fact, some results are in conflict with one another. Nevertheless, a few solid findings can be reported: (1) Institutional setting, (2) socio-economic situation, (3) the party system, (4) different types of elections and political factors, respectively.

With respect to the impact of the institutional setting, e.g. the voting laws, most studies find a strong relationship between compulsory voting laws and higher turnout rates (Powell, 1980, Crewe, 1981, Jackman, 1987, Black, 1991, Franklin, 1996). Additionally, B.G. Powell (1980, 1986, 1982) reports higher turnout rates in countries in which individuals are not in charge of getting registered to vote. Furthermore, different scholars show that turnout is slightly higher in more proportional voting systems (Crewe, 1981, Jackman, 1987, Blais and Carty, 1990a, Franklin, 1996). Interestingly, Black (1991) finds no statistically significant relationship between the electoral systems on turnout apart from compulsory voting.

Despite the institutional setting, various authors support the notion that socio-economic factors may be responsible for variations in turnout. For example, Powell (1980)

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[18] For a survey of the literature see for example BLAIS, A. 2000. *To vote or not to vote? : the merits and limits of rational choice theory,* Pittsburgh, Pa., Univ. of Pittsburgh Press. GEYS, B. 2006a. Explaining voter turnout: A review of aggregate-level research. *Electoral Studies,* 25**,** 637-663..

finds that turnout is positively correlated with the economic development of a particular state. Blais (2000) also finds evidence for this relationship. Crewe (1981), on the other hand, reports no relationship between the economic situation of a country and turnout rates.

With respect to the effect of the party system on the variation of turnout, scholars report conflicting results. On the one hand, Powell (1982) suggests a strong impact on the party systems in states that have a strong connection between parties and social groups. Crewe (1981) confirms this finding.

Considering the impact of different election types, more often than not turnout is higher in national elections compared to low order elections (Blais, 2000). Next to election types, various scholars analyze the impact of other political factors such as closeness of an election (see for example Franklin, 2004), campaign spending (see for example Caldeira and Patterson, 1982, Patterson and Caldeira, 1983, Cox and Munger, 1989, Jackson, 1997, Hogan, 1999), the political fragmentation, whereas some authors point to a positive effect on turnout (Seidle and Miller, 1976, Blais and Carty, 1990b, Hansen, 1994) and others find evidence for negative effects of political fragmentation (Jackman, 1987).

On the individual level, various scholars identified some robust predictors explaining differences in individual voting propensity. For the United States, for example, Wolfinger and Rosenstone (1980), in their seminal book "Who Votes?", show that education is the single most important predictor of individual turnout. In fact, ceteris paribus, individuals holding a college degree are about 38 percent more likely to vote (Wolfinger and Rosenstone, 1980). Schmitt and Mannheimer (1991) and Blais (2000) find support for this relationship outside the US, as well, using survey data regarding elections mainly from Europe.

Furthermore, Wolfinger and Rosenstone (1980) find that an increase in age also has a relatively strong positive impact. Again, Blais (2000) supports these findings by drawing on a European sample. Moreover, Franklin (1996) believes age as the main socio-demographic predictor of individual turnout in his study drawing on pooled data coming from 22 mainly Western-European countries.

Additional to these stylized facts, different studies found other socio-demographic aspects to play an important role in explaining individual turnout. For example, studies show that married people are more likely to vote (Blais, 2000, Wolfinger and Rosenstone, 1980). Stoker and Jennings (1995), however, indicate that this relationship might only evolve in a longer term since they show that in the short term, marriage has a slightly negative impact on turnout. Income also has a positive effect on the turnout propensity (Blais, 2000), but some find it to be less strong (Wolfinger and Rosenstone, 1980). Schmitt and Mannheimer (1991)

also claim that gender predicts differences in turnout. Blais (2000) supports the notion that females tend to have a slightly lower voting propensity than male voters.

Since the main research aim of this study is to examine how compulsory voting laws affect individual voting behavior, I will focus on theories explaining turnout on the individual level in this review chapter.

3.1.1 Aggregate Level Approaches

In general, Blais (2009) classifies four different theoretical approaches with regard to individual level turnout explanations. Brady et al. (1995) devise a resource related argument to better understand individual turnout. From this point of view, individual resources like money, time, or skills are crucial to understand why people bother to participate in elections (Brady et al., 1995). Since one could argue that voting does not require many resources, this model, however, is better suited to explain political participation in general (Blais, 2009), and is less relevant with regard to turnout (Brady et al., 1995).

A second way of explaining individual level turnout points to a psychological approach (Verba et al., 1995). By acknowledging the limits of their resource model, they conclude that "(…) *what matters most for going to the polls is not the resources at voters´ disposal but, rather, (…), their interest in politics" (Verba et al., 1995).* Interest in politics alone, however, does not explain turnout. Thus, scholars attempt to discover how and why people develop an interest in politics (Blais, 2009). Two important factors are identified: education and parental influence (Verba et al., 1995). Both factors seem to be strong predictors of political interest. With regard to explaining individual turnout, however, Blais (2009) indicates that more in-depth research is necessary to be sure those factors are accountable for interest in politics.

As a third model to examine turnout points to a mobilization approach, Rosenstone and Hansen (1993) argue that voting can hardly be explained from an individual point of view, because a voter cannot be decisive. Thus, Rosenstone and Hansen (1993) point to the importance of groups like family, friends, neighbors and so on. Many scholars have found that voters' which have been contacted before elections are more likely to attend the polls (Cox and Munger, 1989, Gerber and Green, 2000).

The fourth model of explanation is based on rational choice assumptions. Basically, individuals calculate costs and benefits before voting. Therefore, they only turn out if the benefits outweigh the costs of participation (Downs, 1957). Considering large elections, probabilities of determining the outcome are very slim. Thus, generating a greater benefit seems very

unlikely. From this point of view, rational voters should always abstain (Downs, 1957, Aldrich, 1993). It follows that the rational choice model is able to explain why an individual should decide to vote, but cannot explain rather high turnout rates in, example given, national elections (Blais, 2000, Grofman, 1993). Nevertheless, the rational choice model is a valuable asset when contemplating why individuals turn out, even when they should not. Thus, a pure rational choice perspective remains useful to explain variations in individual turnout (Blais, 2000).

3.1.2 Individual Level Approaches (Rational Choice)

Pure rational choice theory expects voters to turn out when expected (P) benefits (B) of voting exceed initial voting costs (C). Mainly, this assumption dates back to Anthony Downs (1957). This calculus of voting is: R = PB – C > 0. Whereas R refers to the expected utility of voting, P denotes the individual probability of being decisive. B refers to the different expected benefits depending on the policies of two different alternatives, and C stands for the costs of voting. According to this model, turnout should be very low, since it is very unlikely to hand in the decisive vote in large elections. That is, P is usually minuscule (Blais, 2000). In fact, empirical turnout rates can hardly be explained by drawing on this instrumental voting approach (Grofman, 1993).

In order to deal with this paradox of (not) voting, different expansions of the basic instrumental voting approach have been formulated. Downs (1957) introduced a so-called D-term to the basic voting calculus, claiming that some voters might derive utility out of preserving democracy as a whole, and therefore participate in elections (Blais, 2000). Advancing this idea, Riker and Ordeshook (1968) point to possible consumption effects of voting. That is, individuals might derive a non-instrumental benefit from voting itself in order to fulfill their civic duty (Riker and Ordeshook, 1968). Thus, electoral participation is expected when $R = PB + D - C$. However, this civic duty assumption is often criticized to be a hardly observable and possibly tautological assumption (Blais, 2000), failing to explain why some individuals gain utility from expressing themselves and others do not (Mueller, 2008).

Drawing on the assumption that individuals are not only driven by selfish motives, various scholars provide an ethical voter approach (see for example Goodin and Roberts, 1975, Jankowski, 2002, Jankowski, 2007). This basically means that individuals have two sets of preferences; a selfish and an unselfish altruistic one. Following the latter, individuals might turn out to enhance the welfare of others (Geys, 2006b).

Different from that, Ferejohn and Fiorina (1974) provide a minimax-regret approach of voting. That is, the decision to vote is not a decision made under risk but one of uncertainty (Ferejohn and Fiorina, 1974). In other words, P is dropped from the initial equation, because individuals cannot access the actual value of P (Ferejohn and Fiorina, 1974). It follows that individuals seek to find the course of action that provides the minimal regret considering different outcomes to a situation. Most importantly, the minimax-regret criterion asks individuals to calculate different regrets. For example, a person decides to vote but is not decisive. This is compared to the situation in which an actor refrains from voting and their most preferred alternative loses by exactly one vote. Now, if the comparison of those regrets results in a higher regret of the latter situation, the actor should vote and vice versa (Blais, 2000). In fact, this approach is able to predict higher turnout levels compared to the basic instrumental approach (Geys 2006a:21). However, it is also highly controversial. On the one hand, different scholars criticize the assumptions. Aldrich, for example, points out that individuals might in fact not be able to access the actual value of P but, on average, they should be able to recognize that, in large elections, P is close to zero (Aldrich, 1993). On the other hand, Beck (1975) fundamentally questions the logic behind the minimax-regret assumption. In fact, he claims that, from that perspective, individuals should not cross the street since they could get hit by a car. Thus, they should also abstain from voting, because probably dying on the way to the polling station establishes the maximum regret. In short, the minimax-regret approach introduces an important discussion about what is crucial in the rational calculus but also fails to resolve the voting paradox (Blais, 2000).

In another approach, Palfrey and Rosenthal (1983) (1985), introducing a game theoretic perspective, argue that individuals thinking about turning out are taking the possible action of others into account. The reason for that is pretty straightforward. If everybody votes, the possibility of having an impact on the electoral outcome is very slim. Thus, no one should vote. But in that case, one could determine the election with a single vote. Hence, expecting all individuals to be rational and therefore expecting them to abstain from voting, a single person should vote in order to determine the electoral outcome and increase its individual utility. Thus, P might, in fact, be a lot bigger than the initial calculus suggests (Blais, 2000). However, since all individuals make the same calculation, they expect all others to vote in order to be the decisive voter. That would again lead to N increasing so that P would return to being tiny again. In other words, a rational actor that is unsure about whether the other actor really abstains, abstain himself (Blais, 2000). It follows that this game theoretic approach only has explanatory power with respect to rather small elections (Geys, 2006b). Nevertheless, it

establishes the notion that P might not be as small as initially expected. Furthermore, it shows that some individuals might overestimate P and therefore decide to participate in elections.

Other authors point to the importance of social context. Since groups are expected to have a bigger impact on political outcomes and voting costs are exceeded on the group level, they argue that voting might be rational for individuals in the context of social groups (Grossman and Helpman, 2001). Even so, participation in elections might be rational for the group as a whole, but the group based approach fails to solve the puzzle why individuals would not free ride (Geys, 2006b). The main advantage of this approach is that individuals are no longer seen as isolated.

Drawing on the bounded rationality theory (see Simon, 1966), Matsusaka (1995) points to the importance of information levels in order to explain turnout. In other words, individuals are more likely to turn out when they know whom to vote for. On the other hand, Feddersen and Pesendorfer (1996) learned that uninformed voters are strictly better off abstaining in order to increase the chances of informed voters to determine elections. Additionally, Degan (2006), Degan and Merlo (2011) and León (2011) argue that uninformed voters are less likely to turn out since they might regret voting the most. Similar to the instrumental approach, this information approach has a problem explaining high empirical turnout rates. But, it too, helps to explain why some individuals turn out and others abstain (Geys, 2006b).

Different from the forward-looking logic[19] of the instrumental approach, the learning theory draws on a backward orientated logic. That is, individuals adaptively learn from the past in order to maximize their utility (Fowler, 2006). Thereby this approach is able to explain changes in individual-level turnout over time (Geys, 2006b).

There are various reasons to build an investigation of the effects of compulsory voting on individual voting behavior. First, this question clearly addresses the individual level, thus a theory focusing on the individual, like rational choice, must be applied. Secondly, even though rational choice approaches struggle to explain empirical turnout in general, they are able to explain changes in individual turnout at the margin (Grofman, 1993). That is, the rational choice approach enables researchers to come up with straightforward expectations regarding the change in individual turnout, due to an alteration of single parameters of the initial voting calculus. Thus, it is suitable for underpinning assumptions regarding the change in individual turnout due to the introduction of costly compulsory voting.

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[19] Individuals try to maximize their utility in prospective.

3.2. Calculus of Compulsory Voting

Recent studies have supported the notion that effects of compulsory voting laws on turnout can be explained by an expansion of the classic voting calculus (see for example Downs, 1957, Riker and Ordeshook, 1968). In both cross-country comparisons and experimental approaches to explain the effects of CV on voting, high turnout is most likely when costs for non-voting outweigh initial voting costs (Panagopoulos, 2008, Shineman, 2012b). In general, the calculus of voting (e.g. Downs, 1957) predicts that individuals only participate in elections if the benefit of voting (B) is higher than the costs of participation (C). Here, (p) is the probability that a citizen's vote is decisive. B is the (indirect) benefit of voting depending on the realized electoral outcome. Thus, voting is only rational if pB > C.

In contrast to voluntary voting countries, individuals have to care about their utility being derived from abstention when voting is legally required. Compulsory voting laws, usually, introduce additional costs to the voting calculus – the costs of not participating (Cnv). It follows that the expected utility of abstention is – Cnv[20] (Panagopoulos, 2008, Kato, 2007). Hence, if costs for non-voting are introduced and $Cnv \geq C$ initial voting costs are expected to be off-set and rational voters should participate, because the individual expected utility of abstention ($-Cnv$) would always be lower than the expected utility of participating in the elections. Therefore, the calculus of compulsory voting seems to be able to explain empirical turnout rates in compulsory voting states[21] (Panagopoulos, 2008).

Additionally to the impact of costs of not participating, the calculus of compulsory voting also considers differences in the levels of law enforcement between the different countries employing mandatory voting. In fact, countries differ strongly in the way of how effectively they are controlling the election participation or punishing the disobedience. In general, individuals abstaining from voting face an uncertainty whether they will be punished for not attending the polls or they get away with it. In other words, individuals only get punished for not participating in the election with a certain probability (p). This probability also affects the calculus of compulsory voting equation. Instead of focusing on the utility of participation, introducing (p) shifts the calculus in the direction of considering the utility of abstention. Recall, that if Cnv ≥ C and p = 1 the expected reward of abstaining should be always lower than

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[20] For countries not imposing a fine for non-participation the voting calculus should not be affected and rational voters are expected to abstain PANAGOPOULOS, C. 2008. The Calculus of Voting in Compulsory Voting Systems. *Political Behavior,* 30**,** 455-467..

[21] However, following the above-mentioned utility function, turnout would expected to be universal, if Cnv ≥ C. But there is only little empirical evidence for that. This can be explained be different levels of law enforcement ibid..

the expected utility of participating. However, different levels of might p change that general assumption. Let p be the probability with which a voter gets punished for not turning out on Election Day. That is, they would have to pay the penalty (Cnv). It follows that $1 - p$ is the probability of the voter not getting punished. In that case, the penalty would be 0. Since this situation specifically considers abstention, the expected utility of abstention is: $E[U(Abstain)] = -pCvn - (1 - p) * (0)$. Given that equation, Panagopoulos (2008) suggests that rational actors should be turning out to vote if $pCnv \geq Cv$.

Drawing on the equation above, it can be argued that both Cnv and p, could be conditional on one another. For instance, there could be a trade-off between the levels of penalties and the levels of law enforcement. It could be the case that fixing one factor at a high or very high level and only decreasing the other would still lead to high numbers of turnout. In fact, Panagopoulos (2008) assumes that costs of not participating and levels of law enforcement each individually affect turnout in compulsory voting systems. However, together both factors should have a stronger effect.

In the next two sections, this study systematically examines the impact of the costs of not participating and the levels of law enforcement. First (Ch.4) the calculus of compulsory voting approach is investigated within a decision-theoretic framework. Afterward, the general assumptions regarding Cnv and p are transferred into a game-theoretical model (Ch.5)

3.2.1 Explaining individual turnout in the Compulsory Voting mode

In the surrounding literature exists a long tradition of formal modeling concerning turnout (Feddersen and Pesendorfer, 1996). In general, the theoretical literature on turnout draws on the basic calculus of voting framework, in which (p) and (B) refer to the indirect instrumental, and (D) to direct expressive or consumption aspect of voting (Degan and Merlo, 2011). However, many approaches treat these factors as exogenous. Thus, they might lack a sufficient explanation of the empirical evidence regarding turnout (Merlo, 2005). Most of the formal literature points to those two aspects in order to predict individual turnout. The existing formal literature can be subcategorized into three categories: (1) pivotal or decisive voter models (among others Ledyard, 1984, Palfrey and Rosenthal, 1985, Palfrey and Rosenthal, 1983), (2) ethical voter models (e.g. Harsanyi, 1980, Feddersen and Sandroni, 2006) and (3) uncertain voter models (i.e. Matsusaka, 1995, Feddersen and Pesendorfer, 1996). Each of these approaches focuses on one or more of the core parameters of the voting calculus in order to explain or predict individual turnout. Therefore, they try to endogenize p, B or D (Merlo, 2005, Degan and Merlo, 2011).

Pivotal models of voting endogenize the individual probability for a single person to hand in the decisive vote in order to predict individual turnout. In those models, the probability of being decisive, (p) is the main individual motivation to participate in the election. It depends, to a large extent, on the size and composition of the electorate. Moreover, the electoral outcome is determined by the group decision, and can, therefore, be considered as a public good. Therefore, these models consider a game-theoretic environment in which the voting decision is a strategic one (Merlo, 2005). Normally, (p) is supposed to be tiny in comparison to the size of the electorate (N) as it increases, so rational actors are, thus, very unlikely to participate in large elections from this perspective. In short, pivotal voters models are able to explain substantial turnout rates for rather small electorates, since in which (Merlo, 2005) (p) is assumed to be higher when (N) is low. However, endogenizing (p) does not help to solve the voting paradox in large elections in which (N) is large and, thus, (p) and turnout should be low, respectively. Empirically, however, turnout in the given example is significantly different from zero.

Unlike the previous examples, ethical voter models endogenize (D) in order to predict individual level turnout. In general, ethical voter models (e.g. Feddersen and Sandroni, 2006), model the voting situation in a way that a single voter cannot be decisive. Instead, individual motivation to participate in a given election is derived from fulfilling ones civic duty, thereby contributing to a public good (Feddersen and Sandroni, 2006). Different from decision-theoretic approaches, a sense of (D) is derived due to equilibrium outcomes of the game (Merlo, 2005). That is, voters might gain a positive utility for voting for the preferred candidate without being decisive. Thus, benefits of voting are more direct in comparison to the pivotal models. Therefore, ethical voter models are considered to predict empirical turnout much more accurately (Merlo, 2005) than, the aforementioned decisive voter models. However, these models assume that individuals have a preferred alternative in each election and are therefore likely to participate (Degan and Merlo, 2011). But, empirically, there are many elections in which individuals have preferred the alternative.

Uncertain voter models, however, try to endogenize parts of the C-term in order to provide formal evidence for the notion that individual information levels are a good predictor of individual turnout. In the model provided by Timothy Feddersen and Pesendorfer (1996), voting is technically costless. However, voting can be potentially costly. On the one hand, the model considers that each vote can, in fact, be pivotal. But on the other hand, information is asymmetrically distributed. Thus, an uninformed vote could lead to lower utilities. It follows that a major prediction of this model is that uninformed voters have a stronger incentive to

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abstain (Feddersen and Pesendorfer, 1996). At the same time, informed voters will, in equilib-rium, always vote according to their information signal (Feddersen and Pesendorfer, 1996). Matsusaka (1995) provides a decision-theoretic model in which individuals are more likely to vote as their confidence in their voting decisions increase. Ghirardato and Katz (2006, 2002) also consider a positive effect of the individual information level on the propensity to partici-pate in elections. They focus on the impact of different quality levels of information and refer to that as ambiguity. In sum, these models find the relationship between information and vot-ing to be causal (Lassen, 2005). Even though some empirical studies only point to correlation, the effect of information on turnout seems to be positive and robust (Wolfinger and Rosenstone, 1980) (see for example Wolfinger/Rosenstone 1980; see also Palfrey/Poole 1987).

At the same time, various scholars have tried to provide formal models of voting by considering compulsory voting. Kato (2007), Panagopoulos (2008), Singh (2011) and Tyson (2013) all model voting with compulsory participation. One key prediction is that more severe penalties lead to higher turnout (Panagopoulos, 2008). Another line of research, undertaken by, for example, Borgers (2004) Jakee and Sun (2006), Goeree and Großer (2007), Ghosal and Lockwood (2009), Krasa and Polborn (2009), Shineman (2010) and Großer and Seebauer (2013) considers compulsory voting and informed voting in their model. Thereby, Borgers (2004) and Krasa and Polborn (2009) focus mainly on the differences in electoral outcomes in terms of welfare between voluntary and compulsory voting modes by providing voting mod-els in which voting is costly. Jakee and Sun (2006), instead, chose to focus on the relationship between compulsory voting and information, thereby supposing a negative effect of compul-sory voting laws on the information level of the electorate, since they expect more uninformed voters to obey the legal requirement to vote. Moreover, they argue that compulsory voting might decrease the quality electoral outcome (Jakee and Sun, 2006). Furthermore, Großer and Seebauer (2013) find that in small groups, unpunished compulsory voting increases infor-mation acquisition. Shineman (2010) finds evidence for the notion that compulsory voting alters the individual voting calculus on the individual level by drawing on an experimental design. In her controlled computer-based experiment, individuals

must decide between two alternatives. Individuals are either informed or uninformed about their preferences. If they are uninformed, they may buy extra information. Hence, her model considers endogenous information acquisition. Shineman finds that, on one hand, compulsory

voting boosts turnout and slightly increases individual willingness to obtain information (Shineman, 2010).

Figure 3 Relationship between information and turnout
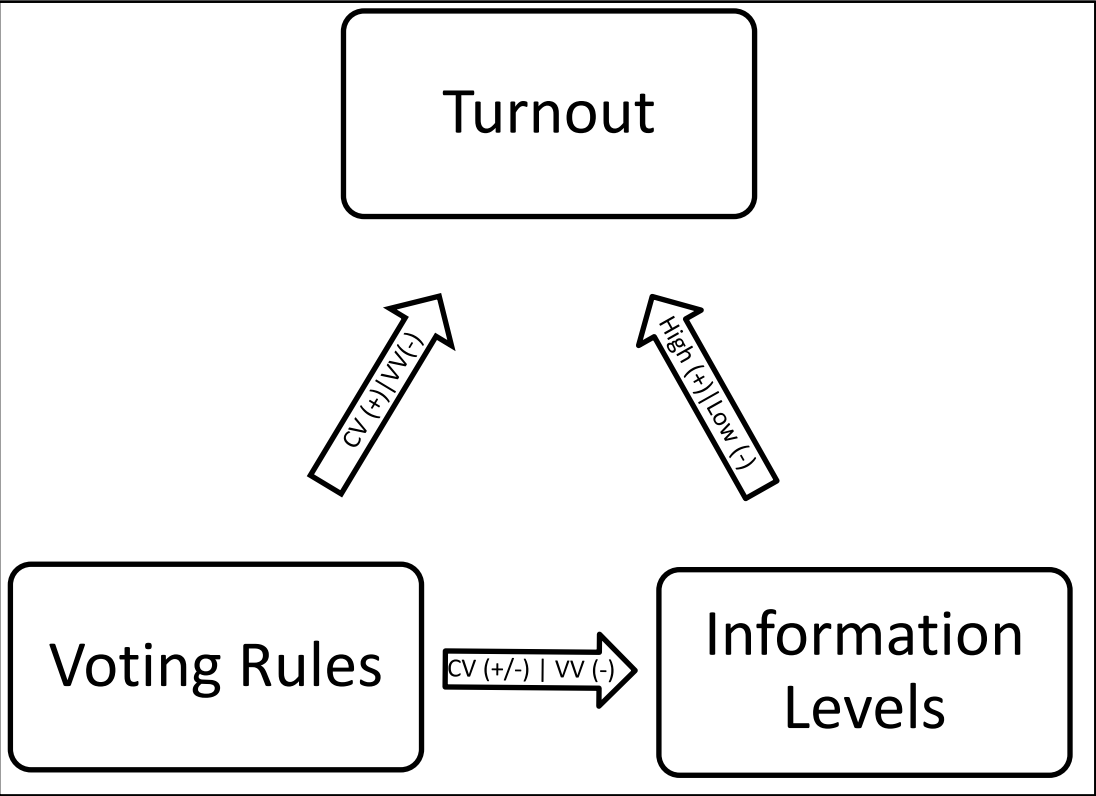
Note: CV stands for compulsory voting. VV refers to voluntary voting. "High" refers to a high level of informedness, whereas "Low" refers to low level of informedness (+) indicates a positive effect. (–) indicates a negative effect.

Drawing on the previous finding of empirical research[22] and the predictions of the formal literature, Figure 3 provides a stylized model of the expected effect of individual information levels on turnout for voluntary voting rules (VV) and compulsory voting rules CV). Thereby, Figure 3 summarizes the empirical findings reported in Section 2.3 and the predictions of the above-mentioned voting models considering information and turnout in both voting modes. With respect to turnout in general, the figure captures the negative empirical trend of low or declining turnout in most western-style democracies employing voluntary voting. Theoretically, the figure follows the assumption that rational actors only have little incentive to participate in large-scale elections since their impact is supposed to be marginal. Regarding the importance of individual informational levels, the figure suggests that when voting is voluntary uninformed individuals might abstain more frequently than their informed counter-

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[22] For a discussion of the empirical literature regarding turnout see Section 2.3

parts. This is in line with the main result of Wolfinger and Rosenstone (1980), and also corresponds with the models of Lassen (2005), Feddersen and Pesendorfer (1996) and Matsusaka (1995).

Drawing on previous findings, Figure 3 generally suggests a positive impact of CV on turnout regardless of the individual information level. Recall that the calculus of compulsory voting expects a positive effect of compulsory voting on turnout when the costs of non-voting are higher or equal to the considered costs of voting.

3.2.2 Explaining informed Turnout in the Compulsory Voting mode

In addition to the explanation of higher turnout in compulsory voting states due to the relationship between Cnv and C, some authors argue that this also might increase informed turnout. In both laboratory (Shineman, 2010) and field experimentation (Shineman, 2012a) Victoria Shineman finds that costs of non-voting reduce considered cost of voting, thus informed voting becomes more likely (Shineman, 2012b). The reasoning goes as follows; Casting informed votes is desirable since it creates a positive effect on the probability of a preferred outcome (Shineman, 2012a). But in order to vote for the preferred candidate, individuals must invest in information and the participation itself. Normally, those costs exceed the expected benefit and individuals refrain from voting. Since CV now adds costs for non-voting to the individual voting calculus, the considered costs of participation decrease (Shineman, 2012b). It follows that individuals now find that the combined costs of participation and information are lower than the expected benefit of an uninformed vote (Shineman, 2012a). Introduction of Cnv translates some or even all of the initial participation costs into sunk-costs. That reduces considered costs of voting (Shineman, 2012a). Hence CV could make informed participation more likely.

This can also be explained by looking at the voters that are most likely being additionally mobilized by a legal requirement to participate in the elections. Compulsory voting is expected to concentrate on activating voters that can be characterized as habitual non-voters in voluntary voting systems. A massive body of literature has shown that turnout can be explained by various aspects, e.g. age, education, and income (Wolfinger and Rosenstone, 1980, Blais, 2000, Matsusaka and Palda, 1999). Differences in individual voting behavior can, therefore, be explained by variations in politically relevant socio-economic characteristics (Bechtel et al., 2016) That is, individuals who are, for example, low income-earners, less educated, young or members of a minority are significantly less likely to vote (DeNardo, 1980, Verba et al., 1995). Education has been discovered as a strong predictor of turnout in particu-

lar, (Wolfinger and Rosenstone, 1980). Accordingly, voluntary non-voters are believed to abstain from voting mostly because they are indifferent between political alternatives, or are not interested in the political process in general (or in particular). Indifference between alternatives thereby often derives from a lack of political or contextual knowledge. Hence, individuals are not able to identify their most preferred alternative (Matsusaka, 1995). Compulsory voting, however, is considered to essentially activate individuals who can be characterized as voluntary non-voters. They are most likely to abstain if voting is voluntary, and strongly contingent on additional information in order to avoid voting mistakes (Degan, 2006, León, 2011). Thus, it seems reasonable to assume that compulsory voting can be considerably costly for uninformed individuals since abstention is not the answer to indifference anymore[23].

The effect of compulsory voting on informed turnout can be also related to an information theory approach, proposed by Matsusaka (1995). This framework models the notion that information levels are the main predictor of individual turnout (Matsusaka, 1995). Basically, the model assumes that all individuals have a predisposition to vote, but this does not always translate into casting a ballot[24]. The reasoning for that goes as follows: if individuals do not have enough information to evaluate candidates, there is the chance of voting for the wrong candidate. That is, e.g. voting for A but really preferring B. Thus, individuals might abstain even though they have a strong preference to vote in general. Therefore, voting becomes more likely the more informed an individual is. In other words, citizens want to be sure of whom to vote for (Matsusaka, 1995, Jakee and Sun, 2006).

Considering a two-candidate election, in which the electoral winner is determined by simple majority rule, an individual receives a utility of 1 if the elected candidate matches the individual preference and a utility of -1 if not. In particular, payoffs are determined to correspond to V(t) = MZ(t), whereas M refers to the state of the world and Z to some candidate specific characteristics. Let $M \in \{1, -1\}$ and $Z \in \{1, -1\}$. Furthermore, Z is determined as Z = Z(1)- Z(2). Thus a person prefers Candidate 1 if MZ = 1 and Candidate 2 when MZ =-1(Matsusaka, 1995). Unfortunately, not all individuals can evaluate which candidate is best for them. Information, however, can help to make a more confident decision.   Note   that normally the expected utility of an indifferent voter abstaining is zero, if participation is vol-

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[23] Since the act of marking the ballot in the voting booth is still free and unobservable for the state, it could be the case that, instead of investing more in information or casting more informed ballots, voluntary non-voters could just hand in invalid ballots. Thus, the additional costs for non-voting would possibly increase turnout in general but would not affect the basic voting calculus when it comes to actual act of voting.

[24] This raises the question why people have this predisposition. So far, information theory approaches lack of a sufficient theoretical explanation for the assumption of a predisposition to vote. Thus, it seems unable to predict actual turnout. However, it is able examine why individuals have different propensities to turn out GEYS, B. 2006b. 'Rational' Theories of Voter Turnout: A Review. *Political Studies Review,* 4**,** 16-35..

untary. However, according to the calculus of compulsory voting, the utility of abstention is – Cnv and not zero, when participation is a legal requirement (Panagopoulos, 2008) . Thus, if individuals who would abstain if voting were voluntary no longer consider abstention to be their best response, they could have an incentive to invest in additional information in order to gain confidence with respect to their voting decision. Therefore, compulsory voting could incentivize especially uninformed voters to invest in additional information.

Different studies have examined the relationship between information acquisition and voting building on formal modeling. Starting with Condorcet´s Jury Theorem, scholars have supported the notion that group decisions are able to aggregate information in general (Austen-Smith and Banks, 1996, Austen-Smith and Feddersen, 2009) and in elections in particular (Feddersen and Pesendorfer, 1999b, Feddersen and Pesendorfer, 1999a, Feddersen and Pesendorfer, 1997). Thus some argue that groups produce better decisions (Großer and Seebauer, 2013).

Rational choice scholars, in the tradition of Anthony Downs, suggest that information acquisition is almost always associated with costs (Downs, 1957, Martinelli, 2007). If information acquisition is costly, individuals should have an incentive to free ride and rely on the effort of others. In fact, Schumpeter (1961) and Downs (1957) introduced the "rational ignorance hypothesis", which claims that rational individuals hesitate to acquire costly information and prefer to rely on the informational effort of others in order to increase expected utility. Various models find support for this notion[25] (Mukhopadhaya, 2003, Martinelli, 2006, Martinelli, 2007).

Feddersen and Sandroni (2006) on the other hand, show in an ethical voter model that in large elections, a significant part of the electorate acquires information depending on the costs and the quality of the information. Shineman (2010)[26] conducts laboratory experiments to test a decision theoretical model of costly information acquisition and voting comparing between compulsory and voluntary voting. Tyson (2013) models compulsory voting as an incomplete information game allowing for partisan and independent voters. Sastro and Greiner (2010) conduct laboratory experiments in order to examine compulsory voting with regard to the impact of exogenous information signals, abstention, and invalid balloting. Großer and Seebauer (2013) employ a laboratory experiment concerning voting and information acquisition in small groups. They examine differences between voluntary and compul-

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[25] For an excellent survey of the literature see for example GERLING, K., GRÜNER, H. P., KIEL, A. & SCHULTE, E. 2005. Information acquisition and decision making in committees: A survey. *European Journal of Political Economy,* 21**,** 563-597..

[26] This study is discussed more detailed in chapter 2.2.2.

sory voting modes[27]. Drawing on the formal literature concerning information acquisition and voting, they try to examine the impact of group size on individual information gathering and whether this varies between voluntary and compulsory voting rules. They find that in small groups, unpunished CV increases information acquisition.

According to the predictions of the swing voters curse (Feddersen and Pesendorfer, 1996), rational voters abstain when they are uninformed. In general, formal models show that uninformed voters might impair the group decision (e.g. electoral outcome) since they could only affect the outcome by voting for the alternative not preferred by informed voters (Feddersen and Pesendorfer, 1996). That is, uninformed voting creates negative group externalities since uninformed subjects might outvote the informed members of the group in pivotal events. Consider that all individuals but one are informed and consider also that informed voters vote according to their signal. Let Alternative A be in the lead with one informed vote. Since informed voters always vote their signal, A matches the group preferences. If the uninformed voter abstains, A will win the election with a probability of 1. However, if an uninformed individual casts a random vote, the election outcome will be a tie with the same probability[28] for each alternative winning the election, $\frac{1}{2}$. When ties are broken randomly, the probability of A winning the election will diminish to 0.75, compared to 1 if the uninformed voter abstains[29] (Großer, 2012). The decrease in the winning probability of the better alternative leads to a negative externality for the group (Großer, 2012). It follows that rational voters abstain when they are uninformed even when voting is costless (Feddersen and Pesendorfer, 1996, Battaglini et al., 2010). Drawing on the expectations of the formal literature on voting and information acquisition, Figure 4 suggests a stylized model of the expected relationship applied voting mode and costly information acquisition.

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[27] In their study they do not consider abstention in the compulsory voting mode. Thus, all subjects must vote (page).

[28] Note, that the probability of a two vote win for A is also $\frac{1}{2}$ GROßER, J. & SEEBAUER, M. 2013. The curse of uninformed voting: An experimental study..

[29] $0.5 * 1 + 0.5 \, (0.5 * 0 + 0.5 * 1) = 0.75$

Figure 4 Expected effect of the electoral system on information acquisition and informed turnout
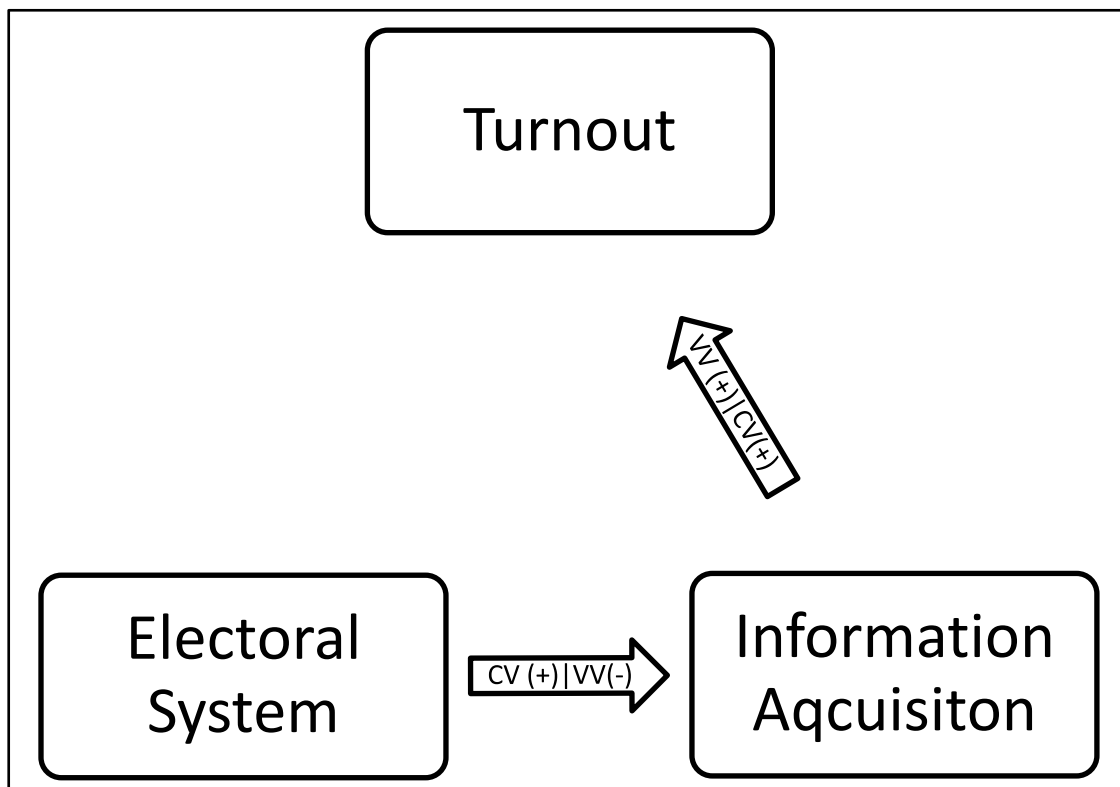
Note: CV stands for compulsory voting. VV refers to voluntary voting. (+) indicates a positive effect. (–) indicates a negative effect

Part II: Experimental Evidence

4. Reassessing the Calculus of Compulsory Voting

The calculus of compulsory voting predicts that compulsory voting (CV) enhances turnout because the introduced costs of not participating disable initial voting costs. Furthermore, it accounts for empirical differences with respect to the actual implementation of CV-rules. That is, some countries strictly control if voters participate in elections, others do not. Therefore, the calculus of compulsory voting states: High turnout in CV-countries can be explained by the cost of not participation and the level of law enforcement. Thereby it assumes that, if costs are high and law enforcement is strict, CV-regimes should be most effective.

This has been tested in different ways: case studies, cross-country comparisons, formal modeling, and experiments. Results are ambiguous. For example, empirically, CV-countries are sometimes effective in boosting turnout, even though enforcement is low. Until now, only the impact of the cost of not participating has been specifically and systematically and offered as an explanation for why voters tend to turn out more in CV-countries. Therefore, this chapter offers a systematic investigation of how the level of law enforcement affects the individual decision to turn out to vote when voting is mandatory. The research questions are: How and to what extent does compulsory voting affect the individual decision to turn out? And how and to what extent does compulsory voting affect the individual decision to acquire information before participating in an election?

To answer these questions, the chapter proceeds as follows: First, it presents a reference model which systematically assesses the effect of costs of not participating on the individual voting decision. Second, it discusses the associated experiment and experimental results testing the effect of costs of not participating. Third, drawing on this model, the chapter presents a decision-theoretic model of compulsory voting, also accounting for the impact of the cost of not participating, but also including the level of law enforcement. Fourth, the chapter presents a series of controlled lab experiments testing the predictions of an expanded model. Fifth, this chapter presents the empirical analysis of the data generated by the experiments. The chapter closes with a brief discussion of the empirical results.

4.1 Analytical Framework

The calculus of compulsory voting presumes that compulsory voting increases turnout by adding costs for not participating to the individual voting calculus (Panagopoulos, 2008). More specifically, the calculus of compulsory voting argues that compulsory voting is supposed to be effectively increasing turnout when the costs for not voting are at least equal to the initial voting costs. It follows, that if costs of not participating are lower than the initial voting costs, the individual voting calculus should not be affected and turnout should be low. However, empirically some countries employing compulsory voting laws still have higher levels of turnout than countries employing voluntary voting laws. Therefore, Panagopoulos (2008) argues that focusing only on the costs of not participating is insufficient in terms of explaining high turnout in compulsory voting countries. Instead, he suggests to also include different levels of law enforcement into the examination. This means that, empirically, coun-

tries differ strongly with respect to their ability to enforce the obligation to vote. It follows that countries who mandate voters to participate in the elections and are actually able to punish individuals disobeying the law are expected to have higher levels of turnout compared to countries in which voting is compulsory but not participating is hardly getting punished. Thus, in addition to costs for not participating also levels of law enforcement are expected to affect individual voting behavior.

Even though various studies support the notion that compulsory voting laws do, in fact, increase turnout, only the impact of the costs of not voting has been tested in a systematic way. Even though Panagopoulos (2008) also accounts for different levels of law enforcement, he conducts a comparative study of various countries employing compulsory voting, which cannot exclude country-specific intervening factors. Thus, causal mechanisms of costs of not voting and levels of law enforcement can hardly be revealed.

Therefore this study provides a formal model of (compulsory-) voting drawing model provided by Shineman (2010) in order to systematically examine how and to what extent costs of not participating and levels of law enforcement increase turnout. Furthermore, the model will also examine a possible impact of compulsory voting laws on informed turnout.

4.1.1 The Reference Model

In a decision-theoretic model, Victoria Shineman (2010) models the effect of compulsory voting on turnout in general and informed turnout in particular. The decision-theoretic model, thereby, simplifies the act of voting, as it only considers a single actor that is always pivotal. That neglects the interactive nature of elections. However, the model is supposed to serve as a baseline model in order to isolate the effect of compulsory voting laws on individual voting behavior[30] (Shineman, 2010). Furthermore, the model accurately captures the way compulsory voting laws are practiced in the real world by modeling it in a two-stage way. That means that the act of voting consists of two particular steps. First, individuals decide to attend the polls on Election Day or abstain. Second, if they have decided to turn out, they can cast a vote in the voting booth. Compulsory voting laws only mandate individuals to turn out on Election Day. The actual voting decision within the voting booth is not mandated

In general, it predicts that compulsory voting offsets ordinary voting costs with having no negative effect on informed turnout (Shineman, 2010).

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[30] TOMZ, M. & VAN HOUWELING, R. P. 2008. Candidate Positioning and Voter Choice. *American Political Science Review,* 102**,** 303-318. generally argue that decision theoretic models are helpful tool to extract basic evidence about individual behavior in general and political behavior in particular.

The model considers a two-stage participation game in which a single rational actor can only decide between two alternatives. The voter (V) either prefers alternative F or G. At the beginning of the game, nature determines the state of the world (F or G) with both states having the same probability (0.5). Voters can initially be informed (V_i) or uninformed (V_u) about which candidate they prefer. If a voter is initially uninformed, he can buy information about the current state of the world. At the beginning of the game, voters are fully aware if they are informed or uninformed. Voters are also fully aware of all additional cost and benefit parameters (Shineman, 2010).

At the beginning of the game, if the voter is initially uninformed, he can decide whether to invest in costly information or to remain uninformed. If the voter buys information, he must pay information costs ($C_i > 0$) and no information costs if he remains uninformed. If the voter is informed, either initially or after buying information, he is fully informed about the current state of the world (Shineman, 2010). The act of voting itself takes place on two stages in the model, the balloting stage, and the voting stage. After the voter learned about the current state of the world or remained uninformed he can decide to participate in the ballot stage (B) or stay at home (H). If voters enter the ballot stage, they have to pay costs of balloting ($C_b > 0$). Otherwise, no ballot costs are due (Shineman, 2010). Note that a voter can only cast a vote (V) on the voting Stage for one of the two alternatives later if he had entered the ballot stage in the first place. If voters cast a vote on the voting stage, they have to pay the costs of voting ($C_v > 0$) (Shineman, 2010). Voters can also decide to abstain on the voting stage (A). If the voters abstain, they do not pay voting costs. This captures the nature of voters rolling-off in the voting booth, e.g. by casting a blank or invalid ballot.

The distinction of balloting stage and the voting stage is also crucial to the modeling of compulsory voting in this model. It helps to model compulsory more accurately with respect to the way it is generally practiced in the real world (Shineman, 2010). However, balloting is costly in the model. Not balloting, however, is free in the voluntary voting setup. In the compulsory voting mode, though, not balloting is charged with a varying fee ($C_{nb} > 0$). Not participating in the voting stage, however, is free in both voting modes. That captures the general notion that compulsory voting regimes can charge not attending the polls, but cannot sanction voting behavior within the voting booth.

Since the model is a decision-theoretic model and it considers a single rational actor that is pivotal all the time, the individual reward depends on the voters' decisions and the current state of the world. For instance, if the voter votes for F in state F, F wins the election and the voter receives a Benefit ($B > 0$). However, if he votes for F in state G, F wins and vice

versa. In that situation, the benefit is zero. In the case of abstention, either on the ballot or the voting stage, the election winner is determined randomly by a coin toss. In that situation, both candidates can be picked with the same probability (0.5). If F is drawn as the random winner in state F, the voter also receives (B) and, e.g., no benefit if G is the random winner in state F, and vice versa (Shineman, 2010). Figure 5 provides an overview of the general structure and

Figure 5 Sequence of decisions in the reference model
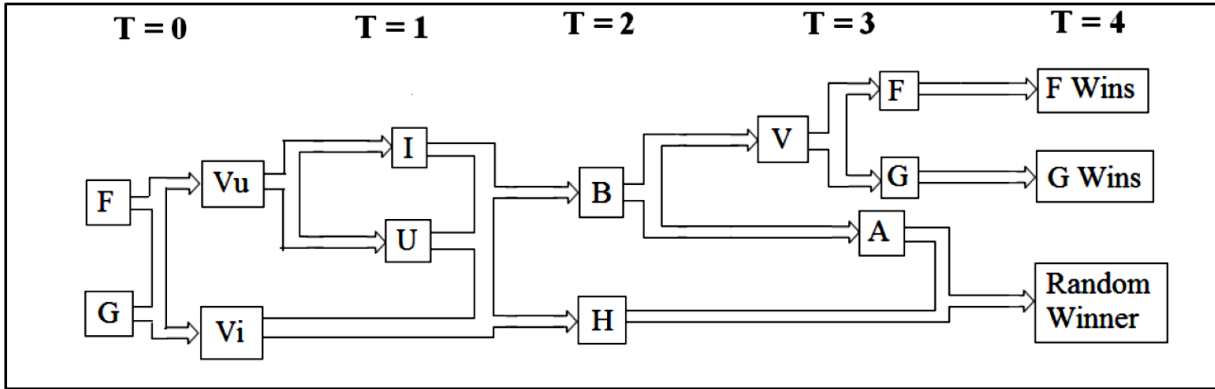
Note: Decision tree originally provided by (Shineman, 2010)

procedure of the reference model. Considering the basic parameters and the general structure of the model, the voter can choose between various strategies. Table 7 summarizes the different strategies a voter can choose in this model

Table 7 Alternative Strategies in the reference model

Strategy	Formal
Remaining uninformed and staying at home	U, H
Remaining uninformed, ballot but abstain (rolling-off) at the voting stage	U, B, A
Remaining uninformed and cast a valid vote	U, B, V
Getting informed but staying at home	I, H
Getting informed, ballot but abstain (rolling-off) at the voting stage	I, B, A
Getting informed, and cast a valid vote	I, B, V

Note: The table shows the different strategies a subject can adopt in this model.

Without the loss of generality, the model assumes that an informed voter will always vote according to the revealed preference. Thus, the reward is of an informed vote is always B. Casting an uninformed vote, however, leads to a reward of B or to a reward of 0, with the same probability (0.5). Thus, it follows that the reward of casting an uninformed vote is B/2. Any other strategy also produces an expected reward of B/2, since the difference between the

reward of an informed vote (B) and an uninformed vote (B/2) is B/2 (B – B/2 = B/2) (Shineman, 2010).

Drawing on these parameters, the model provides predictions with respect to turnout in general and informed turnout in particular, comparing the voluntary and compulsory voting mode. First, the model predicts that there is a parameter space in which the combined costs of voting, e.g. C_i, C_b and C_v is less than the expected reward of an uninformed vote. In that case, casting an informed vote is the dominant strategy in both voting modes (Shineman, 2010). However, if the combined voting costs exceed the expected reward of an uninformed vote, dominant strategies vary over voting modes. In the voluntary voting mode, rational actors should abstain, whereas informed voting is the dominant strategy in the compulsory voting mode since initial costs of informed voting are offset by the costs for not balloting (C_{nb}) (Shineman, 2010). If C_{nb}, however, is marginal remaining uninformed and staying at home is the dominant strategy in both voting modes. This also accounts for the case in which the voting costs (C_v) and the information costs (C_i) are larger than B/2. This also applies when the balloting costs are larger than the costs for not participation (Shineman, 2010). However, if the costs for not participation exceed the balloting costs, the dominant strategy is casting a ballot but rolling off in the compulsory voting mode and abstaining completely in the voluntary voting mode.

Drawing on these predictions, the model postulates three main hypotheses with respect to the relationship between compulsory voting rules and informed voting. First, compulsory voting does not increase uninformed voting. Second, it also does not decrease informed voting. Third, compulsory voting is sometimes able to compel informed voting (Shineman, 2010). The next section presents this studies model.

4.1.2 The Model

The model presented in this section basically draws on the model presented by Shineman (2010). Thereby it especially enables the two-stage way of modeling compulsory voting. Compulsory voting, as practiced in the real world, legally obliges voters to show up at the polling stations on Election Day. Nonetheless, individual behavior within the voting booth is beyond legal control (Keaney and Rogers, 2006, Shineman, 2010, Panagopoulos, 2008). Therefore, considering voting as a two-stage process in which individuals first have to decide whether to participate in the election and then whether to cast a valid vote or not, captures the act of voting accurately.

In contrast to the reference model, however, the model presented here will not consider voting costs on the voting stage, as they are not crucial to the understanding of the function of the calculus of compulsory voting. Even though the two stages of the voting process are convincing, establishing two different costs of voting[31] is less persuasive in this context. The literature on voting costs distinguishes between different voting costs. On the one hand, costs voters incur before the actual elections and on the other hand costs that occur on election day (Geys, 2006b). For instance, costs occurring long before the actual Election Day are costs for gaining information about candidates[32] and costs for registering for voting[33]. Those costs are also seen as direct costs of voting (Goerres and Rabuza, 2014). Indirect costs of voting, on the other hand, occur mostly on election day, for example getting to the polls, and can be generally understood as opportunity costs (Goerres and Rabuza, 2014). That is, by turning up to vote, voters forego the chance of gaining utility by doing something else[34]. So voting costs are really costs of turning out and not decision costs that could occur in the voting booth. Degan and Merlo (2011), for example, consider voting costs as the negative costs of an individual electing his less preferred candidate. Therefore, these costs can be considered as decision costs. Since compulsory voting laws only affect the individual decision to turn out on Election Day but do not affect the actual decision within the voting booth, decision costs are non-relevant to the model.

In addition to the reference model, this model will also consider the importance of the level of law enforcement to the functioning of compulsory voting. The calculus of compulsory voting, as proposed by Panagopoulos (2008), indicates that mandatory voting laws should be most effective when penalties for non-compliance and the level of law enforcement are high. Evidence gained from cross-country comparisons underpin this notion (Panagopoulos, 2008). However, this approach cannot claim causality as country-specific variables could in-

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[31] Balloting costs (C_b) on the balloting stage and costs of voting (C_v) on the actual voting stage SHINEMAN, V. 2010. Compulsory voting as compulsory balloting: How mandatory balloting laws increase informed voting without increasing uninformed voting. *Annual Meeting of the American Political Science Association, Toronto.*.
[32] Downs DOWNS, A. 1957. *An economic theory of democracy,* New York, Harper [and] Row. and Aldrich ALDRICH, J. H. 1993. Rational Choice and Turnout. *American Journal of Political Science,* 37**,** 246-278. for example argue, that these costs can be considered as marginal. Converse CONVERSE, P. E. 1964. *The nature of belief systems in mass publics,* New York Free Press of Glencoe , CONVERSE, P. E. 2000. ASSESSING THE CAPACITY OF MASS ELECTORATES. *Annual Review of Political Science,* 3**,** 331-353, CONVERSE, P. E. 1970. *Attitudes and Non-attitudes: Continuation of a Dialogue,* Reading, Mass. , Addison-Wesley., on the other hand shows that, contingent on the individual capabilities, these costs can be considerably high.
[33] ROSENSTONE, S. J. & WOLFINGER, R. E. 1978. The Effect of Registration Laws on Voter Turnout. *American Political Science Review,* 72**,** 22-45. argue that registration can incur relevant costs if voters have to register themselves.
[34] Various scholars have claimed that these costs are insignificant NIEMI, R. 1976. Costs of voting and nonvoting. *Public Choice,* 27**,** 115-119, PALFREY, T. R. & ROSENTHAL, H. 1983. A strategic calculus of voting. Ibid.41**,** 7-53, ALDRICH, J. H. 1993. Rational Choice and Turnout. *American Journal of Political Science,* 37**,** 246-278..

terfere with the supposed effect. Furthermore, Shineman (2010) does not expressively account for the impact of the level of law enforcement in her model, as well. Therefore, this factor has not been examined in a formal way. Therefore, the model presented in this section will additionally consider varying levels of law enforcement, in order to test whether the assumption of the calculus of compulsory voting hold.

General Parameters

Basically, the model presented in this section considers similar general parameters as the reference model discussed above. However, it operationalizes voting costs differently. Like the reference model, the model presented here is a decision-theoretic model considering rational actors (V), who can decide between two alternatives (A or B). If an actor votes, he is pivotal all the time (Shineman, 2010). At first, actors can be initially informed (i) or uninformed (u) about the preferred candidate. If a voter is initially informed, he is fully informed about which candidate he prefers. In the case a voter is initially uninformed, he can invest in information about his preference by paying information costs ($C_i > 0$). An initially uninformed voter can also decide to remain uninformed. Remaining uninformed incurs no information costs. After making the decision of whether to get informed or to remain uninformed, voters can decide to attend the balloting stage (b) or abstaining completely (a). Entering the balloting stage incurs a cost of voting ($C_v > 0$). The two cost parameters, C_i and C_v, capture the concepts of direct and indirect voting costs, with C_i referring to the direct costs and C_v referring to the indirect costs of voting. Akin to the reference model, abstaining is free in the voluntary voting mode but incurs the cost of not participating ($C_{nv} > 0$) (Shineman, 2010). If a voter decides to participate in the ballot stage (b), he can afterward decide to cast a vote for one of the two candidates or roll-off at the voting stage. Casting a valid vote (v) for A or B on the voting stage does not incur any additional voting costs. Furthermore, rolling-off also incurs no costs in both voting modes. This captures the assumption that compulsory voting laws have an impact prior to the actual act of voting. Thus, the model does not consider decision costs occurring within the voting booth but voting costs that occur before voting.

Considering these basic parameters, and the different actions an actor can choose, different rewards are possible. Since the model is a decision-theoretic model, the individual reward depends on the actors' decisions. In general, a voter receives a reward ($B > 0$) if he casts a vote for his preferred candidate and no reward if he votes for the candidate not matching his preference. In the case of abstention or roll-off, the winning candidate is determined randomly. Both candidates share the same probability of getting picked as the winner. The probability

is ½. It also follows that casting an uninformed vote leads to a reward (B) with the probability ½ and to no reward with the probability ½. Therefore, the reward of an uninformed vote is B/2. The reward of an informed vote, however, is B. This means informed voters should always vote according to their preference because the difference between the reward of an informed vote (B) and an uninformed vote (B/2) is B/2[35]. Hence, deviating from informed voting should always produce an expected reward of B/2.

In order to examine the effect of compulsory voting on turnout in general - and informed turnout in particular - the model focuses on initially uninformed voters. Thereby, only two different states are crucial to the model. The model presumes rational voters. That is, voters are expected to prefer a higher reward over a lower reward. It follows that, initially, informed voters cast a vote for the candidate matching their preference. Uninformed voters, however, should they choose to remain uninformed, can still participate in the voting stage but can only do so by casting an uninformed and thus random vote. Since informed voters will always vote according to their preference and uninformed voters participating in the election stage can only cast random votes, two states of the world (stotw) are crucial to the model. First (S1), an uninformed voter casts an uninformed vote for the candidate matching its initial preference. In other words, voting for the better candidate. Second (S2), an uninformed voter casts an uninformed (random) vote for the candidate not matching his prior preference. That is, they vote worse. Both stotw have the same probability (0.5) of getting realized.

Taking the two states into consideration, initially uninformed voters (V) can make various decisions at different points in the model. Figure 6shows the different options a voter can choose in a game tree.

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[35] B – B/2 = B/2

Figure 6 Sequence of decisions in the voluntary voting mode
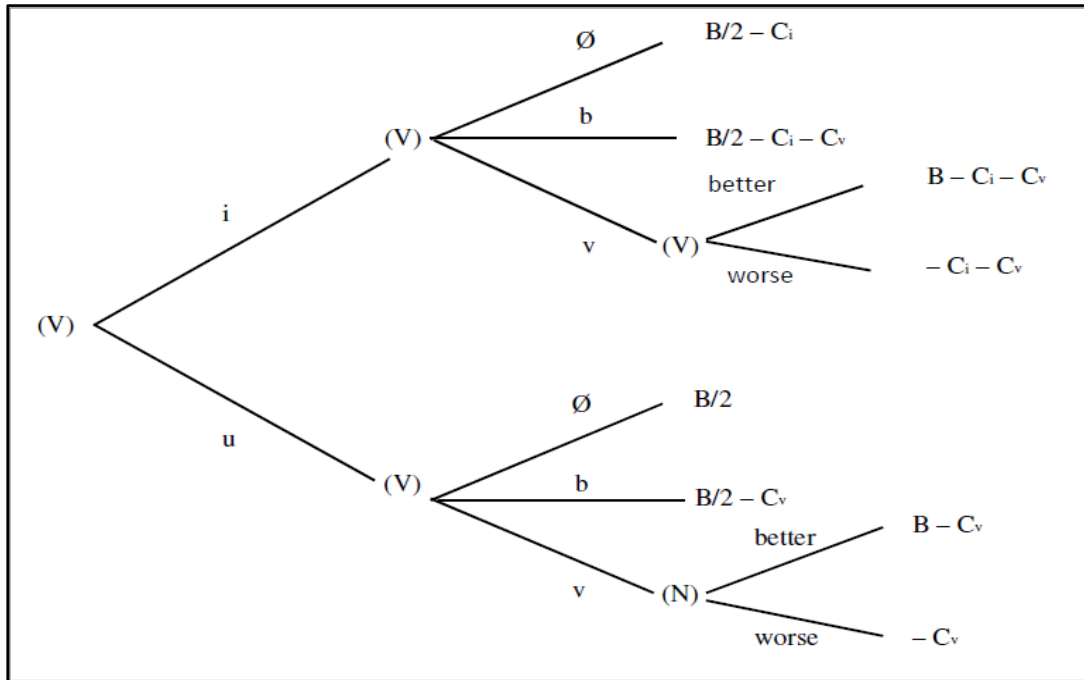
Note: the game tree shows the sequence of possible decisions an initially uninformed voter can take in the voluntary voting mode.

At first, the voter can decide between getting informed (i) or remaining uninformed (u). After that decision, the voter can decide between abstaining completely (Ø), entering the ballot stage but not casting a valid vote (b) or entering the ballot stage and cast a valid vote (v). If the voter enters the balloting stage and decides to vote, he can either vote for the candidate that matches his preference (better) or the candidate that does not match his preference (worse). Recall that if an initially uninformed voter decides to get informed in the first step, he is presumed to vote for the candidate that matches his preference. However, if an initially uninformed voter remains uninformed but still enters the ballot stage and decides to vote, this vote can only be random with respect to the match or mismatch of the candidate he votes for and the initial preference. Thus, chance (N) decides whether the individual decision leads to picking the "better" candidate or the "worse" candidate.

Choosing different actions at different points in the model can lead to different pay-offs. Table 8 summarizes possible actions and shows which action leads to which outcome considering the different states of the world.

Table 8 Actions and states of the world in the voluntary voting mode

	States of the world	
Action	**S1**	**S2**
i, Ø	B/2-Ci	B/2-Ci
i, b	B/2-Ci-Cv	B/2-Ci-Cv
i, v (better)	B-Ci-Cv	B-Ci-Cv
i, v (worse)	-Ci-Cv	-Ci-Cv
u, Ø	B/2	B/2
u, b	B/2-Cv	B/2-Cv
u, v (random)	B-Cv	-Cv

Note: S1 refers to the state of the world in which an initially uninformed individual randomly elects the better candidate. S2 refers to the state of the world in which an initially uninformed individual randomly elects the worse candidate. Therein the model only considers initially uninformed actors.

Recall that the different states of the world refer to (S1) an uninformed voter who would vote for the "better" candidate and (S2) an uninformed candidate voter who would vote for the "worse" candidate. Because informed voters should always vote for their preferred candidate, possible outcomes are the same for informed subjects. Thus, outcomes only differ between states of the world if a voter votes without being informed.

By eliminating dominant strategies, the game displayed in figure 6 can be presented in a reduced form. The model assumes rational actors preferring a higher reward. Thus, actors should not consider all strategies displayed in Figure 6 or Table 8 respectively. Thus, for instance, the strategy informed abstention is strictly dominated by the strategy uninformed abstention, since $B/2 > B/2 - Ci$. Uninformed abstention also dominates uninformed balloting since $B/2 > B/2 - Cv$. Furthermore, the strategy informed voting (better) dominates informed voting worse and informed balloting. In both cases, informed voting (better) produces the higher individual reward. Therefore, in order to identify preferred strategies actors should only consider the strategies displayed in Table 9.

Table 9 Actions and states of the world in the voluntary voting mode, reduced game

	States of the world				
Action	**S1**	**S2**	**Expected Utility**	**Maxi Max**	**Maxi Min**
i, v (better)	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv
u, Ø	B/2	B/2	B/2	B/2	B/2
u, v (random)	B-cv	-Cv	$\frac{1}{2} * (B/2) + \frac{1}{2} * (-Cv)$[36]	B-Cv	-Cv

Note: S1 refers to the state of the world in which an initially uninformed individual randomly elects the better candidate. S2 refers to the state of the world in which an initially uninformed individual randomly elects the worse candidate.

Considering different types of individual motivation, the model predicts different best strategies in the voluntary voting mode. Note that the model assumes that $Ci + Cv \geq B/2$. This captures the notion that voting costs can be considerably high for initially uninformed voters (Degan, 2006). Drawing on expected utility theory, instrumentally motivated actors should always choose the strategy that produces the highest expected utility (Von Neumann and Morgenstern, 2001). Thus, for all values of $Ci + Cv \geq B/2$, the model predicts high levels of abstention and low levels of information acquisition since the strategy uniformed abstention produces the highest expected utility[37]. This is in line with the general assumption of the rational voter calculus (Downs, 1957).

However, specific individual risk attitudes could lead to the adoption of a different strategy. Table 9 suggests that uninformed (random) voting produces the single highest utility[38] in the case of randomly picking the candidate matching the individual preference, given $Cv < B/2$. Actors interested in maximizing their possible maximum outcome should adopt that strategy. Therefore the model predicts uninformed voting in the voluntary voting mode for actors with specific individual risk attitudes. On the other hand, more risk averse actors interested in minimizing their risk should also adopt the strategy uninformed abstention most of the time in the voluntary voting mode. Table 9 also shows, that in order to maximize a possible minimum outcome, risk averse actors should also adopt the strategy uninformed abstention.

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[36] $\frac{B}{2} - Cv$

[37] Note that, $\left(B/2 > B - Ci - Cv > \frac{1}{2} * (B/2) + \frac{1}{2} * (-Cv) \right)$

[38] $B - Cv > B/2 > B - Ci - Cv$

To derive testable predictions for the compulsory voting mode, the model draws on the calculus of compulsory voting. Keeping in mind that the calculus of compulsory voting presumes compulsory voting to be effective in enhancing turnout if $Cnv \geq Cv$ (Panagopoulos, 2008). Thus, if $Cnv \geq Cv$ rational voters should always vote, as the cost of not participation outweighs the initial voting costs[39]. Empirically, however, a relevant portion of voters abstain in compulsory voting countries (Panagopoulos, 2008). One reason for that could be, for instance, that penalties in some countries are trivial. Another explanation could be different levels of law enforcement (Panagopoulos, 2008). Therefore Panagopoulos (2008) suggests another variation of the general decision theoretic model of rational voting. In particular, he argues that incorporating the probability of being penalized for not participating in the elections alters the expected utility of abstaining. Note that the expected utility of abstaining is: $E[U(Abstain)] = -qCnv - (1 - q) * (0) = -qCnv$ (Panagopoulos, 2008). Hence, rational actors should participate in elections when $(qCnv) > Cv$.

Considering this expansion of the general expected utility model of voting, actors face changed consequences when adopting certain strategies in the compulsory voting mode. Note that the model's general parameters also account for the modeling of the voting decision in the compulsory voting mode. Figure 7 shows the sequence of decisions in the compulsory voting mode. In the two cases in which an actor could abstain completely from participating

Figure 7 Sequence of decisions in the compulsory voting mode
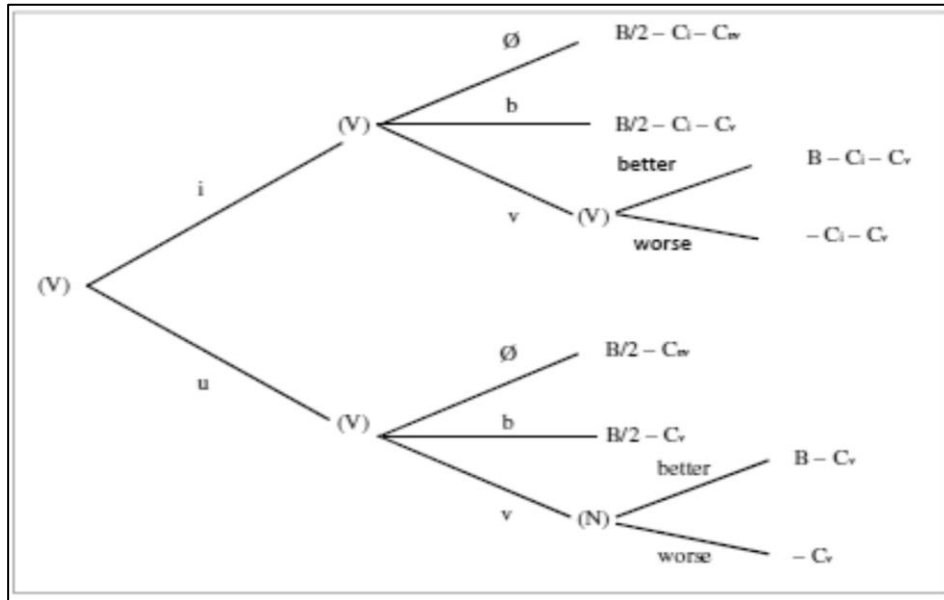
Note that in comparison to the decision tree of the voluntary voting mode the decision tree of the compulsory voting mode is only different with respect to two possible payoffs.

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[39] It also follows that voters should abstain if $Cnv < Cv$.

in the election –Cnv is added to the possible payoff. Table 10 shows the different actions and accompanied outcomes.

Table 10 Actions and states of the world in the compulsory voting mode

Action	States of the world	
	S1	S2
i, Ø	B/2-Ci-Cnv	B/2-Ci-Cnv
i, b	B/2-Ci-Cv	B/2-Ci-Cv
i, v (better)	B-Ci-Cv	B-Ci-Cv
i, v (worse)	-Ci-Cv	-Ci-Cv
u, Ø	B/2-Cnv	B/2-Cnv
u, b	B/2-Cv	B/2-Cv
u, v (random)	B-Cv	-Cv

Note: S1 refers to the state of the world in which an initially uninformed individual randomly elects the better candidate. S2 refers to the state of the world in which an initially uninformed individual randomly elects the worse candidate.

Recall that the states of the world in which an uninformed voter would vote for the "better" candidate in the state (S1) and an uninformed candidate voter would vote for the "worse" candidate in the state (S2). Also recall that because informed voters are presumed to always vote for their preferred candidate, their possible outcomes are the same. Akin to the voluntary voting mode, outcomes differ between states of the world if a voter votes without being informed. Note that this particular decision matrix only considers cases in which the probability of getting punished is 1. This reproduces the general idea of the reference study.

Again, by eliminating dominated strategies, the game can be also presented in a reduced form. Presuming instrumentally motivated rational actors, some strategies displayed in Figure 7 or Table 10 can be eliminated, because they are dominated by other strategies. For example, like in the baseline model, the strategy informed abstention is dominated by the strategy uninformed abstention. But in the case of compulsory voting and if $Cnv \geq Ci + Cv$[40], the strategy uninformed abstention itself is dominated by uninformed balloting. More

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[40] This captures the central idea of calculus of compulsory voting as presented above. Commonly information costs are seen as a part of the genera voting costs. However, this model distinguishes information costs and voting costs, because participation in election is modeled in the two process way as suggested by SHINEMAN, V. 2010. Compulsory voting as compulsory balloting: How mandatory balloting laws increase informed voting

importantly, uninformed balloting is no longer dominated. Other than that, dominations are the same as in the model for the voluntary voting mode. Table 11 shows the reduced game for the compulsory voting mode.

Table 11 Actions and states of the world in the compulsory voting mode, reduced game

	States of the world				
Action	**S1**	**S2**	**Expected Utility**	**Maxi Max**	**Maxi Min**
i, v (better)	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv
u, b	B/2-Cv	B/2-Cv	B/2-Cv	B/2-Cv	B/2-Cv
u, v (random)	B-Cv	-Cv	$\dfrac{B}{2} - Cv$	B/2-Cv	-Cv

Note: S1 refers to the state of the world in which an initially uninformed individual randomly elects the better candidate. S2 refers to the state of the world in which an initially uninformed individual randomly elects the worse candidate.

Thus, introducing compulsory voting laws shifts optimal strategies. Therefore, predictions of the model also change in that regard. Considering the probability of getting punished for not participating in the elections, uninformed abstention is no longer an optimal strategy. Instead, the model indicates that informed voting is the optimal strategy for instrumentally motivated actors in the case of compulsory voting since the strategy produces the highest expected utility, given $Ci + Cv > {}^B/_2$. It follows that $B - Ci - Cv > {}^B/_2 - cv$ and $B - Ci - Cv > \frac{B}{2} - Cv$. Thus, the model predicts higher levels of initially uninformed voters investing in information and participating in the elections in the case of compulsory voting. This is in line with the assumption of the model and findings presented by Shineman (2010).

Akin to the predictions of the model for the voluntary voting mode, the model indicates that specific individual risk attitudes could lead to the adoption of a different strategy. Table 11 shows that the strategy uninformed voting produces the single highest utility in the case of an uninformed actor randomly voting for the candidate that matches the actor's prior preferences. Note that $B - Cv > {}^B/_2$ and $B - cv > B - Ci - Cv$. Therefore, non-risk seeking actors could have a strong incentive to adopt that strategy. Hence, random voting would increase in the case of compulsory voting. Since voting randomly helps actors to avoid a punishment for not participating in the election, it could be the case that random voting occurs more often in the compulsory voting mode as well. This would be in line with critical litera-

ture regarding compulsory voting (Jakee and Sun, 2006, Singh and Thornton, 2013). This only accounts for the situation in which the probability of getting punished for not participating equals one and the values of the cost of not participation are higher or equal to the combined voting costs. For all values of Cnv below the value of the combined voting costs, the prediction of the general decision theoretic model of voting is active and turnout should not be significantly different from turnout in the voluntary voting mode (Panagopoulos, 2008).

In order to test the assumptions of the calculus of compulsory voting, the model also considers different values of the costs of not participating and different probabilities of getting punished in the compulsory voting mode. Let, for example, p be the probability of getting punished for not participating in the election. And let $1 - p$ be the probability of not getting punished for not participating Figure 8 shows the consequence of introducing p into the sequence of decisions.

Figure 8 Sequence of decisions in the compulsory voting mode including p
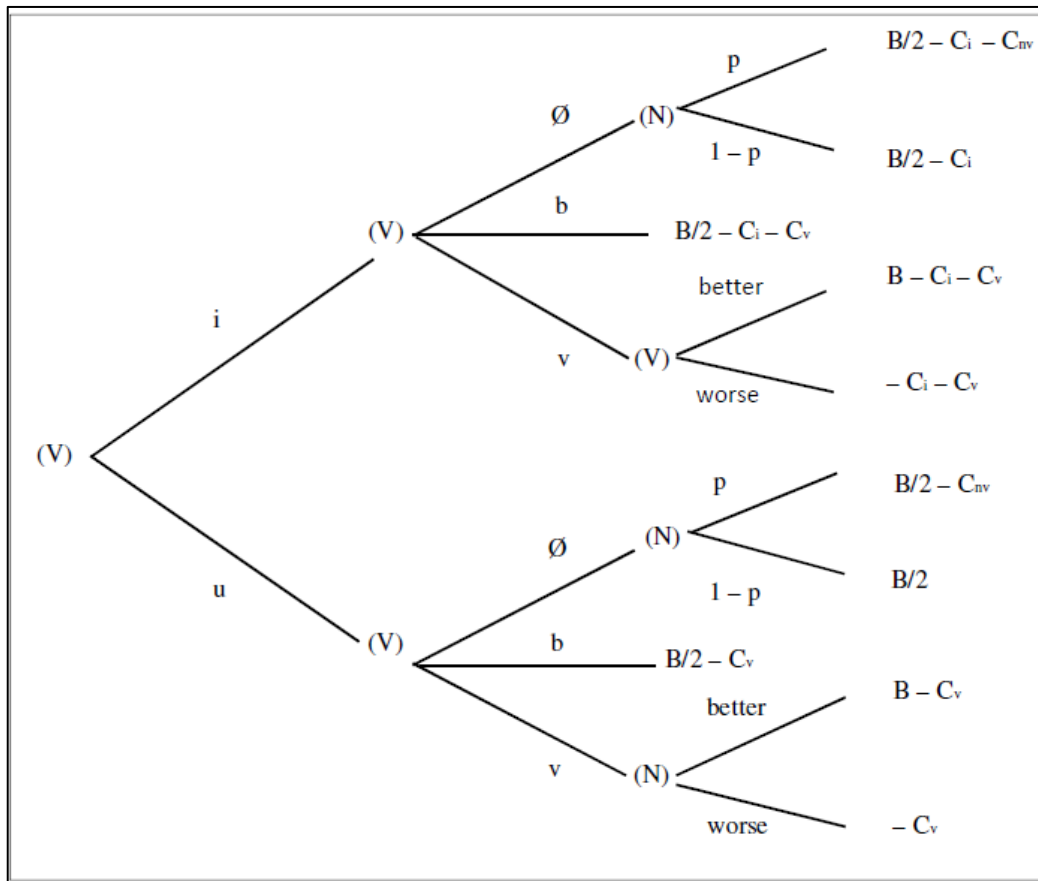
Note: that the introduction of p leads to new situations in which the actor cannot directly determine their outcome anymore. Recall that p is the probability of getting punished for not participating. Hence $1 - p$ is the probability of not getting punished in that case.

In the case of abstaining from participating in the elections, chance decides whether an actor gets punished or not. For instance, if an actor decides to remain uninformed and then decides to abstain (∅), the actor either receives a reward of $B/_2 - Cnv$ with the probability p in the case of getting punished. Or a payoff $B/_2$ with the probability 1 – p. In both cases, payoffs are contingent on the probability of getting penalized. In other words, chance (N) is making that decision.

The introduction of p also leads to new possible states of the world in the compulsory voting mode. On the one hand, in state S1, an uninformed actor votes for the "better" candidate but gets punished with a probability of p when abstaining completely. In S2, an uninformed actor votes for the "worse" candidate and is also punished with the probability p when abstaining completely. On the other hand, in S3, uninformed actors vote for the "better" candidate but will not be punished with the probability 1 – p when abstaining completely. In S4, an uninformed actor votes for the "worse" candidate and is also not punished with the probability 1 – p when abstaining from participating in the election. Table 12 shows the different possible actions and possible results for these cases.

Table 12 Actions and states of the world in the compulsory voting mode including p

	States of the world			
Action	**S1** **(p/2)**	**S2** **(p/2)**	**S3** **((1-p)/2)**	**S4** **((1-p)/2)**
i, Ø	B/2-Ci-Cnv	B/2-Ci-Cnv	B/2-Ci-	B/2-Ci
i, b	B/2-Ci-Cv	B/2-Ci-Cv	B/2-Ci-Cv	B/2-Ci-Cv
i, v (better)	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv
i, v (worse)	-Ci-Cv	-Ci-Cv	-Ci-Cv	-Ci-Cv
u, Ø	B/2-Cnv	B/2-Cnv	B/2	B/2
u, b	B/2-Cv	B/2-Cv	B/2-Cv	B/2-Cv
u, v (random)	B-Cv	-Cv	B-Cv	-Cv

Note: S1 refers to the state of the world in which an initially uninformed individual randomly elects the better candidate and would get punished for not entering the voting stage with the probability p. S2 refers to the state of the world in which an initially uninformed individual randomly elects the worse candidate and would get punished for not entering the voting stage with the probability p. S3 refers to the state of the world in which an initially uninformed individual randomly elects the better candidate and would not get punished for not entering the voting stage with the probability ((1-p)/2). S4 refers to the state of the world in which an initially uninformed individual randomly elects the worse candidate and would not get punished for not entering the voting stage with the probability p ((1-p)/2)..

Considering p also shifts dominated and dominant strategies in the compulsory voting mode. Unlike the reduced decision matrices of the voluntary voting mode or the matrix of the compulsory voting mode considering p = 1 Table 13 displays four different dominant strategies in the case of compulsory voting.

Table 13 Actions and states of the world in the compulsory voting mode including p, reduced game

Action	S1 (p/2)	S2 (p/2)	S3 ((1-p)/2)	S4 ((1-p)/2)	Expected Utility	Maxi Max	Maxi Min
i, v (better)	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv	B-Ci-Cv	B-Ci-Vv	B-Ci-Cv
u, Ø	B/2-Cnv	B/2-Cnv	B/2	B/2	$p*\left(\frac{B}{2}-Cnv\right)+(1-p)*\left(\frac{B}{2}\right)$ [41]	B/2	B/2[42]
u, b	B/2-Cv	B/2-Cv	B/2-Cv	B/2-cv	B/2-Cv	B/2-Cv	B/2-Cv
u, v (random)	B-Cv	-Cv	B-Cv	-cv	$\frac{1}{2}*(B/2)+\frac{1}{2}*(-Cv)$ [43]	B-Cv	-Cv

Note: S1 refers to the state of the world in which an initially uninformed individual randomly elects the better candidate and would get punished for not entering the voting stage with the probability p. S2 refers to the state of the world in which an initially uninformed individual randomly elects the worse candidate and would get punished for not entering the voting stage with the probability p. S3 refers to the state of the world in which an initially uninformed individual randomly elects the better candidate and would not get punished for not entering the voting stage with the probability ((1-p)/2). S4 refers to the state of the world in which an initially uninformed individual randomly elects the worse candidate and would not get punished for not entering the voting stage with the probability p ((1-p)/2).

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[41] $\frac{B}{2}-p*Cnv$

[42] The model assumes Cnv ≥ Ci + Cv and Ci +Cv ≥ B/2.Thus, if Cnv ≥ B/2 in the case of uninformed abstention is the strategy that maximizes the minimum.

[43] $\frac{B}{2}-Cv$

In the above model that assumes p to be one uninformed abstention, is dominated by uninformed balloting. However, when the probability of getting punished for not participating in the election is smaller 1, uninformed abstention becomes a reasonable strategy again. The rationale behind it seems straightforward as there is a chance of receiving a higher utility by adopting that strategy compared to adopting the strategy uninformed balloting. Uninformed balloting is a good strategy to avoid the punishment without running the risk of randomly electing the less preferred candidate. Thus, especially risk-averse actors should have an incentive to participate without informing themselves beforehand and gain a higher payoff compared to uninformed balloting. Additionally, it seems plausible that uninformed voting should increase if p approaches zero (ceteris paribus). However, if $C_{nv} \geq C_i + C_v$, any value of p larger than zero should also lead to a rise in informed voting since it produces the highest expected utility, given $C_i + C_v \geq B/2$. As in the two previous matrices, voting randomly without investing in information produces the maximum possible outcome if the chosen candidate matches the actors' initial preference. In sum, the model predicts similar individual behavior to the reference model suggested by Shineman (2010). Compulsory voting should increase if $C_{nv} \geq C_i + C_v$. This also accounts for informed voting among initially uninformed actors' turnout. Yet, if $C_{nv} \leq C_i + C_v$ turnout among the initially uninformed should not be higher than turnout in the voluntary voting mode. Naturally, specific hypotheses depend on the actual realizations of the crucial parameters, C_{nv}, and p. Thus, in order to test the prediction of the calculus of compulsory voting in general and the model presented in this section in particular, the next section will present testable hypotheses.

4.1.3 Hypotheses

Drawing on the model presented in the previous section, the reference study provided by Shineman (2010) and the general ideas presented in the calculus of compulsory voting approach (Panagopoulos, 2008), this section presents various testable hypotheses regarding the question of how costs of not participating and levels of law enforcement affect individual turnout in general and informed turnout in particular.

Control

In the case of voluntary voting, instrumentally motivated actors should only be motivated by the possible reward from their individual decision to participate in the election. The model shows that for all cases in which the combined voting costs exceed the benefit of a random

vote, instrumentally motivated individuals should abstain from participating in voting. Therefore our first hypothesis is as follows:

H1: This study expects high levels of abstention in the voluntary voting mode.

This is in line with the expectations of the reference model and the findings of the accompanied experiment provided by Shineman (2010). This also agrees with the general notion of the rational voting calculus first proposed by Downs (1957). In general, it can also be argued that information acquisition among initial uninformed voters should also be low as they have no incentive to invest in information about the election if they are not going to participate afterward.

H1a: This study expects low levels of information in the voluntary voting mode.

However, alternative individual characteristics could lead to deviant individual behavior. For instance, the model shows that voting randomly creates the single highest possible payoff if the randomly chosen candidate matches the initial preference.

In the case of compulsory voting, the individual calculus of voting is generally expected to change. Previous studies also indicate that alongside an increase in turnout rates, information levels could also increase due to the introduction of compulsory voting rules. The reason for this could be that, since individuals are forced to pay the initial participation costs in order to avoid penalties for non-participation, it could increase individual utility to cast an informed vote. This is especially true for initially uninformed voters who are most likely to abstain when voting is voluntary and are most likely to make voting mistakes when voting without picking up additional information when voting is compulsory. Note that this claim is highly contested. Nevertheless, following the general argument, this study expects higher turnout when voting is compulsory and also expects higher levels of information acquisition when voting is compulsory.

H2: This study expects that average levels of turnout are higher in the compulsory voting modes.

If voting becomes more likely in the compulsory voting runs, it could also be the case that informed voting becomes generally more likely. The reason for that could be that initial uninformed voters face a situation in which they would normally abstain. However, compulsory voting laws prohibit this strategy. Therefore, initial uninformed voters vote more often. As mentioned before, these voters are also most likely to make voting mistakes, if they decide not

to invest in additional information. In other words, they might elect their less preferred candidate and thus receive a lower payoff.

H2a: This study expects that average levels of information acquisition are higher in the compulsory voting modes.

However, depending on the specific parameter set, actors might enter the ballot stage but will cast an invalid vote in order to avoid the penalty for not participating. By not casting a valid vote, they could avoid the risk of electing the less preferred candidate when voting without proper information.

H2b: This study expects higher levels of random voting in the compulsory voting mode.

The model indicates that adopting this strategy is particularly rational for initially uninformed voters if the costs of not participating are equal to the initial voting costs or only slightly higher than those costs. Moreover, individual risk attitudes could lead to this behavior. Initially, uninformed voters could decide to remain uninformed vote randomly as this strategy produces the single highest possible outcome. However, in contrast to this general notion, the calculus of compulsory voting approach argues that the main predictions towards individual turnout only shift substantially, when penalties are not trivial. The model indicates that for all values of Cnv smaller than the combined voting costs, the initial voting calculus remains unaffected.

H3: This study expects relevant levels of abstention in the compulsory voting mode when the costs of not participating are low.

The rationale behind this expectation is straightforward since the calculus of compulsory voting expects compulsory voting to be effective if the costs of not participation cancel out initial voting costs (Panagopoulos, 2008). Therefore, instrumentally motivated and initially uninformed actors should not consider shifting their strategy towards participation as long as the costs of not participating are low. This also accounts for the acquisition of additional information. If it is not rational to vote for initially uninformed voters, it is also not rational to get informed in the first place.

H3a: This study expects low levels of information acquisition in the compulsory voting mode when the costs of not participating are low.

Both H3 and H3a are in line with the reference model (Shineman, 2010) and the findings reported in the reference experiment (Shineman, 2010). Furthermore, Panagopoulos (2008) finds similar patterns in a study comparing turnout in different countries that enforce compulsory voting. However, if the costs of not participation increase, this behavior might change. Recall, that the calculus of compulsory voting indicates that the costs of not participation equalize initial voting costs at least when they are equal or higher than these costs. For those cases, the model suggests that instrumentally motivated voters should participate in votes more often. Especially if the costs of not participating are approaching the cut point of the cost of not participation being equal to initial voting costs. Depending on the specific parameter set, individuals could be indifferent between adopting certain strategies.

H4: This study expects increasing levels of turnout as costs of not participating increase.

Following the notion that instrumentally motivated actors prefer higher payoffs over lower payoffs, the model indicates that as penalties increase, rational actors should deviate from uninformed abstention as informed voting produces a higher expected utility as costs of not participation increase.

H4a: This study expects increasing levels of information acquisition as costs of not participating are increasing.

This should especially account for cases in which the costs of not participating are equal to or higher than the initial voting costs (Panagopoulos, 2008). This is in line with the expectations of the reference model. This is also in line with the findings provided by the reference experiment (Shineman, 2010) and the results presented by Panagopoulos (2008).

Expansion

Unlike the model presented by Shineman (2010) this study also considers the level of law enforcement as a predictor of variation in individual voting behavior due to compulsory voting. Recall that the model understands the level of law enforcement as the probability of getting caught for not participating in the electoral stage in the game tree. The calculus of compulsory voting (Panagopoulos, 2008) expects that compulsory voting regimes should be more effective if the threat of getting punished is real. The reason for that is simple. Even if penalties are high, rational individuals could still abstain from voting when they are certain that

there is a good chance of not getting punished at all. In fact, the model shows that the decision matrix in the compulsory voting mode is not very different from that in the voluntary voting mode when the chance of getting punished is closer to zero. That is because the probability (p) of getting punished is added to the individual voting calculus, and like in the original voting calculus, it affects the calculation. Recall that in the calculus of voting, individuals should only vote if the probability of casting the decisive vote multiplied with the costs of voting outweigh the potential outcome. In the case of compulsory voting, the rationale is similar. Individuals should only turn out if the probability of getting caught multiplied with the potential penalty outweighs the initial costs of voting. It follows that turnout should go up if $p * Cnv \geq Cv$. If p is low that reduces the potential threat of the penalties and vice versa.

> **H5: This study expects that levels of turnout will increase when levels of law enforcement increase and will be highest when levels of law enforcement are at the maximum.**

This also accounts for information acquisition. If voting becomes more likely due to higher levels of law enforcement, informed voting becomes more likely for initial uninformed voters too. Individuals are expected to enter the voting stage in order to avoid the penalties for not voting. In most cases, however, the utility of an informed vote exceeds the utility of a random vote.

> **H5a: This study expects that levels of information acquisition will increase when levels of law enforcement increase as well and will be highest when levels of law enforcement are at the maximum.**

Akin to the expectation regarding low levels of costs of not participating, the model also states that low levels of law enforcement will also not alter the initial calculus of voting. For instance, if there is no effective law enforcement, the decision matrix is the same as for the voluntary voting mode. This also accounts for those cases in which levels of law enforcement are high but there are no costs for not participating.

> **H6: This study expects low levels of turnout in the compulsory voting mode when levels of law enforcement are low.**

Again, this should also account for levels of information acquisition, because if the potential law enforcement does not motivate voters to participate in the elections, it will also not help motivate them to acquire information. Also, the model assumes individuals to be

rational and instrumentally motivated. Thus, it can be expected that individuals paying to get informed will also participate in the election. It follows that individuals who will not participate in the election have no rational incentive to invest in costly information.

H6a: This study expects low levels of information acquisition in the compulsory voting mode when levels of law enforcement are low.

Note unlike the situation in which abstention is theoretically punished with a fine but there is no effective law enforcement, it seems rather unlikely to observe a situation in which the level of law enforcement is high but there are no penalties included. Therefore, the expansion of the reference model does not consider cases in which p is high but Cnv is zero.

In order to examine the effect of compulsory voting on individual voting behavior, the calculus of compulsory voting approach proposes that CV-laws are most effective when both penalties and the probability of getting punished are not trivial and vice versa. Particularly, it claims that the initial voting calculus is hardly affected if both factors are low. The model shows that this is the case; the expected utility of uninformed abstention is higher than the expected utility of an informed vote.

H7: This study expects low levels of turnout in the compulsory voting mode if levels of law enforcement and costs of not participating are low.

Since that is the case, additional information acquisition is also not likely to occur in the condition of both factors being trivial.

H7a: This study expects low levels of information acquisition in the compulsory voting mode if levels of law enforcement and costs of not participating are low.

However, according to the calculus of compulsory voting (Panagopoulos, 2008), the level of law enforcement in general, and in combination with non-trivial penalties in particular, should increase turnout among initially uninformed voters.

The model specifically shows that instrumentally motivated actors should adopt the strategy of informed voting (better) in the case of increasing costs of not participating and increasing levels of law enforcement since the strategy produces the higher expected utilities. In general, it follows that compulsory voting is supposed to be most effective in terms of mobilization if costs of not participating and levels of law enforcement are at their maximum

H8: This study expects that levels of turnout increase if levels of law enforcement and costs of not participating increase at the same time- and that turnout will be highest when both factors are at their maximum.

It could also follow that numbers of informed turnout among initial uninformed voters might go up as well. In order to avoid sanctions from not voting and lower payoffs from uninformed voting, initially uninformed voters are more likely to invest in additional information in the case of increasing costs of not participating and rising levels of law enforcement.

H8a: This study expects that levels of information acquisition increase, if levels of law enforcement and costs of not participating increase at the same time, and that the level of information acquisition will be highest when both factors are at their maximum.

Panagopoulos (2008) finds that this is true for levels of turnout by comparing various compulsory voting countries. In fact, the study shows that high levels of costs and high levels of law enforcement increase turnout individually and as an interaction effect. In both ways, the statistical effect on turnout is highly significant. However, marginal effects of the interaction between the severity of the penalty and the level of law enforcement are even stronger. Turnout is lower if one the level of one parameter is reduced and lowest if both parameters are marginal at the same time (Panagopoulos, 2008).

Again, in this situation information acquisition should also be at its maximum, since initially uninformed actors, in particular, have strong incentives to gather additional information before entering the voting stage. In fact, if penalties and the probability of getting punished are very high, possible losses from abstaining or uninformed voting are also very high. On the contrary, Panagopoulos (2008) states that compulsory voting is lacking power if the two factors differ in levels. In particular, he finds that turnout is not increased as strongly if only one factor is. The model used here supports that notion.

H9: This study expects a lower increase in turnout in the compulsory voting mode if only one of the two factors is high.

According to the calculus of compulsory voting, this should also be the expectation for cases in which penalties are low or moderate even if levels of law enforcement are high because costs of not voting are ineffective in boosting turnout if they are lower than initial voting costs. In fact, this reflects a situation in which law enforcement alone hardly changes the initial voting calculus. Moreover, since additional information acquisition is mainly driven by

72

the incentive to turn out, this study also claims that information acquisition is affected in the same way if the two factors differ with respect to their severity.

H9a: This study expects a lower increase in information acquisition in the compulsory voting mode if only one of the two factors is high and the other is low.

In the following section, this study will operationalize these hypotheses by drawing on the basic model presented in the previous section.

4.1.4 Operationalization

Drawing on the reference model and the model presented for this section, the main experimental manipulation is the introduction of different voting modes in a within-subject design. In a within-subject design, subjects are generally confronted with different treatment conditions. For instance, subjects are exposed to the control condition and the treatment condition within the same treatment. Therefore, it is possible to directly compare individual behavior since subjects serve as their own baseline (Shineman, 2010). Furthermore, within-subjects designs have the advantage of being closely related to the theoretical idea of the model (Charness et al., 2012). This especially applies to the model presented in this section. The model simply accounts for a single actor faced with various decisions. Thus, only parameters and the individual decision affect the individual outcome. The model specifically does not consider interaction. This means that a within-subject design fits the purpose of the study at this point.

Different voting modes are manipulated within subjects in an x*x factorial design. Since the model predicts two indicators affecting individual voting behavior in compulsory voting regimes, the study utilizes a factorial experimental design to test both indicators separately and together within the same treatment. Factorial designs are suitable when it is theoretically plausible that two or more factors affect individual behavior (Kubbe, 2016, Hamenstädt, 2012). Keep in mind that the model predicts that the costs of not voting and the level of law enforcement both have a strong effect on individual voting behavior in the compulsory voting mode. To be specific, the model predicts that high values of both parameters should individually increase turnout in general and informed turnout in particular. Furthermore, low levels of either penalties or law enforcement should not substantially affect the basic predictions of the decision theoretic explanation of individual voting. However, if both parameters are high, general turnout and informed turnout should be the highest. Thus, values of Cnv and p are changed over periods. Thereby, various combinations of high values of the one and low val-

ues of the other are considered alongside cases in which factors are high or both factors are low. In particular, the design considers two factors, cost of not participating (Cnv) and the level of law enforcement (p). For each factor, the design considers five levels reflecting the model predictions. Thus the design can be described best as a 5^2 factorial design. Table 14 presents the fully specified factorial design considering all possible combinations of the two factors.

Table 14 Fully specified factorial design plan

Run	Cnv	p
1	control	control
2	control	low
3	control	medium
4	control	high
5	control	very high
6	low	control
7	low	low
8	low	medium
9	low	high
10	low	very high
11	med	control
12	med	low
13	med	medium
14	med	high
15	med	very high
16	high	control
17	high	low
18	high	medium
19	high	high
20	high	very high
21	very high	control
22	very high	low
23	very high	medium
24	very high	high
25	very high	very high

Note: In the case of Cnv control = 0; low = 10 ; med = 30 ; 60 = high and 90 = very high.
For p the control = 0; low = 0.25; med = 0.50; high = 0.75 and 1.00 = very high.

Since the model wants to isolate the impact of the two main factors in order to explain the functioning of compulsory voting identified by the theory, other important costs parameters are fixed at distinct amounts reflecting basic theoretical assumptions of the calculus of compulsory voting. In each period, subjects can earn 100 experimental points (B). Generally, the instrumental theory of voting argues that voting costs are a good predictor for turnout on the

individual level. In fact, the general voting calculus proposes that voters should only participate if the benefit of voting exceeds the initial voting costs (Downs, 1957). Therefore, turnout should be low. Even though there are opposing positions in the literature whether voting costs can be high or rather marginal, this study considers voting costs to be moderately high with respect to compulsory voting as mandatory voting should activate habitual nonvoters that can be considered less (Degan, 2006, Degan and Merlo, 2011) informed. Therefore, especially information costs (ci) should be potentially high for initially uninformed voters. The study fixes voting costs at the level of 30 experimental points. Initially informed voters face no information costs, however, they face higher opportunity costs of voting, thus, participation costs are also not trivial. Thus, in the experiment, voting costs are operationalized as the combined costs of participation consisting out of information costs (C_i) and voting costs (C_v). It follows that for initially uninformed subjects, voting can be relatively costly when they decide to get informed and participate in the election stage. The calculus of compulsory voting, however, states that costs of not voting could potentially outweigh initials voting costs if C_{nv} $\geq C_v$ (Panagopoulos, 2008). Furthermore, turnout should be high if the probability of getting punished for not participating in the experimental election is high. Turnout should be highest if both factors are nontrivial. Thus, in the experiment, C_{nv} and p are varied individually and in combination. For C_{nv} the experiment considers values of 10 points, 30 points, 60 points and 90 points, whereas 10 and 30 points can be seen as low or moderate costs of not voting. According to the theoretical assumption and the combined costs of voting, compulsory voting should start activating initially uninformed voters at a value $C_{nv} = 60$ since $C_{nv} \geq C_v$. Different levels of law enforcement are operationalized as different probabilities (p) of getting punished for not participating. Depending on the period, p can be 0.25, 0.5, 0.75 or 1.00, whereas all values of $p \leq 0.5$ can be considered as low or moderate. Values over 0.5 can be considered moderate or high. The design also considers a control condition for both parameters in which the value of C_{nv} and p are zero. With respect to the control conditions of the two factors, it follows, that not all combinations displayed in Table 14 are necessary for the sake of this study. Even though they refer to theoretically accurate combinations and maybe even reflect some empirical cases accurately[44]. For instance, if only one of the factors is 0, the theory claims that the individual voting calculations should not be any different from the ones

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[44] For example, consider a country which legally requires voters to participate in the elections but does not impose any financial penalties. Drawing on the calculus of voting these voting rules should not affect the general decision theoretic voting calculus. Therefore, this combination does not help answering this chapters´ research question. Thus, only cases in which both factors equal 0 at the same time are considered since they reflect the control situation. That is voluntary voting laws. Run 18 ads an additional control condition to the design.

in cases in which voting is voluntary. Hence, Table 15 summarizes the relevant combinations of Cnv and p.

Table 15 Reduced factorial design plan

Run	Cnv	p
1	control	control
2	low	low
3	low	medium
4	low	high
5	low	very high
6	med	low
7	med	medium
8	med	high
9	med	very high
10	high	low
11	high	medium
12	high	high
13	high	very high
14	very high	low
15	very high	medium
16	very high	high
17	very high	very high
18	control	control

Note: In the case of Cnv control = 0; low = 10 ; med = 30 ; 60 = high and 90 = very high.
For p the control = 0; low = 0.25; med = 0.50; high = 0.75 and 1.00 = very high.

Runs 1 and 18 of the experiment reflect the control condition in which voting is voluntary. In fact, hypotheses H1 and H1a operationalize the control condition. Thus, in the Runs 1 and 18 Cnv and p are set to zero. Recall that H1 states this study expects high levels of abstention and H1a expects low levels of information acquisition in the voluntary voting mode among initially uninformed actors. The decision matrix presented in Table 16 below suggests that the reason for this is that uninformed abstention produces a higher expected utility compared to all other strategies. Note that this only accounts for strictly instrumentally motivated actors.

Table 16 Decision matrix control condition (voluntary voting)

Action	S1	S2	Expected Utility	Maxi Max	Maxi Min
i, Ø	20	20	20	20	20
i, b	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60
u, Ø	50	50	50	50	50
u, b	20	20	20	20	20
u, v (random)	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate.

The matrix suggests that initially uninformed subjects should remain uninformed and abstain from voting in Run 1 and Run 18 of the experiment since uninformed abstention can be seen as a best answer strategy for utility-maximizing individuals. Yet, more risk-seeking subjects could also cast random votes more often. For instance, specific individual risk attitudes could lead individuals to adopt the "maximize the maximum" strategy and cast random votes in the control periods, since it produces the single highest outcome in the decision matrix.

In general, compulsory voting is expected to raise levels of turnout. Furthermore, Shineman (2010) showed that, in a laboratory experiment, compulsory voting also increases informed voting. Thus Hypotheses H2 and H2a state the basic claim that average levels of turnout and information acquisition will be different from those in the voluntary voting conditions. To test this, the study will compare the overall means of turnout and levels of information acquisition between the two voting modes, without specifically considering different realizations of Cnv and p. Apart from that, this study also tests for the general notion that compulsory voting does not lead to an increase in informed decision making, but instead might be even favoring poor or random voting. Therefore, this study will also examine the overall mean of random voting in both voting modes, without differentiating between the various levels of Cnv and p.

Hypotheses H3 to H4a try to reproduce the main findings of the reference experiment conducted by Shineman (2010). Both hypotheses H3 and H3a capture the influence of varying levels of Cnv in the experimental runs. Thereby, H3 assumes that for low values of Cnv, the initial individual voting calculus is not substantially affected. Additionally, H3a expects that information acquisition should also not be considerably higher when costs of not participating are low. Thus, the expectations are similar to the control condition – turnout and levels of

information acquisition should be low. Table 17, for example, shows the decision matrix for Cnv = 10.

Table 17 Decision matrix Cnv = 10 (compulsory voting)

Action	S1	S2	Expected Utility	Maxi Max	Maxi Min
i, Ø	10	10	10	10	10
i, b	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60
u, Ø	40	40	40	40	40
u, b	20	20	20	20	20
u, v (random)	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate. In both states, not participating would instantly be punished. Cnv=10.

Cell entries in the matrix indicate that subjects trying to determine their best strategy by identifying their highest expected utility should be indifferent between informed voting and uninformed abstention since the expected utilities of both strategies are the same. Thus, turnout and information acquisition should be mixed and not substantially higher in experimental runs implementing Cnv =10.

H4 and H4a, however, state that turnout and information acquisition should be increasing as cost for not voting increase as well and both turnout and information gathering should be at their peak, if costs of not participating are at the highest level Table 18 contains the decision matrices for increasing values of Cnv in order to operationalize H4 and H4a.

Table 18 Decision matrices for Cnv = 30, Cnv = 60 and Cnv = 90

Action	S1	S2	Expected Utility	Maxi Max	Maxi Min
Cnv = Medium					
i, Ø	-10	-10	-10	-10	-10
i, b	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60
u, Ø	20	20	20	20	20
u, b	20	20	20	20	20
u, v (random)	70	-30	20	70	-30
Cnv = High					
i, Ø	-40	-40	-40	-40	-40
i, b	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60
u, Ø	-10	-10	-10	-10	-10
u, b	20	20	20	20	20
u, v (random)	70	-30	20	70	-30
Cnv = Very High					
i, Ø	-70	-70	-70	-70	-70
i, b	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60
u, Ø	-40	-40	-40	-40	-40
u, b	20	20	20	20	20
u, v (random)	70	-30	20	70	-30

Note: Cnv = Medium refers to 30 experimental tokens as a penalty. Cnv = High refers to 60 experimental tokens as a penalty. Cnv = Very High refers to 90 experimental tokens as a penalty. S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate. In both states, not participating would instantly be punished.

In the case of Cnv = 30 costs for not participating are still below the cut point of Cnv = Cv identified by the calculus of compulsory voting, but mobilization should already be more effective since informed voting produces the highest expected utility. Since that is the case, information acquisition is also expected to increase at that point. Nonetheless, turnout cannot be expected to be universal since uninformed abstention and uninformed balloting still produces positively expected utilities. Still, some subjects might still decide to cast a random vote since it produces the highest possible outcome. Again, individual risk attitudes could be an explanation for that. Since the calculus of compulsory voting states that turnout should be increased significantly if the costs of not voting are at least equal to initial voting costs look-

ing at Cnv = 60 is crucial to this study. The cell entries for Cnv = 60 show that, now, in-formed voting (better) produces by far the highest expected utility. Thus, instrumentally moti-vated actors that are uninformed at the beginning of an experimental period in which Cnv = 60, should acquire additional information and cast a valid vote afterward. All other strategies, except for casting an uninformed and therefore random vote, are, in fact, dominated by the strategy i, v (better). Hence, a substantial increase in turnout and information acquisition can be expected at this point. However, by remaining uninformed and casting a random vote, sub-jects could try to adopt a strategy that possibly maximizes the maximum outcome.

To test the notion that the impact of compulsory voting is strongest when costs of not participating are maximally increased, the above table reports the decision matrix for cases with Cnv = 90. Drawing on the matrix, instrumentally motivated subjects are expected to turn out almost universally. Additionally, it can be expected that initially uninformed voters will almost certainly adopt information. Thus, following the logic of the expected utility theory, instrumentally motivated subjects should identify "informed voting (better)" as their best strategy, given the particular parameters. Thus, levels of turnout and information acquisition should be at their highest levels, with respect to the influence of costs of not participating alone, for cases in which Cnv = 90. Only risk-seeking subjects could be expected to some-times deviate from this strategy and remain uninformed and cast a random vote.

Due to the expansion, the reference model also considers variations in the level of law enforcement as an additional explanation for changes in turnout in the compulsory voting mode. Recall that this study operationalizes different levels of law enforcement as different probabilities (p) of getting caught when not entering the voting stage in the experimental runs implementing compulsory voting rules. Thus, considered states of the world are changing. Again, the study assumes individuals to be rational actors and thus, will always prefer a high-er payoff instead of a lower payoff. Therefore, it can be assumed that, in the experiment, sub-jects that receive information about the randomly determined preference in a period will al-ways vote according to that signal[45]. It follows that in the case of examining Cnv and p to-gether, four different states of the world are possible and can be considered with respect to initially uninformed subjects. First, like in the decision matrices above, S1 refers to the state of the world in which an initially uninformed subject would randomly vote for the candidate that matches the prior preference. Additionally, the uninformed actor would be punished for not participating in the election in the new setup. Thus, S1 refers to the state of the world in

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[45] Deviations from that expected behavior should only occur due to mistakes or misunderstandings of the func-tioning of the game.

which an initially uninformed subject would vote for the better candidate but would be getting punished for not participating in the election. In S2, initially uninformed subject votes for the candidate not matching the prior candidate (vote worse) and would also be punished for not entering the voting stage. S3 and S4 consider the situation in which an initially uninformed subject would vote better (S3) or worse (S4) respectively but would not get punished for not participating in the election in both cases.

Before looking into the interaction of costs of not participating and levels of law enforcement, this study also examines the impact of varying levels of p, while fixing Cnv to a certain level. Recall that this study assumes that there is no theoretical argument to examine the impact of p without considering Cnv > 0 at the same time. The reason this being that cases in which Cnv = 0 are likely to be perceived as a voluntary voting setup. In contrast, when there are costs, not voting but no effective level of law enforcement, it might be the case that the costs still impose a psychological pressure on the individuals (Shineman, 2012b) who might change their individual voting behavior[46]. In order to get an impression of how levels of law enforcement affect individual voting behavior, this study examines increasing levels of p. To isolate the effect of p, costs of not participating are fixed to a low level (Cnv = 10). Hypotheses H5, H5a, H6 and H6a in particular state distinct expectations of how changes in p affect levels of turnout and levels of information acquisition. Table 19 contains the decision matrices for all levels of p, given Cnv = 10.

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[46] Note that this is also unlikely but part of the reference model, and thus considered in this study as well.

Table 19 Decision matrices for different levels of p at Cnv = 10

Action	S1	S2	S3	S4	Expected Utility	Maxi Max	Maxi Min
	12.5%	12.5%	37.5%	37.5%			
p = Low							
i, Ø	10	10	20	20	17.5	20	10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	40	40	50	50	47.5	50	40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30
	25%	25%	25%	25%			
p = Medium							
i, Ø	10	10	20	20	15	20	10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	40	40	50	50	45	50	40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30
	37.5%	37.5%	12.5%	12.5%			
p = High							
i, Ø	10	10	20	20	12.5	20	10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	40	40	50	50	42.5	50	40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30
	50%	50%	0%	0%			
p = Very High							
i, Ø	10	10	20	20	10	10	10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	40	40	50	50	40	40	40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1, S2, S3, and S4 refer to the possible states of the world (stotw). Percentages within the table refer to the probability of a stotw being realized. Values of p are: Low = 25, Medium 50, High = 75, Very High = 100.

For instance, H5 generally expects that increasing levels of p will lead to higher levels of turnout. Moreover, it states that turnout levels will be highest when p is increased to its maximum. The different decision matrices indicate that this could be true since the expected utility of the strategy of uninformed abstention is reduced with every increase in p. However, until p is very high (p = 100), the expected utility of remaining uninformed and abstaining from voting is higher than the one of an informed vote. In fact, if p is increased to 100, subjects are supposed to be indifferent between informed voting and uninformed abstention as the expected utilities of adoption one of those strategies are the same. Thus, turnout is not expected to increase dramatically in the experimental runs imposing penalties of 10 tokens, even if levels of p are increased. Nonetheless, since subjects are supposed to be indifferent between voting and abstaining when p is very high, turnout could be highest in the experimental runs employing low levels of Cnv and very high levels of p.

The expectations towards information acquisition are basically the same. Recall that H5a states that levels of information acquisition will increase when levels of law enforcement increase as well and will be highest when levels of law enforcement are at the maximum. Note, that the table indicates that only informed voting becomes more likely as p is increased. Instead, uninformed voting is not a rational strategy in all conditions. So, like turnout in general, it can be expected that increasing levels of p could lead to increasing levels of information acquisition among initially uninformed subjects. Especially when p is very high should information acquisition be highest. Because for all conditions of p < 100, the expected utility of uninformed abstention is higher than the expected utility of an informed vote. It also follows that, as expected in hypotheses H6 and H6a, numbers of turnout and levels of information acquisition should be rather low. Likewise, all conditions discussed so far and specifically individual risk attitudes could lead to deviant behavior in terms of random voting.

Hypotheses H7 to H10 specifically consider the impact of Cnv and p together in order to disentangle the mechanism of the calculus of compulsory voting. Following the notion of the calculus of compulsory voting, that the initial individual voting calculus remains unaffected if the costs of not voting and the level of law enforcement are low (Panagopoulos, 2008), H7 and H7a expect no real changes in turnout and in information acquisition respectively if Cnv and p are low. Table 20 presents the decision matrix for Cnv = 10 and p = 0.25.

Table 20 Decision matrix Cnv = 10 and p = 0.25 (compulsory voting)

Action	S1 (12.5%)	S2 (12.5%)	S3 (37.5%)	S4 (37.5%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	10	10	20	20	17.5	20	10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	40	40	50	50	47.5	50	40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

Comparing the cell entries for the strategies informed voting (i, v better) better and uninformed abstention (u, Ø) indicate that rational actors should, in fact, stick to the prediction of the general decision theoretic voting calculus and abstain from voting since uninformed abstention produces the highest expected utility. Furthermore, even subjects that are more risk aware and therefore try to maximize their possible minimum outcome given the specific parameter set are at most indifferent between informed voting (better) and uninformed abstention. According to Panagopoulos (2008), the reason for that is that possible costs for not voting are not high enough to offset initial voting costs and the probability of getting caught is also not high enough to incentivize subjects to deviate from abstention in order to avoid the punishment. However, likewise, the other decision matrices Table 20 suggests that risk-seeking subjects could, in fact, deviate from informed voting and decide to remain uninformed and cast a random vote. Thereby they could receive the highest possible payoff. Thus, subjects adopting a maximizing their maximum payoff strategy could adopt that strategy.

In order to examine hypotheses H8 and H8a, the study operationalizes various increasing levels of Cnv and p. For instance, the experimental runs 7 the experiment considers medium levels of Cnv (30) and p (0.5). Table 21 shows the corresponding decision matrix.

Table 21 Decision matrix Cnv = 30 and p = 0.50 (compulsory voting)

Action	S1 (25%)	S2 (25%)	S3 (25%)	S4 (25%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-10	-10	20	20	5	20	-10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	20	20	50	50	35	50	20
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

The matrix indicates that, in fact, instrumentally motivated subjects should deviate from uninformed abstention and should get informed and vote according to the signal instead of the expected utility of this strategy is higher. Thus, this study already expects increasing turnout even though factor levels are only moderately higher. This contradicts the general expectation stated in the calculus of compulsory voting whereby turnout should only increase if the costs of not voting are least equal to initial voting costs. However, the reason for that can be that the impact of different levels of law enforcement has not been considered in a formal way. In the experimental run 12, the experiment considers high levels of both factors Cnv (60) and p (0.75). Table 22 presents the decision matrix for that factor combination.

Table 22 Decision matrix Cnv = 60 and p = 0.75 (compulsory voting)

Action	S1 (37.5%)	S2 (37.5%)	S3 (12.5%)	S4 (12.5%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-40	-40	20	20	-25	20	-40
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	-10	-10	50	50	5	50	-10
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

In compliance with the calculus of compulsory voting argument, the matrix suggests that subjects making their decision based on the expected utility calculations should adopt the strategy of informed voting. Likewise, in all other decision situation so far, risk-seeking subjects could deviate from that strategy and try to maximize their outcome (max outcome = 70) by remaining uninformed and casting random votes. Nevertheless, the matrix suggests that increasing the factors simultaneously should lead to higher numbers of informed turnout. The expected effect is even stronger for cases in which both factors are very high.

In fact, H8 and H8a expect that turnout and informed turnout will be highest among initially uninformed subjects if both factors are increased to their maximum. In the experimental run, 17 Cnv (90) and p (1.00) are operationalized that way. Table 23 presents the corresponding decision matrix.

Table 23 Decision matrix Cnv = 90 and p = 1.00 (compulsory voting)

Action	S1 (50%)	S2 (50%)	S3 (0%)	S4 (0%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-70	-70	20	20	-70	-70	-70
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	-40	-40	50	50	-40	-40	-40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

Drawing on expected utility theory, informed voting (better) is by far the best strategy. Thus, initially uninformed subjects are expected to get informed and vote for the candidate that matches their prior preference in this situation. Only risk seeking subjects could have an incentive to deviate from that strategy. Such subjects might cast random votes in order to avoid the penalty and gain a higher payoff in situations in which their randomly casted vote matches the prior preference. Another strategy could be to remain uninformed and enter the voting stage but refrain from casting a vote. By doing that, subjects would avoid the penalty for not voting. However, turnout and information gathering among initially uninformed subjects should be highest in this situation.

In contrast to the expected effect, if both factors are increased simultaneously this study presumes that turnout and levels of information acquisition are not increasing as strongly if only one factor is high or very high and the other is only low or moderate. For instance, H9 states that turnout is lower when Cnv is high but p is only low or moderate, compared to the turnout numbers when both factors are high. Run 10 considers high levels of Cnv and low levels of p. In Run 11, the level of Cnv remains high, whereas the level of p is moderate. Table 24 and table 25 show the corresponding decision matrices.

Table 24 Decision matrix Cnv = 60 and p = 0.25 (compulsory voting)

Action	S1 (12.5%)	S2 (12.5%)	S3 (37.5%)	S4 (37.5%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-40	-40	20	20	5	20	-40
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	-10	-10	50	50	35	50	-10
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

The matrix suggests that initially uninformed voters should get informed and vote according to their signal since it produces the highest expected utility. That is in line with the general notion of the calculus of compulsory voting. That is, compulsory voting should increase turnout if Cnv = C_v. However, given the specific parameters, the difference in expected utilities between informed voting (better) and uninformed abstention is not very large. In fact, in cases in which subjects remain uninformed and do not get punished, the individual payoff exceeds the payoff of an informed vote. Thus, turnout is expected to be higher than, e.g., in the control condition. However, it should be lower than in a situation in which both factors are at least high. Table 25 shows the decision matrix for Cnv = 60 (high) and p = 0.5 (moderate).

Table 25 Decision matrix Cnv = 60 and p = 0.5 (compulsory voting)

Action	S1 (25%)	S2 (25%)	S3 (25%)	S4 (25%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-40	-40	20	20	-10	20	-40
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	-10	-10	50	50	20	50	-10
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

The matrix reveals that the expected of utility of the strategy u, Ø is lower compared to the factor combination (Cnv = high and p = low) before. Thus, in the experimental runs implementing high levels of Cnv and moderate levels of p. turnout is expected to be higher than in the runs utilizing Cnv = 60 and p = 0.25. However, the expected utility of an uninformed abstention is still much higher ($EU_{u, \emptyset}$ = 20) in this parameter set compared to the condition in which both factors are higher ($EU_{u, \emptyset}$ = 5). Hence, turnout should be increased when Cnv is high and p is only moderate. Furthermore, that increase should be stronger compared to the condition in which Cnv is high but p is low. Also, turnout should definitely be higher when Cnv is high and p is moderate when compared to the control condition. However, it should be less increased compared to experimental runs in which both factors are high. Tables 26 and 27 show the decision matrices for the cases in which Cnv is high but p is moderate or low respectively.

Table 26 Decision matrix Cnv = 90 and p = 0.25 (compulsory voting)

Action	S1 (12.5%)	S2 (12.5%)	S3 (37.5%)	S4 (37.5%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-70	-70	20	20	-2.5	20	-70
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	-40	-40	50	50	27.5	50	-40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

In general, the matrix suggests that informed turnout among initially uninformed subjects should be significantly higher than in the control condition or in the cases in which Cnv and p are low as informed voting (better) produces the highest expected utility. However, comparing this condition with the one in which Cnv is high and p is low, it can be stated that the expected utility of the strategy of uniformed abstention is only slightly lower in the case of Cnv being very high and p being low. Yet, the excepted utility is higher in this condition than in the situation in which Cnv is high and p is moderate. Thus, observing uninformed abstention is more likely in this condition than in the one in which costs of not voting are only high but the probability of getting punished is at least moderate. It also seems likely that not participation could take place in this condition, because among all strategies entailing not voting of some sort, uninformed abstention produces the highest expected utility. In Table 27 the decision matrix for the case of Cnv operationalized as very high (90) and p being moderate (0.5).

Table 27 Decision matrix Cnv = 90 and p = 0.50 (compulsory voting)

Action	S1 (25%)	S2 (25%)	S3 (25%)	S4 (25%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-70	-70	20	20	-25	20	-70
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	-40	-40	50	50	5	50	-40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

The matrix indicates that informed turnout should be significantly higher in this condition. Especially since the expected utility of uninformed abstention is now very low. Thus, initially uninformed subjects utilizing the expected utility theory in order to make their decision should get informed and vote for the better candidate.

This study also assumes that in case of high or very high levels of law enforcement but only low or moderate levels of costs of not voting in the compulsory voting condition, turnout and information acquisition should also be higher than in the control condition but lower than in the conditions in which both factors are high or very high. The level of law enforcement is operationalized as different probabilities of getting punished for not entering the election stage. A high level of law enforcement is defined as p = 0.75 and a very high level as p = 1.00. Keep in mind, that low levels of costs of not voting are defined as Cnv = 10 and moderate levels are understood as Cnv = 30. Table 28 presents the decision matrix for the experimental runs considering p as high and Cnv as low[47].

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[47] In the experiment this particular condition occurs in run 4.

Table 28 Decision matrix Cnv = 10 and p = 0.75 (compulsory voting)

Action	S1 (37.5%)	S2 (37.5%)	S3 (12.5%)	S4 (12.5%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	10	10	20	20	12.5	20	10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	40	40	50	50	42.5	50	40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

The cell entries for the expected utility indicate that instrumentally motivated subjects, in fact, should abstain from voting in this situation even though chances for getting punished are considerably high. Therefore, the turnout among initially uninformed voters should be the same as in the control conditions. In fact, this is only slightly different from the run considering high levels of Cnv and low levels of p. In that case, the expected utility of uninformed abstention is 35 which is lower than the expected utility of informed voting (better) in that condition. This could indicate that high levels of p do not change the decision calculus the way high levels of costs of voting do. In other words, varying Cnv could have a stronger effect on the individual decision calculus than the variation of p. Table 29 shows the decision matrix for the cases in which p is very high (1.00) and Cnv is low.

Table 29 Decision matrix Cnv = 10 and p = 100 (compulsory voting)

Action	S1 (50%)	S2 (50%)	S3 (0%)	S4 (0%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	10	10	20	20	10	10	10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	40	40	50	50	40	40	40
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

It follows that subjects using expected utility theory to detect their best strategy should be indifferent between uninformed abstention and informed voting (better) since the expected utility of both strategies is the same. Thus, in general, turnout levels should be mixed in this situation.

Again, this supports the notion the impact of the Cnv parameter could, in fact, be stronger in the calculus of compulsory voting. The experimental Runs 8 and 9 consider medium levels of Cnv and high and very high levels of p respectively. Table 30 entails the decision matrix corresponding to the situation in which p = 0.75 and Cnv = 30.

Table 30 Decision matrix Cnv = 30 and p = 0.75 (compulsory voting)

Action	S1 (37.5%)	S2 (37.5%)	S3 (12.5%)	S4 (12.5%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-10	-10	20	20	-2.5	20	-10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	20	20	50	50	27.5	50	20
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

In this situation, compulsory voting should be effective in increasing turnout in general and informed turnout in particular, since the expected utility of the strategy informed voting (better) is the highest. Thus, initially uninformed voters are expected to get informed and vote for the candidate matching the information signal in this condition. However, since the possible outcomes for subjects following the logic of the "maximize the possible maximum" are higher than the expected utility of 40, it could be the case that turnout and information acquisition among initially uninformed actors will not be close to universal. For instance, abstaining from voting could gain a payoff of 50 if the non-participation is not sanctioned. Furthermore, a random vote could lead to an outcome of 70 if the randomly elected candidate matches the subjects' prior preference. Thus, more risk-seeking individuals could adopt these strategies. Hence, turnout would not be universal. Table 31 presents the decision matrix for the case in which the probability of getting punished is 1 and the costs for not voting are 30 experimental points.

Table 31 Decision matrix Cnv = 30 and p = 100 (compulsory voting)

Action	S1 (50%)	S2 (50%)	S3 (0%)	S4 (0%)	Expected Utility	Maxi Max	Maxi Min
i, Ø	-10	-10	20	20	-10	-10	-10
i, b	-10	-10	-10	-10	-10	-10	-10
i, v (better)	40	40	40	40	40	40	40
i, v (worse)	-60	-60	-60	-60	-60	-60	-60
u, Ø	20	20	50	50	20	20	20
u, b	20	20	20	20	20	20	20
u, v (random)	70	-30	70	-30	20	70	-30

Note: S1 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and getting punished for not participating in the election. S2 refers to the state of the world in which uninformed actor would vote randomly for the worse candidate and getting punished for not participating in the election. S3 refers to the state of the world in which an uninformed actor would vote randomly for the better candidate and not getting punished for not participating in the election. S4 refers to the state of the world in which an uninformed actor would vote randomly for the worse candidate and not getting punished for not participating in the election.

Again, instrumentally motivated subjects should adopt the strategy informed voting (better), because the expected utility is the highest, given the specific parameter set. Thus, it can be expected that initially uninformed subjects will get informed and vote for the right candidate much more often than, for example, in the control condition (voluntary voting). However, turnout should also be higher than in the situation in which p is very high (1) but Cnv is only low (10). That supports the notion that the costs of not voting have a strong effect on the individual voting calculus than the probability of getting caught. Nevertheless, the levels of turnout and information acquisition should always be highest if both factors are high or very high at the same time. The next section presents the research design entailing a discussion of the reference experiment and this studies experimental procedure

4.2 Research Design

Essentially, this chapter raises the question whether compulsory voting enhances turnout even among uninformed voters, which otherwise often abstain. In other words, this chapter examines how the alteration on the institutional level affects individual decision making. Unfortunately, empirically it is hardly possible to observe the same group of individuals being exposed to different voting laws at the same time. Thus, in order to test whether compulsory

voting alternates the individual calculus of voting, an experimental test of the above-noted hypothesis is employed. Thereby, voting rules are alternated between different treatments. That is, some participants are exposed to voluntary voting and others to compulsory voting laws during the experiments. Due to ex-ante randomization, intervening factors are equally distributed over the different treatment groups. Thus, the experimental test is able to examine a possible causal link between compulsory voting and the individual decision to turnout out especially with respect to uninformed voters. The next sections present the reference experiment provided by Shineman (2010) as well as this chapter's experimental procedure.

4.2.1 The Reference Experiment

The individual level experiment[48] tests the impact of compulsory voting on turnout in general and informed turnout in particular in a within-subject design. To evaluate the decision-theoretic model of compulsory voting, subjects make various decisions within the experiment without interacting with other subjects. Furthermore, there is only one experimental group. All subjects are exposed to all different treatment conditions and manipulations. Thus, there is no control group. Instead, in this within-subject design, subjects serve as their own baseline. One advantage of this method is that this approach also accounts for unobservable differences between subjects (Shineman, 2010). In total, 18 subjects each played 111 periods in a single session[49]. Thereby 1998 observations were created.

In the experiment, each subject played individually against the computer and was asked to make several decisions in different voting modes and different states of the world. In the beginning, the state of the world is determined. A "team color" is randomly picked, and subjects either prefer blue or yellow (Shineman, 2010). In the first stage, initially uninformed subjects[50] can decide to invest in costly information (C_i)[51] about the state of the world. If subjects invest in costly information, they are fully informed about the current state of the world. After the information stage, subjects decide whether they enter the ballot stage or stay at

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[48] The experiment was computed in ztree FISCHBACHER, U. 2007. z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics,* 10**,** 171-178..

[49] The experiment was conducted at the Center for Experimental Social Science at the New York University in January 2010. Subjects were invited through the computer laboratories mailing list. The experiment lasted for two and a half hours. Subjects earned $26.15 on average SHINEMAN, V. 2010. Compulsory voting as compulsory balloting: How mandatory balloting laws increase informed voting without increasing uninformed voting. *Annual Meeting of the American Political Science Association, Toronto*..

[50] Note, that subjects are either initially informed or uninformed. Initially informed voters were expected to always vote according to their revealed preference.

[51] Information costs (C_i) were varied over periods (e.g. $C_i = 0$, $C_i = 5$, $C_i = 10$, $C_i = 20$) SHINEMAN, V. 2010. Compulsory voting as compulsory balloting: How mandatory balloting laws increase informed voting without increasing uninformed voting. *Annual Meeting of the American Political Science Association, Toronto*..

home. Participating in the balloting stage incurs a cost of balloting (C_b)[52]. Complete absten-tion, however, is only charged (C_{nb})[53] in the compulsory balloting mode (CB). After entering the balloting stage, subjects could decide to cast a valid vote on the voting stage by voting for one of the two alternatives. Voting also is costly (C_v)[54]. Abstaining at the voting stage, how-ever, incurs no cost in both voting modes. If the subject votes blue in state blue, he receives a reward (B)[55] if he votes blue in the state yellow he/she receives no reward[56]. All parameters are announced at the beginning of each period to ensure that all decisions endogenous to the parameter set (Shineman, 2010).

Results show that the predictions of the decision-theoretic CB- model hold with re-spect to the models first hypothesis – Moving from voluntary balloting to compulsory ballot-ing does not increase informed turnout – but not for uninformed turnout in general. Independ-ent from the specific expected effect of compulsory balloting on informed turnout, the model generally predicts uninformed turnout as very unlikely. In fact, 1.55 % of the voting decisions were uninformed votes, whereas 2.5 % of the votes were uninformed in the VB-Mode and only 1.34% of the votes were uninformed in the CB-Mode. Thus, the general assumption that uninformed turnout never happens does not hold in this experiment. On the contrary, unin-formed turnout was significantly different from zero for all treatment conditions (Shineman, 2010). However, in contrast to the general notion that compulsory balloting could lead to an increase in ill-or uninformed (Jakee and Sun, 2006) votes, uninformed turnout happened 1.16% more often in the VB-Mode[57] (Shineman, 2010).

In order to examine the predictions of the model, Shineman (2010) compares informed voting between the two voting modes by measuring different relationships between the pa-rameters C_i, C_b, C_v, and C_{nb}. Therefore, she specifically focuses on three distinct categories of informed turnout in the experiment: first, when informed voting is not expected VB-Mode but sometimes in the CB-mode. Second, always when informed voting is expected in both modes. Third, when informed voting is not expected to occur at all (Shineman, 2010). Each

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[52] Ballot costs (C_b) were also alternated over time $(C_b = 15, C_b = 40, C_b = 41, C_b = 45, C_b = 50, C_b = 53, C_b = 60)$ ibid..

[53] Different levels of costs of not balloting (C_{nb}) were applied over periods. Unfortunately, there was no infor-mation available on which specific levels of (C_{nb}) were used throughout the experiment. Cost of not balloting were always 0 in the voluntary voting mode.

[54] Costs of voting (C_v) were also varied of periods $(C_v = 5, C_v = 10)$ SHINEMAN, V. 2010. Compulsory voting as compulsory balloting: How mandatory balloting laws increase informed voting without increasing uninformed voting. *Annual Meeting of the American Political Science Association, Toronto.*.

[55] B = 100

[56] Note, that if a subject votes yellow he also receives a reward (B) and no reward if he votes yellow in the state blue.

[57] Analysis show, that the differences in uninformed voting ar significant (p = 0.054) SHINEMAN, V. 2010. Compulsory voting as compulsory balloting: How mandatory balloting laws increase informed voting without increasing uninformed voting. *Annual Meeting of the American Political Science Association, Toronto.*.

category is yielded by different combinations of the main parameters C_i, C_b, and C_v. In order to account for the predicted categories, Shineman generates different parameters sets reflecting the predictions including varying values of C_{nb}.

Drawing on specific and distinct cut-points, the model predicts when informed voting should and should not occur. Cut-points were identified for all parameter sets predicting when informed voting should or should not occur depending on the value of C_{nb} (Shineman, 2010). The cut-point exists for all cases in which the costs of information (C_i) and costs of voting (C_b and C_v) combined are larger than 50^{58} and also when the combination of information costs (C_i) and only the costs of voting (C_v) are smaller than 50 (Shineman, 2010). Note, that drawing on the cut-points, the model predicts that informed voting is irrational for all values of C_{nb} below the cut-point and rational for all values of C_{nb} over the cut-point (Shineman, 2010).

Since hypotheses two and three both address the impact of compulsory balloting on informed turnout, the two hypotheses are tested in combination. Results indicate that the specific point predictions were not realized all the time.

Table 32 Percentage of Subjects casting informed votes

Predicted Rational	Informed voting in %	Standard Deviation	Obs.
Action			
Abstain	29.53	0.457	342
Indifferent	49.44	0.501	180
Informed Voting	64.29	0.479	882

Notes: Results originally presented by Shinman (2010).

Results presented in Table 32 support the notion that, even though not all predictions were realized all the time, overall subjects behaved in the predicted manner. That is, compulsory voting does not decrease informed turnout but is instead sometimes able to enhance informed turnout. Shineman argues that subject-specific risk attitudes could explain deviant behavior in the experiment (Shineman, 2010).

4.2.2 Experimental Procedure

This section sketches out the basic experimental procedure. To disentangle the effect of the severity of penalties and the level of law enforcement on turnout in general and informed turnout in particular, this study enables a series of computer-based lab experiments. The experiment was computed in ztree (Fischbacher, 2007). Sessions took place in the computer laboratory (OLExS) at the University of Oldenburg. In total, 62 subjects participated in three

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[58] The cut-point is calculated as follow: Ci + Cb + Cv – 50 ibid..

experimental sessions. The experiment was organized and recruited with the software "hroot" (Bock et al., 2012). On average, participants earned 8.50€. Sessions lasted for about 45 minutes.

In the experimental procedure [59], subjects individually play against the computer and can make various decisions at different stages of the experiment. First, subjects can be initially informed or uninformed about their preference. They prefer either Candidate A or B. The individual preference is randomly induced with both candidates equally likely to be picked as a preference. Initially uninformed subjects, then, must decide to buy additional information or remain uninformed. If they click on the information button, subjects have to pay information costs (Ci) of 30 experimental Tokens. After clicking on the information button, subjects are fully informed of their preference. Initially informed subjects wait until uninformed subjects have made their decision on the information stage. After the information stage, subjects can either enter the final voting stage or abstain at the balloting stage. Abstaining on the balloting stage, however, is punished with the probability (p) and incurs a cost (Cnv) in the experimental runs considering compulsory voting. Participating in the voting stage also incurs a cost (Cv) of 30 experimental tokens. However, voting during the voting stage does not incur additional costs. On the voting stage, subjects can either vote for Candidate A or Candidate B or cast an invalid ballot. Handing in an invalid vote is not punished in any experimental run.

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[59] Figure 9 contains a stylized version of the experimental procedure.

Figure 9 Experimental procedure
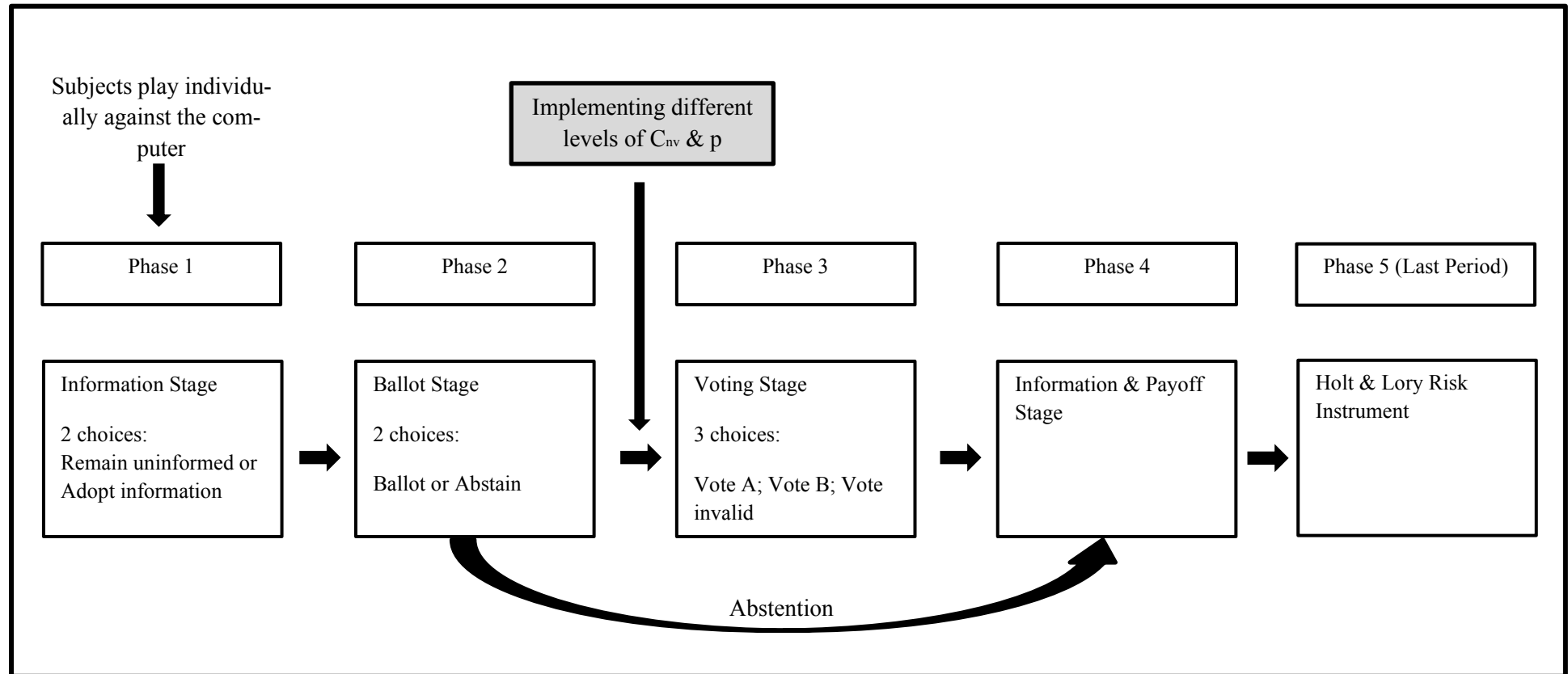
Note: The experiment consist out of 19 experimental runs corresponding to different levels of costs of not participating and different levels of law enforcement. After finishing

the last period subjects proceeded to a post-experimental survey.

The individual reward in a period depends on the individual decision and the randomly determined state of the world. According to the decision-theoretic model underlying this experiment, subjects can directly affect their individual payoff. That is, if a subject votes for one of the two candidates, that candidate is going to be the election winner. If the elected candidate matches the previously determined individual preference, the subject earns 100 experimental tokens. Depending on the individual decisions made, different cost parameters are subtracted from that reward. For instance, if an initially uninformed subject picks up additional information, enters the voting stage and votes for the candidate that matches the prior preference, the subject earns 40 experimental tokens in that period, since the subject would have to pay information costs and voting costs based on their decisions to buy information and participate in the vote. Subjects are fully informed about all possible costs and rewards in all periods.

In addition to the main treatments, the experiment also entails an experimental instrument measuring individual risk attitudes, proposed by Holt and Lory (2002). The instrument provides various lottery choices in order to elicit individual degrees of risk aversion. Lotteries are presented at the end of the last period in order to test whether individual risk characteristics can give an alternative explanation for individual behavior within the main experimental treatment because that strategy produces the single highest possible payoff regardless of the chosen parameter combination. The decision matrices for all possible parameter combinations suggest that remaining uninformed and casting random votes can be a payoff maximizing strategy. Thus, this study assumes that more risk-seeking individuals will more often adopt the maximax strategy, in any given parameter set. After finishing all experimental runs, subjects are informed of their total payoff and proceed to the post-experimental questionnaire which entails general socio-demographic questions, questions regarding attitudes towards politics in general and elections in particular, as well as questions to risk attitudes. The next chapter discusses the empirical results.

4.3 Empirical Analysis

In order to disentangle the relationship between compulsory voting laws and individual voting behavior in general and information acquisition in particular, individual data was collected. Data was gained from a controlled computer-based experiment drawing on a decision-theoretic model. With respect to the hypotheses deducted from the calculus of compulsory approach, two different dependent variables were computed. Those variables were tested in

individual models with various predictor variables. Both, the dependent and independent variables are described in the flowing chapter. Afterward, descriptive findings are discussed following the statistical analysis. In the end, the chapter briefly discusses the findings.

4.3.1 Dependent Variables

Turnout

With respect to this chapter's research question, turnout is obviously the most crucial dependent variable. Because of the implementation of compulsory voting laws in the treatment, a significant increase in turnout in those groups is expected. This is in line with the theoretical assumptions of the calculus of compulsory voting idea (Panagopoulos, 2008), and consistent with empirical studies regarding the effect of mandatory voting rules on turnout as well. Furthermore, Victoria Shineman (Shineman, 2010) showed in a laboratory experimental design that compulsory voting laws have a positive effect on turnout. However, her experiment only accounts for the costs of not participating as an explanation for higher turnout levels. The calculus of compulsory voting, however, also considers different levels of law enforcement as an important predictor of variance in turnout due to compulsory voting.

Therefore, this study includes both factors in order to test the predictions of the calculus of compulsory voting approach and strengthen the previous findings. The variable *Turnout* is a metric that captures the percentage of subjects entering the experimental ballot stage. Thus, subjects deciding on abstaining from balloting are not included in the analysis. Based on this measure the alternation of voting rules has an effect on turnout in the experimental groups will be examined.

Informed Voting

In the debate about actual or possible consequences of compulsory voting, opponents argue that compulsory voting laws enhance uninformed voting (Singh and Thornton, 2013, Jakee and Sun, 2006). In contrast, Shineman (2010), showed that compulsory voting can enhance turnout without decreasing information acquisition. Instead, given specific circumstances, compulsory voting was able to increase informed voting.
Generally, most voluntary voting regimes suffer from unequal participation. That is, the more educated and political interested individuals are more likely to turn out. Compelling the others to participate as well could bring the uninformed to the polls (Singh and Thornton, 2013). On the other hand, scholars in the tradition of Arendt Lijphart argue that compulsory voting could

help /overcome this unequal participation pattern (Lijphart, 1997, Franklin, 2004, Hill, 2006, Engelen, 2007). Since individuals are obliged to vote, they might reason more about politics.

To test whether one or the other can be observed in the conducted experiments, levels of informed turnout will be examined within the different treatment conditions. Again, the dependent variable is coded as a metric variable capturing the percentage of initial uninformed voters picking up additional information. Recall, that at the beginning of each period subjects were either informed or uninformed about their preference. If they were uninformed, they had the chance to buy additional information about their preference. Note that for the examination of the variable *Informed Turnout,* only cases in which subjects were initially uninformed are included[60].

Random Vote

A direct result of the discussion about how compulsory voting affects individual voting behavior is the question of whether mandatory voting could also lead to an increase in ill-informed or random voting. Opponents of compulsory voting argue that instead of investing in additional information, individuals could prefer to participate in the election but they might hand in invalid or random votes (Jakee and Sun, 2006, Singh and Thornton, 2013). Therefore, this study will test this claim by examining the number of initial uninformed voters casting random votes in both voting modes. Like the other dependent measures, the variable *Random Vote* is a metric variable and captures the percentage of initial uninformed individuals remaining uninformed and casting valid but random votes at the experimental voting stage. Table 33 summarizes the dependent variables.

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[60] Since the study assumes individuals to be rationally motivated it is assumed that all initially informed subjects will vote according to their signal. Examining initially informed subjects can therefore not contribute to answering the question whether compulsory voting could lead to an increase or decrease in information acquisition.

Table 33 Dependent Variables

Dependent Variables	Definition	Coding
Turnout	Percentage of subjects entering the ballot stage in a period	metric (0-100)
Informed turnout	Percentage of initially uninformed subjects buying information in a period	metric (0-100)
Random Vote	Percentage of initially uninformed subjects remaining uninformed, enter the ballot stage and cast a random vote	metric (0-100)

4.3.2 Independent Variables

Factors

In general, the main manipulation of this experiment was to observe individual voting behavior at different voting rules- voluntary voting and compulsory voting – in a within-subject design. Drawing on the calculus of compulsory voting, the two main predictors for changes in turnout are the cost of not participating and levels of law enforcement. Therefore these two are the dependent variables in this chapter. Due to the factorial design of the experiment, this study not only considers one single value of the indicators but instead examines the possible impact of different levels of the two factors. In fact, this study examines the impact of low, medium, high and very high levels of cost for both factors of not participating and law enforcement with respect to variation in turnout. In case of cost of not participating (Cnv), low levels refer to a value of 10 experimental points, medium levels refer to 30 experimental points, high levels refer to 60 experimental points and very high levels refer to 90 experimental points. Furthermore, this study also considers the control condition in which Cnv = 0. With respect to levels of law enforcement (p), low levels refer to a probability of getting caught for not participating 25% (p =0.25), medium levels refer to p = 0.5, high levels to p = 0.75 and very high levels to p = 1. In the control condition, the probability of getting caught for not participating is 0. Therefore, both factors have 5 levels whereas the control condition is coded as 1 and the very high level is coded as 5. In between values 2, 3 and 4 refer to the remaining levels in ascending order. Table (…) at the end of this section gives an overview of all independent variables.

Risk Aversion

People's risk attitude is of a special interest to this study for several reasons. First, drawing on the information approach developed by Matsusaka (1995), individuals are eager to maximize their confidence in their voting decision in order to minimize the risk of voting incorrectly. Thus, it seems reasonable to test whether individual risk aversion has an impact on individual behavior in the experiments. Secondly, in addition to the above-mentioned information approach, Kam (2012) finds that individual risk attitude is a good predictor of individual levels of political participation. However, neither a positive nor a negative influence of risk attitude towards turnout can be seen in the survey data (Kam, 2012). With respect to general political participation, however, three major factors are shown to have influence over individual behavior: individually perceived benefits of participation perceived costs and the individual willingness to trade off between those factors (Kam, 2012). These aspects might have an influence on the behavior in the conducted experiments as well.

To measure a possible influence of individual risk attitudes on turnout in the experimental elections, subjects were asked to report their general level of risk aversion on a scale ranging from 0 to 10 in the post-experimental-questionnaire[61]. Based on this scale, a risk attitude score is easily computed. The risk attitude score is scaled from 0 to 10, whereas 0 refers to a high level of risk awareness and 10 to a high level of risk acceptance. This score is measured for all statistical models.

Furthermore, this study uses the risk instrument created by Holt and Laury (2002). Drawing on Kahneman and Tversky (1979), Holt and Laury develop a tool to measure individual risk aversion by confronting individuals with various small lotteries. Those lotteries vary with respect to possible outcomes and probabilities of winning the lottery. For instance, they create a situation in which an individual has to choose between two different potential payoffs accompanied with different chances to win or lose respectively. This choice situation is repeated for several times. Table 34 shows the different lotteries.

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[61] Examples for the asked questions can be found in the appendix.

Table 34 Holt & Laury Risk Instrument (Lottery)

Lottery	Option A	Option B	Expected utility of option B
1.	7.30 (10%) or 5.84 (90%)	14.05 (10%) or 0.37 (90%)	1.48
2.	7.30 (20%) or 5.84 (80%)	14.05 (20%) or 0.37 (80%)	3.11
3.	7.30 (30%) or 5.84 (70%)	14.05 (30%) or 0.37 (70%)	4.47
4.	7.30 (40%) or 5.84 (60%)	14.05 (40%) or 0.37 (60%)	5.84
5.	7.30 (50%) or 5.84 (50%)	14.05 (50%) or 0.37 (50%)	7.21
6.	7.30 (60%) or 5.84 (40%)	14.05 (60%) or 0.37 (40%)	8.58
7.	7.30 (70%) or 5.84 (30%)	14.05 (70%) or 0.37 (30%)	9.95
8.	7.30 (80%) or 5.84 (20%)	14.05 (80%) or 0.37 (20%)	11.31
9.	7.30 (90%) or 5.84 (10%)	14.05 (90%) or 0.37 (10%)	12.68
10.	7.30 (100%) or 5.84 (0%)	14.05 (100%) or 0.37 (0%)	14.05

Note: The probability of receiving a certain payoff is displayed in brackets.

Over time, the chances of getting a higher payoff increase. In fact, in the last repetition, the chance of getting the high payoff is 1. Thus, even risk-averse actors should decide for the option of generating the higher payoff, since the probability is 1 (Holt and Laury, 2002). Moreover, the expected utility of option also increases over time. In fact, after Run 4 the expected utility of Option B is higher than the expected utility of Option A[62] and risk-neutral subjects should switch from Option A to Option B. Thus, if subjects decide for A in the first runs and switch to B after the fourth run they behave rationally and can be seen as risk neutral actors. However, if they decide for the safe option more often they can be seen as risk-averse actors. Hence, the more a subject plays the safe option the more risk averse they are. For the Holt and Laury risk variable, this study, therefore, uses the sum of safe decisions made by a subject within the experimental lottery. Note that drawing on the assumption that even very risk-averse players should pick Option B in the last run (Lottery 10) all subjects that have picked Option A in all lotteries are excluded from further analysis with respect to risk attitudes since their behavior can be considered irrational or inconsistent. This also accounts for subjects constantly changing between options, because their behavior is also not consistent.

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[62] $EU(A_5) = 0.5*(7.30) + 0.5*(5.84) = 6.57$.

Civic Duty

Why should an individual turn out in elections when chances of influencing the electoral outcome are very slim? One answer to this is a civic duty. Ever since Riker and Ordeshook (1968) introduced *civic duty* as a predictor of individual voting behavior, scholars have discussed its predictive power and consistency with rational choice theory (for a survey of the literature see for example Aldrich, 1993). The main argument of the civic duty approach is individuals not only gain an instrumental utility but can gain a positive utility from the act of voting itself (Riker and Ordeshook, 1968). That is, performing their civic duty. Additionally, different studies have shown that social pressure has a positive effect on turnout (Gerber et al., 2008). Especially, various "get out the vote" field experiments provided insights on the way social pressure increases turnout (Gerber and Green, 2000).

Alongside possible effects of compulsory voting on individual voting calculations, some scholars point to the possible reinforcement of perceiving voting as a civic duty (Shineman, 2012b). To test whether a strong perception of voting as an act of civic duty has an impact on the subjects' behavior in the experiment, a question regarding the individual attitudes towards voting was asked in the post-experimental-questionnaire. Subjects were asked whether they see voting as their civic duty. Based on the answers[63], a binary civic duty variable is computed, whereas a score of 0 refers to subjects not perceiving voting as a civic duty and a score of 1 denotes voting as a civic duty.

Controls

Besides the above-mentioned covariates, which were mostly introduced due to theoretical interest, some individual socio-demographic control variables were tested in the model as well. Certainly, the subjects' age and gender were incorporated in the statistical analysis, whereas gender was coded as a female dummy variable. Here 0 refers to male subjects and 1 to female subjects. Apart from just controlling for age and gender, both variables contribute to the existing literature as well. For example (Quintelier et al., 2011) show that compulsory voting, gender, and age do not interact in the expected way. Advocates of compulsory voting claim that compulsory voting could lead to more equal turnout with respect to various characteristics, like differences in turnout probabilities between men and women, and between younger and older individuals (Lijphart, 1997). However, the expected positive relationship has not been revealed yet (Quintelier et al., 2011).

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[63] A detailed description of the question and possible answers can be found in the appendix.

Furthermore, subjects were asked about their major in the post-experimental question-naire. Taking into account that it is mostly social science majors that are subscribed in the experimental register tool, and that participation in the election is a highly social science major related topic I controlled for a possible effect of being a social science major on the behavior in the experiments. Therefore, a social science dummy was computed. Here all social science majors were coded as 1 and all other majors were coded 0. Table 35 gives an overview of all independent variables.

Table 35 Independent Variables

Independent Variables	Definition	Coding	Source
Cnv	Cost for not participating	1 = 0; 2 = 10; 3 = 30; 4 = 60; 5 = 90	Experiment
p	Probability of punishment	1 = 0; 2 = 0.25; 3 = 0.5; 4 = 0.75; 5 = 1.00	Experiment
Risk aversion	Individual risk attitude	Scale 0 – 10 (0 = high risk aversion; 10 = very low risk aversion	(Kam, 2012)
Holt & Laury Risk	Individual risk attitudes	Sum of save choices (0 = not at all risk averse; 9 = very risk averse)	Holt and Laury Risk instrument (Holt and Laury, 2002)
Civic Duty	Individual attitude towards voting	0 = no duty 1= duty	Post-experimental questionnaire
Political position	Individual self-assessment on a left-right scale	Scale 0 – 10 (0 = very left ; 10 = very right)	Post experimental questionnaire
Gender	Individual gender	0 = male ; 1 = female	Post experimental questionnaire
Age	Age	Age of the participants in years	Post-experimental questionnaire
Major	Individual field of study	0 = other major ; 1 = social science major	Post experimental questionnaire

4.3.3 Empirical Results

In this section, the study presents general descriptive findings with respect to the two dependent variables, *Turnout*, *Informed Turnout*. For the two dependent variables, the study mainly focusses on the influence of the theoretically deducted predictors. First, this study examines whether the alteration of voting rules, in general, has an effect on individual turnout decisions. Second, this study specifically focuses on the importance of different levels of penalties

and/or law enforcement on individual voting behavior. The section starts with a general overview of the treatment groups.

The experiment was conducted in three distinct sessions. In total 62 subjects participated in the three sessions[64]. Due to the fact that subjects played the experiment for 18 periods, 1.116 observations were created for most variables. On average, subjects were about 25 years old with a minimum of 19 years and a maximum age of 50 years. Most participants were females (almost 70%). Furthermore, most subjects were social science majors (40%)[65].

Descriptive Findings

At first, this study presents the descriptive results for the dependent variables *Turnout*, *Informed Turnout,* and *Random Vote*. *Turnout* captures the variation in subjects entering the election stage in percent due to compulsory voting in general or due to different levels of compulsory voting in particular. *Informed Turnout* captures the percentage of initially uninformed subjects[66] picking up additional information and entering the voting stage afterward. Finally, *Random Vote* is operationalized as the percentage of uninformed subjects casting uninformed and thus random votes in the experiment.

According to the general notion that compulsory voting generally increases turnout, this study starts with a simple comparison of overall turnout, overall informed turnout and overall roll off in experimental runs with and without compulsory voting. Overall, the treatments' general turnout was on average about 77%. However, it ranges from 27% to about 98%. This large variation points to substantial differences in turnout.

Regarding the information acquisition of initially uninformed subjects, numbers show that on average 58%[67] of initially uninformed subjects picked up additional information and entered the election stage afterward. Thereby, the variable ranges from 0% to about 76%. Again, this range suggests that there is a variation in information acquisition due to the different treatment conditions throughout the experiment. In the literature, however, there are mixed notions about how compulsory voting affects information acquisition. Therefore, this study also considers the occurrence of randomly casted votes. The variable Random Vote has

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[64] Note, the first and second treatments were run with 20 participants. The third was run with 22 participants.
[65] About 20% of the participants were majoring in natural sciences, about 10% of the participants were majoring in philology, about 6% of the participants had a economics related background. The rest of the participants checked themselves into the other category.
[66] Recall that in the experiment subjects can be either informed or uninformed about theri assigned preference in each experimental period.
[67] Note that in total about 49% of the times subjects were initially uninformed about their assigned preference at the beginning of a new period.

a mean of about 42% at ranges from 11% to about 58%. Figure 10 presents the dependent variables over periods.

Figure 10 Dependent Measures over Periods
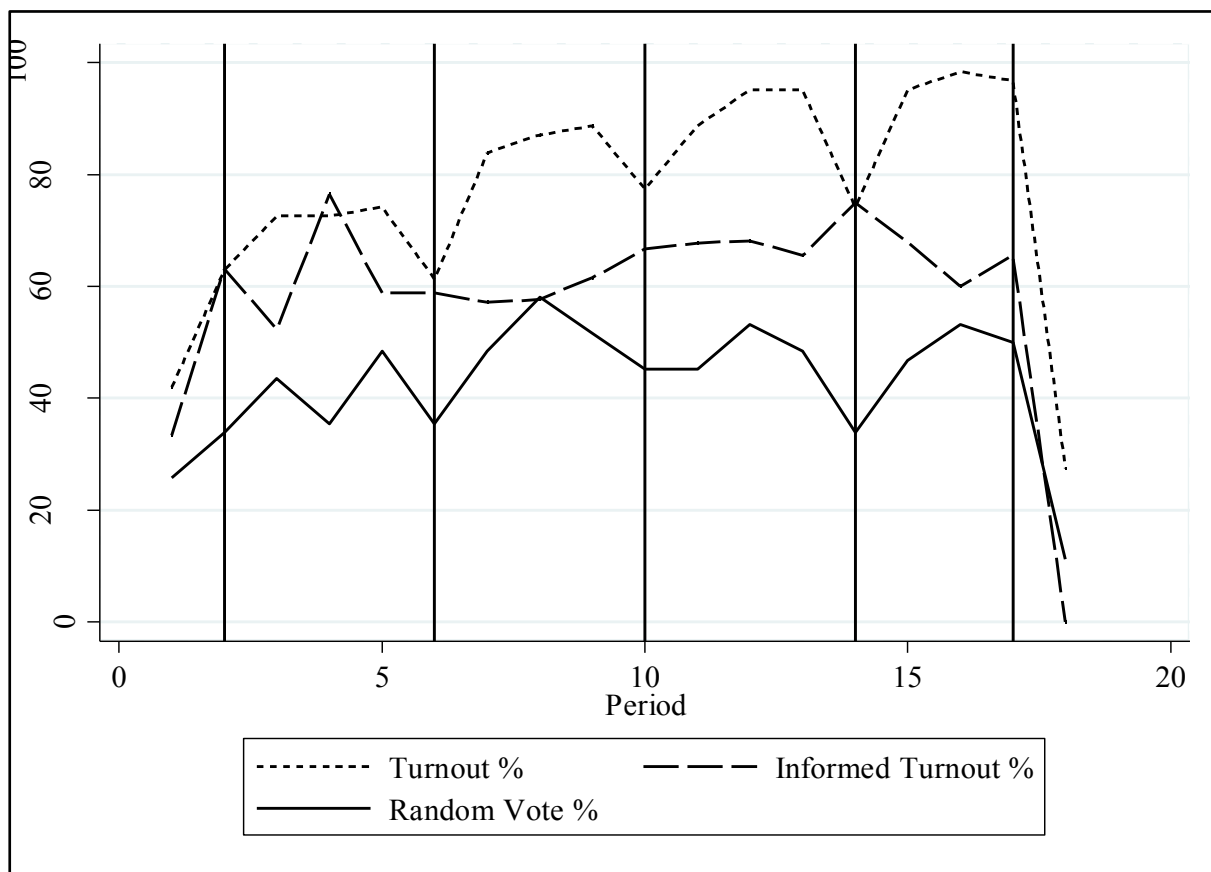
Note: In Period 1 and Period 18 voting is voluntary. The reference lines refer to the introduction of new levels of Cnv and p.

The graph indicates that all the dependent measures react to changes in the levels of compulsory voting. For instance, the reference lines show the introduction of new levels of penalties and law enforcement. In Period 2, for example, compulsory voting is introduced for the first time, but only with low levels of both parameters. Afterward, penalties remain at a low level until the sixth period. Levels of law enforcement, however, already increase within the time frame. So, in general, the pattern goes as follows: at every reference line, a new level of Cnv and p are introduced. Cnv remains constant until the next reference-line whereas p is varied within the time frames. One can see that *Turnout* first increases when compulsory voting is introduced in Period 2. Afterward, it constantly drops when the parameter combination is changed at a new reference-line. Then it continues to increase over time, most likely because levels of law enforcement are increased until the next line. In the last period, turnout collapses

completely since voting is, again, voluntary. With respect to information acquisition, the pattern is comparable, even though it is not as obvious. The level of initially uninformed subjects picking up information goes up as levels of compulsory voting increase at the same time. Also, information acquisition is lowest when voting is voluntary. The solid line represents the variable *Random Vote*. The graph indicates that numbers of randomly casted votes are higher in the experimental runs employing compulsory voting. Most striking is the increase in Period 1 and the massive drop after Period 17. These two points mark the introduction and the abandonment of compulsory voting respectively. Thus, it can be concluded that all dependent measures react to the variation in the voting rules in the experiment.

In the case of overall turnout and information acquisition, both measures seem to be affected by the different levels of penalties and law enforcement[68]. Figure 11 underpins the notion.

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[68] Note that all control variables were dropped from further investigation, since there was almost no correlation between the variables and the dependent measures. Thus, this study solely focusses on the main predictors of turnout deducted from the calculus of compulsory voting. However, output from pairwise correlations for the controls can be found in the appendix.

Figure 11 Dependent Measures by voting modes
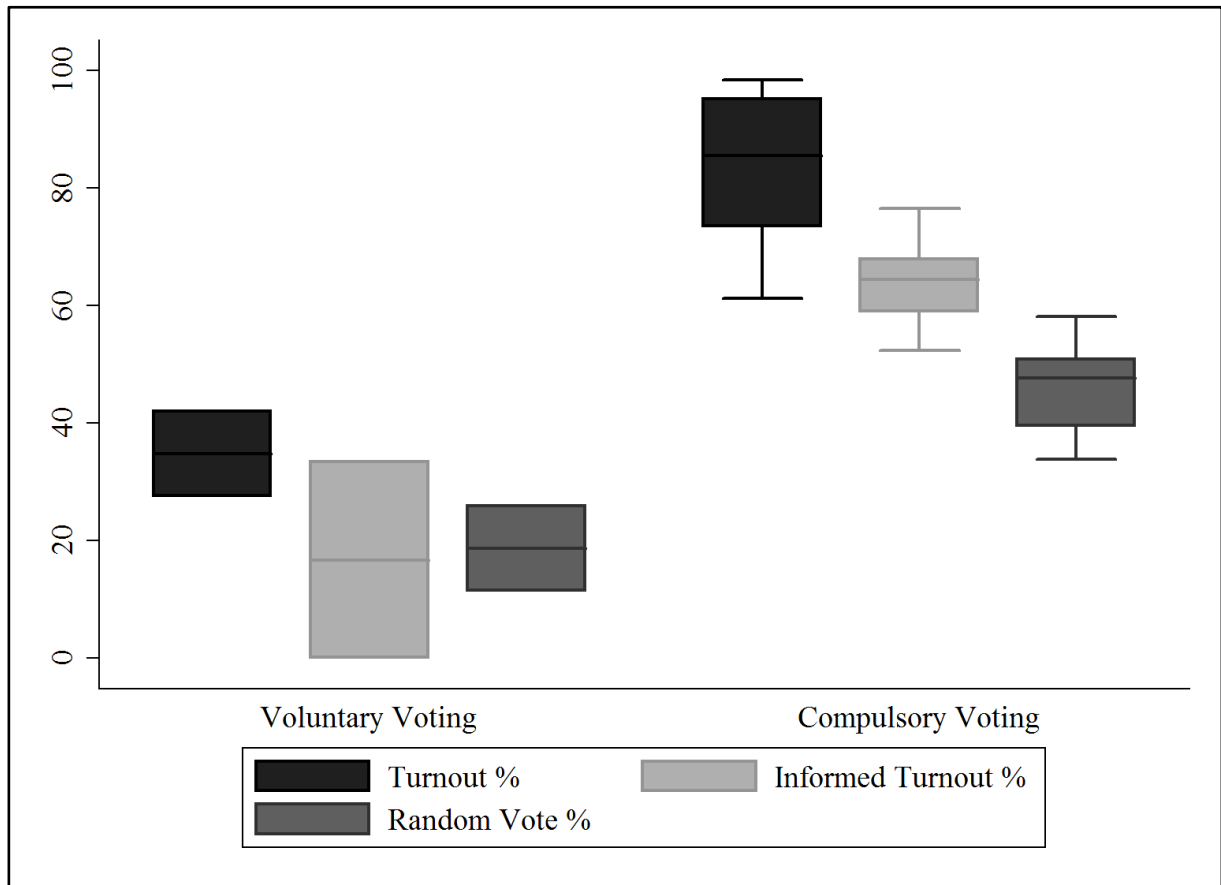
Note: The graph compares the three dependent measures between voting modes.

The plot shows that all three dependent variables seem to differ strongly due to the two different voting rules applied in the experiment. In order to examine whether the difference in *Turnout*, *Informed Turnout*, and *Random Vote* are in fact due to compulsory voting this study continues to test the differences in the variables between compulsory voting and voluntary voting modes.

Thus Table 36 compares the dependent variables by the different treatment conditions. That is, experimental runs considering compulsory voting and runs imposing fines for not participating (CV) and runs with no penalties for abstention (VV).

Table 36 Summary Statistics of Turnout and Informed Turnout by voting modes

	Voluntary Voting				Compulsory Voting			
	Mean	Std. Dev.	Obs.	N	Mean	Std. Dev.	Obs.	N
Turnout	34.68	7.29	124	62	82.76	11.81	992	62
Informed Turnout	16.66	16.73	124	62	63.91	6.29	992	62
Random Voting	18.55	7.29	124	62	45.67	7.23	992	62

Note: The difference in the number of observations is due to the fact that voluntary voting only took place in the first and the last period of the experiment.

The table suggests that on average levels of turnout, information acquisition and randomly casted votes are low when voting is voluntary and higher when voting is compulsory. In fact, there is a substantial difference in the mean turnout and the mean information acquisition comparing the two voting votes. Even though the mean of random votes is also higher in the compulsory voting runs, the difference is not as strong. With respect to turnout, this is completely in line with previous findings in the literature. Regarding individual information acquisition, these descriptive findings are also in line with experimental results presented by Shineman (2010), yet it opposes claims by other scholars, for example, Jakee and Sun (2006), who claim that compulsory voting could be a harm to the level of informedness of the electorate. This, in fact, agrees with the findings regarding random votes. In sum, the descriptive findings are in line with Hypotheses H1 and H1a as well as Hypotheses H2, H2a, and H2b. H1 stated that this study expected high levels of abstention in the voluntary voting mode and H1a expected low levels of information acquisition in the voluntary voting mode. Numbers indicate that this was the case in the experimental runs in which voting was voluntary. Recall also that H2b states that the number of randomly casted votes is expected to be higher in the compulsory voting mode.

After these first insights on the impact of compulsory voting, this study continues to more thoroughly examine the specific effects of the parameters of compulsory voting, proposed by the calculus of compulsory voting (Panagopoulos, 2008), costs of not voting (Cnv) and levels of law enforcement (p) on *Turnout* and *Informed Turnout*. Recall, that in theory,

compulsory voting should be most effective, in terms of mobilizing voters, if both parameters are high and almost ineffective if both parameters are low. In order to test the individual and mutual effect of the two parameters this study, just like the comparison of the dependent variables by voting modes, starts by presenting basic descriptive statistics with respect to *Turnout* and *Informed Turnout*, but this time comparing it to different factor levels of the two parameters – Cnv and p.

To get a first impression of the relationship between the different levels of the two factors and the two dependent measures, Figures 12 and 13 present combined boxplots for the variable *Turnout* and *Informed Turnout* with regard to costs of not participating and levels

Figure 12 Turnout by levels of Cnv and p
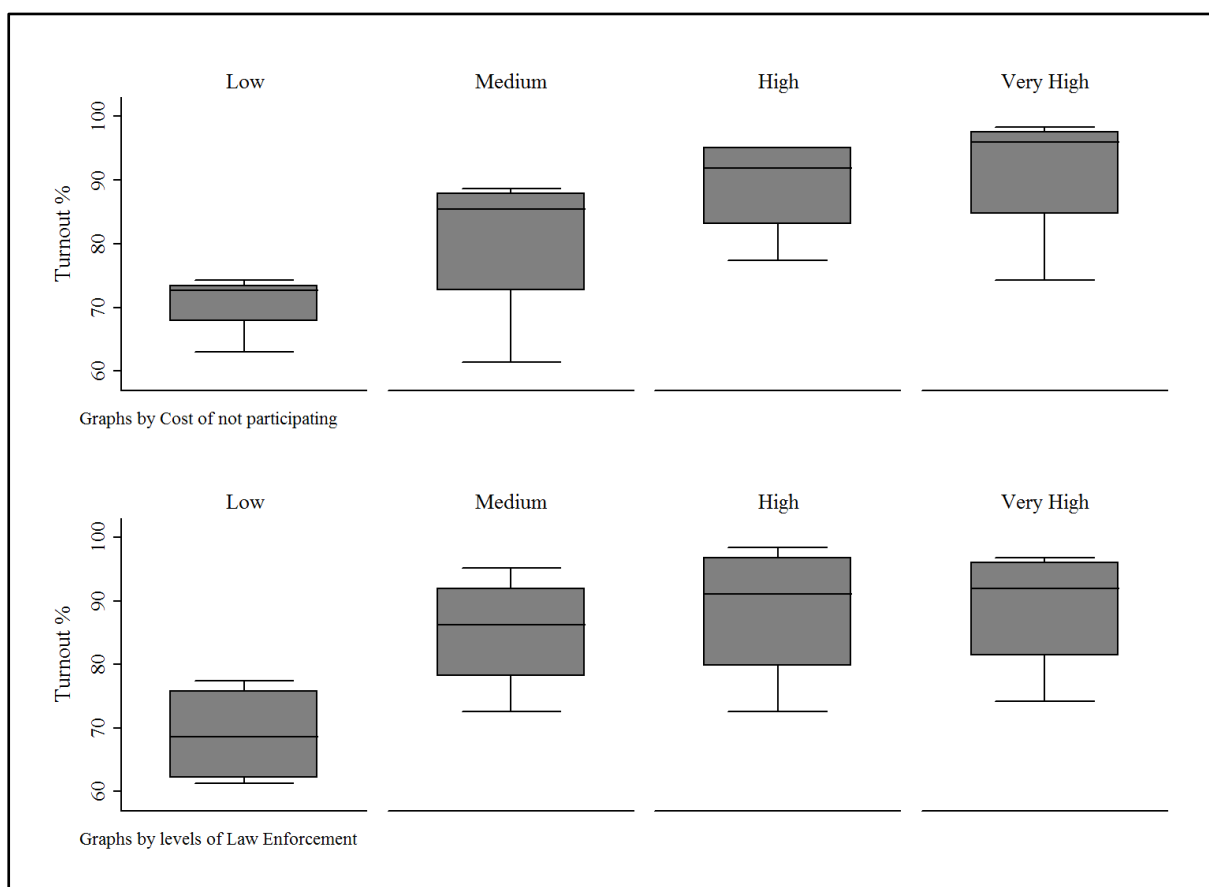
Note: For Cnv Low = 10; Medium = 30; High = 60 and Very High = 90. For p Low = 0.25; Medium = 0.5; High = 0.75 and Very High = 1.00

look even of law enforcement. The boxplots indicate that both factors have an increasing impact on turnout as their levels increase. Yet the effect of increasing penalties seems to be stronger than the effect of increasing levels of law enforcement. For instance, there is almost no difference in the variable *Turnout* with respect to high levels or very high levels of law enforcement. A closer reveals that the median of the variable *Turnout* is slightly higher in the

"High" level compared to the "Very High" level of law enforcement. However, overall the boxplots fit the expectations of the model in general and the expectation of Hypothesis H4 in

Figure 13 Informed Turnout by Cnv and p
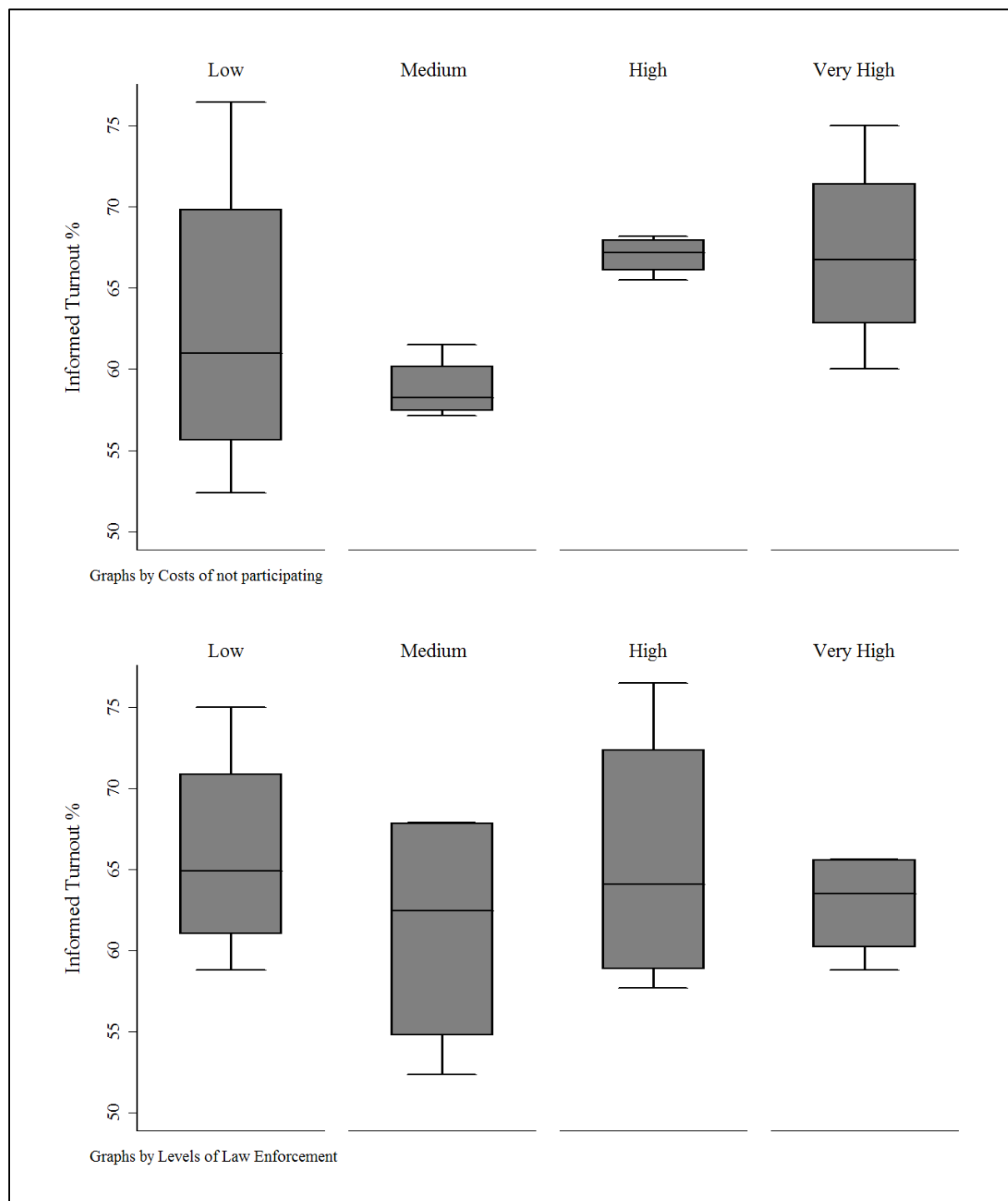
Note: For Cnv Low = 10; Medium = 30; High = 60 and Very High = 90. For p Low = 0.25; Medium = 0.5; High = 0.75 and Very High = 1.00.

particular. Recall that the main assumption was that turnout should be increasing as the two factors of compulsory voting increase at the same time. This is also in line with empirical findings of Panagopoulos (2008).

With respect to information acquisition, the pattern looks slightly different, at least when it comes to the impact of levels of law enforcement. For instance, one cannot see a clear increase in informed turnout due to increasing levels of law enforcement. Instead, the pattern is mixed. In fact, the highest median for the variable *Informed Turnout* can already be seen when levels of law enforcement are low. Also, instead of increasing the levels of law enforcement, it behaves quite unpredictably. Thus, the graph reveals no strong increasing effect of law enforcement on information acquisition altogether. In contrast, increasing levels of penalties, again, seem to have a positive effect on information acquisition as well.

For further examination Table, 37 contains summary statistics for the two dependent variables with respect to the different levels of the two factors.

Table 37 Summary Statistics for Turnout and Informed Turnout by Levels of Cnv and P

| Factor	Turnout				Informed Turnout			
	Mean	**Std. Dev.**	**Obs.**	**N**	**Mean**	**Std. Dev.**	**Obs.**	**N**
Cnv								
Low	70.56	4.48	248	62	62.71	8.84	248	62
Medium	80.24	11.10	248	62	58.79	1.69	248	62
High	89.11	7.26	248	62	67.03	1.03	248	62
Very High	91.13	9.86	248	62	67.12	5.39	248	62
P								
Low	68.95	6.99	248	62	65.91	5.94	248	62
Medium	85.08	8.27	248	62	61.28	6.75	248	62
High	88.31	9.99	248	62	65.59	7.41	248	62
Very High	88.70	8.93	248	62	62.88	2.87	248	62

Note: For Cnv Low = 10; Medium = 30; High = 60 and Very High = 90. For p Low = 0.25; Medium = 0.5; High = 0.75 and Very High = 1.00. Mean Turnout in the voluntary voting condition was about 35%, whereas mean information acquisition was about 16%.

For the variable *Turnout,* the summary table suggests that subjects' participation in the election stage is on average high, even if penalties are low (70.56%). In contrast, the mean turnout was about 34% in the voluntary voting condition. Contrary to the expectation of H3, turnout is already high, even if penalties are low. Overall, however, Table 37 shows that an increase in penalties affects turnout in the expected way. That is, as penalties increase turnout increases as well. Again, that point to the fact that this study's findings match the general notion regarding compulsory voting.

Regarding *Informed Turnout,* the impact of penalties in general and increasing levels of penalties, in particular, does not seem to be as strong as on *Turnout*. In other words, the table suggests that the general introduction of penalties increases information acquisition but the level of initially uninformed subjects acquiring additional information does not change

substantially due to increasing levels of penalties. Nonetheless, introducing penalties for not participating generally increases levels of information acquisition notably. Recall that, the mean level of information acquisition among initially uninformed voters is about 16.66% in the voluntary voting mode.

With respect to levels of law enforcement, the pattern is the same. Likewise, low levels of penalties and low levels of law enforcement also increase turnout (68.95%) substantially compared to the voluntary voting runs (34.68%). Regarding Informed Turnout, summary findings suggest that, in general, introducing some law enforcement increases information acquisition. However, increasing the factor levels themselves does further increase information acquisition. Overall, Table 37 suggests that introducing higher levels of law enforcement leads, on average, to higher levels of turnout in the experiment. Numbers regarding general turnout are in line with the model expectations and also matches the findings of previous studies, for example, Panagopoulos (2008). With respect to *Informed Turnout*, the table indicates that, in general, compulsory voting rules also increase information acquisition. This is in line with the findings presented by Shineman (2010), yet increasing levels of Cnv or p do not increase information acquisition. Yet, Table 37 does not contain information about a possible interaction effect of the two factors. Recall that the calculus of compulsory voting, as well as this chapters' model, predict compulsory voting to be most effective in increasing turnout an information acquisition if both factors are high[69].

In order to capture possible interaction effects, interaction terms of Cnv and p are included in the following within-subject ANOVA outputs. Note that because the same subjects were measured at different times within the three distinct treatment groups, the treatment groups are not unrelated. Therefore this study did not conduct ordinary two-way ANOVA analysis but instead relies on within-subject ANOVA or Analysis of variance with repeated measures (Gueorguieva and Krystal, 2004, Rouanet and Lépine, 1970). Table 38 shows the results of the repeated ANOVA conducted in Stata with a sample of 62 participants to examine the effect of costs of not participating (Cnv) and levels of law enforcement (p) on *Turnout* and *Informed Turnout* respectively.

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[69] This study will test for that in the proceeding analysis.

Table 38 Within-subjects ANOVA for the variables Turnout and Informed Turnout

Source	Turnout SS	df	MS	F	p	Informed Turnout SS	df	MS	F	p
Model	393145.129	77	5105.78089	811.33	0.0000	285292.763	77	3705.10081	111.65	0.0000
Cnv	307180.752	4	76795.188	12203.04	0.000	188320.168	4	47080.042	1418.78	0.0000
p	65030.2428	3	21676.7476	3444.52	0.000	3670.33797	3	1223.44599	36.87	0.0000
Cnv X p	7429.42644	9	825.491827	131.17	0.000	23773.4732	9	2641.49702	79.60	0.0000
Total	399677.384	1038	6.29311744			34444.4497	1038	33.1834776		

Note: Two two-way ANOVA were run with a sample of 62 subjects. Results were obtained with repeated ANOVA-analysis in Stata. The R-squared for the Turnout model is 0.98 and for the Info Turnout model 0.89. In both cases, numbers of observation were 1116. Cnv X P refers to the interaction between the two factors.

The ANOVA output indicates that there are statistically significant differences in the dependent variables between voting rules in main and simple effects at a $p = 0.0000$ levels. In order to test for the main effects of the two factors on the two dependent measures, pairwise comparisons of the means of the *Turnout* and *Informed Turnout* by the different factor levels were computed by using the contrast command in Stata. More specifically, contrasts were computed with respect to the respective base category of the two factors. In both cases, the base categories refer to the control condition of the experiment in which Cnv or p is equal to zero. Moreover, contrasts of the factors were computed by fixing the other factor at the certain level in order to test for the main effect of the factors individually. In other words, when testing for the main effects of Cnv, p is fixed at a level of 1, whereas Cnv is fixed to a level of 10 when the main effects of p are computed. The reason for that is that, empirically, there are no cases in which there are effective levels of law enforcement but no penalties whatsoever. The reason for considering $p = 1$ while testing the main effect of Cnv is directly deducted from the model. Table 39 reports the results of the testing for main effects with respect to *Turnout* an *Informed Turnout*.

Table 39 Test for Main effects on Turnout and Informed Turnout

Dependent Variable	Factor	Contrasts	Std. Err.	t	P > t
Turnout					
	Cnv				
	Low vs. Control	41.12903	0.3576205	115.01	0.0000
	Medium vs. Control	51.77419	0.3576205	144.77	0.0000
	High vs. Control	60.16129	0.3576205	168.23	0.0000
	Very High vs. Control	62.09677	0.3901959	159.14	0.0000
	P at Cnv = 10				
	Low vs. Control	-11.29033	0.4505594	-25.06	0.0000
	Medium vs. Control	-1.6129	0.4505594	-3.58	0.0000
	High vs. Control	-1.6129	0.4505594	-3.58	0.0000
	Very High vs. Control	0	/	/	/
Informed Turnout					
	Cnv				
	Low vs. Control	44.0682	0.8212027	53.66	0.0000
	Medium vs. Control	41.48403	0.8212027	50.52	0.0000
	High vs. Control	48.86189	0.8212027	59.50	0.0000
	Very High vs. Control	48.95833	0.8960056	54.64	0.0000
	P at Cnv = 10				
	Low vs. Control	4.334358	1.034618	4.19	0.0000
	Medium vs. Control	-6.442577	1.034618	-6.23	0.0000
	High vs. Control	17.64706	1.034618	17.06	0.0000
	Very High vs. Control	0	/	/	/

Note: For Cnv Low = 10; Medium = 30; High = 60 and Very High = 90. For p Low = 0.25; Medium = 0.5; High = 0.75 and Very High = 1.00.

The table suggests that there are statistically significant differences in the means of the variables *Turnout* and *Informed Turnout* considering the different values of Cnv or p compared to the respective base category. That is the voluntary voting condition. Thus, it can be argued that introducing increasing levels of costs of not participating or law enforcement seem to have an increasing effect on the mean turnout and mean levels of information acquisition in the experiment. The contrast values for the main effects of Cnv indicate that the introduction of increasing penalty levels has a positive effect on turnout and information acquisition. On the contrary, results regarding p appear to be mixed and inconclusive at this point. For further investigation, this study considers predictive marginal effects in order to see how turnout and information acquisition are affected by the different levels of the two explaining factors.

Again, marginal effects are computed for the two factors likewise the computation of the contrasts above. That is, predictive margins for the different levels of Cnv are computed by fixing p at the level of 1, whereas the predictive margins for p are computed by fixing Cnv at the level of 10. Table 40 contains the predictive marginal effects of the two factors on Turnout and Informed Turnout respectively.

Table 40 Marginal Turnout at different levels of Cnv ad p

Factor	Margin	Std. Err.	z	P>|z|
Turnout				
Cnv				
Control	29.6595	0.3330168	89.06	0.000
Low	70.96774	0.1622199	437.48	0.000
Medium	81.1828	0.1622199	500.45	0.000
High	89.78494	0.1622199	553.48	0.000
Very High	91.75627	0.1622199	565.63	0.000
P at Cnv = 10				
Control	74.19355	0.3185936	232.88	0.000
Low	62.90322	0.3185936	197.44	0.000
Medium	72.58065	0.3185936	227.82	0.000
High	72.58065	0.3185936	227.82	0.000
Very High	74.19355	0.3185936	232.88	0.000
Informed Turnout				
Cnv				
Control	17.99603	0.7647055	23.53	0.000
Low	62.27661	0.3725051	167.18	0.000
Medium	59.10364	0.3725051	158.67	0.000
High	66.85917	0.3725051	179.49	0.000
Very High	66.95437	0.3725051	179.74	0.000
p at Cnv = 10				
Control	58.82353	0.7315855	80.41	0.000
Low	63.15789	0.7315855	86.33	0.000
Medium	52.38095	0.7315855	71.60	0.000
High	76.47059	0.7315855	104.53	0.000
Very High	58.82353	0.7315855	80.41	0.000

Note: For Cnv Low = 10; Medium = 30; High = 60 and Very High = 90. For p Low = 0.25; Medium = 0.5; High = 0.75 and Very High = 1.00. Recall, Overall mean Turnout in the voluntary voting condition was about 35%, whereas overall mean information acquisition was about 16%.

The predictive margins for costs of not participating also point to the notion that numbers of turnout are positively affected by increasing penalty levels. This also accounts for levels of information acquisition. Again, results for levels of law enforcement are not that straightforward. For instance, levels of Turnout are high at all levels of p. With respect to information acquisition, the numbers point to an increase in Informed Turnout due to increasing levels of p. However, information acquisition surprisingly collapses at p = 100. Figures 14 and 15 report marginal effect plots obtained after computing predictive margins.

Figure 14 Marginal Turnout at different levels of Cnv
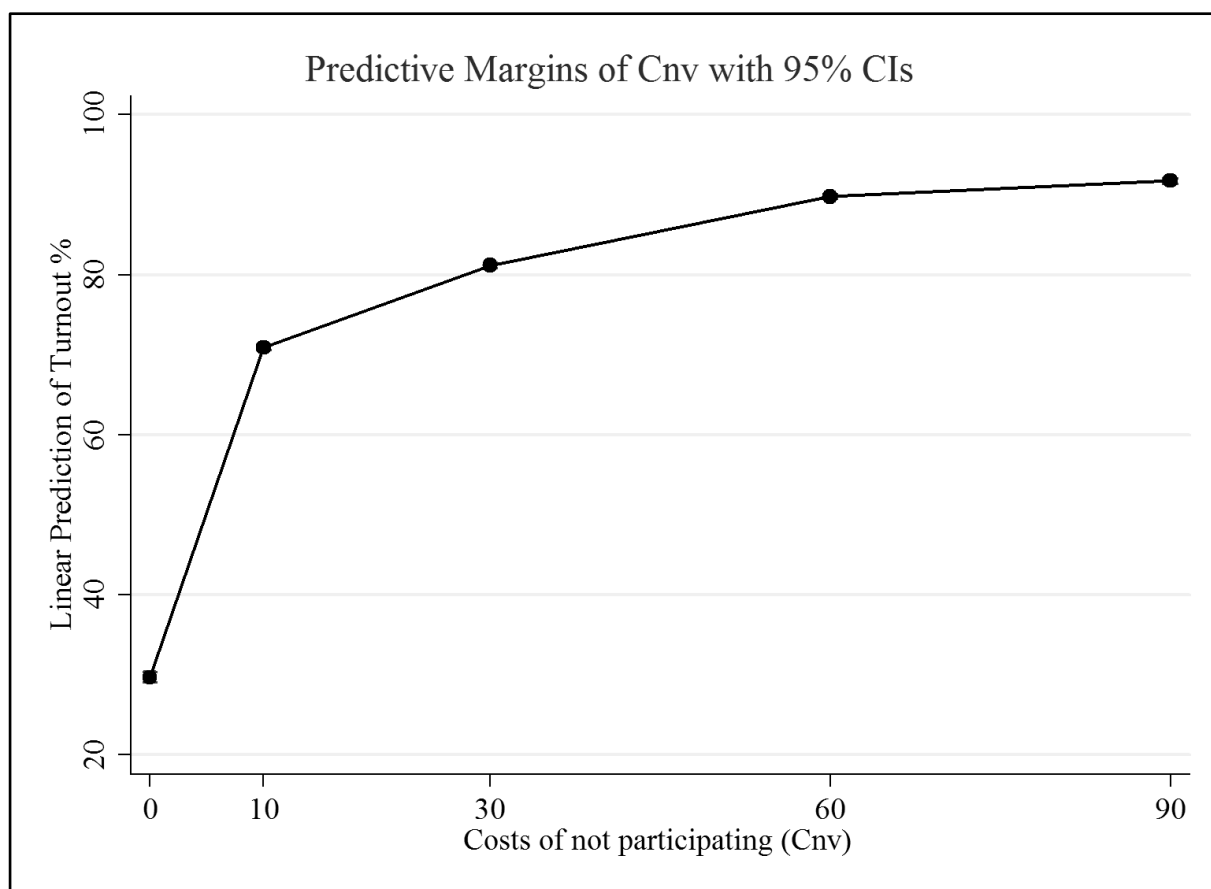
Note: The graph was obtained with the marginsplot command. It shows predictive margins for the variable *Turnout* at different levels of penalties.

Figure 14 indicates that, in fact, marginal turnout increases as costs of not participating rise at the same time. This is in line with Hypotheses H2 and H4. Recall, that H2 states that turnout is expected to be generally higher in the compulsory voting modes compared to the average turnout in the voluntary voting condition (34%). Remember also, that H4, on the one hand, claims that numbers of turnout increase as penalties go up at the same time. But on the other hand, it also states that Turnout should be highest when Cnv is at its maximum. Results, however, show that this is the case. Therefore, H4 can be accepted.

Furthermore, the graph suggests that even low penalties increase marginal turnout substantially. This contradicts the expectations stated in Hypothesis H3 which claims that turnout rates in the compulsory voting conditions with low penalty levels should not be inherently different from turnout rates in the voluntary voting condition. The graph, however, indicates that turnout jumps from about 34% in the voluntary voting condition to over 60% in the compulsory voting condition employing only low levels of penalties (10 tokens). So turnout is much higher than in the voluntary voting runs but not close to being universal. Nonetheless, drawing on the predictive marginal effects, H2 and H4 are accepted, whereas H3 is rejected.

Regarding levels of law enforcement, Figure 15 reveals a similar pattern. Turnout increases substantially as levels of law enforcement are introduced and continues to rise as levels of law enforcement go up as well. Moreover, levels of turnout are highest when p is in-

Figure 15 Marginal Turnout at different levels of p at Cnv = 10
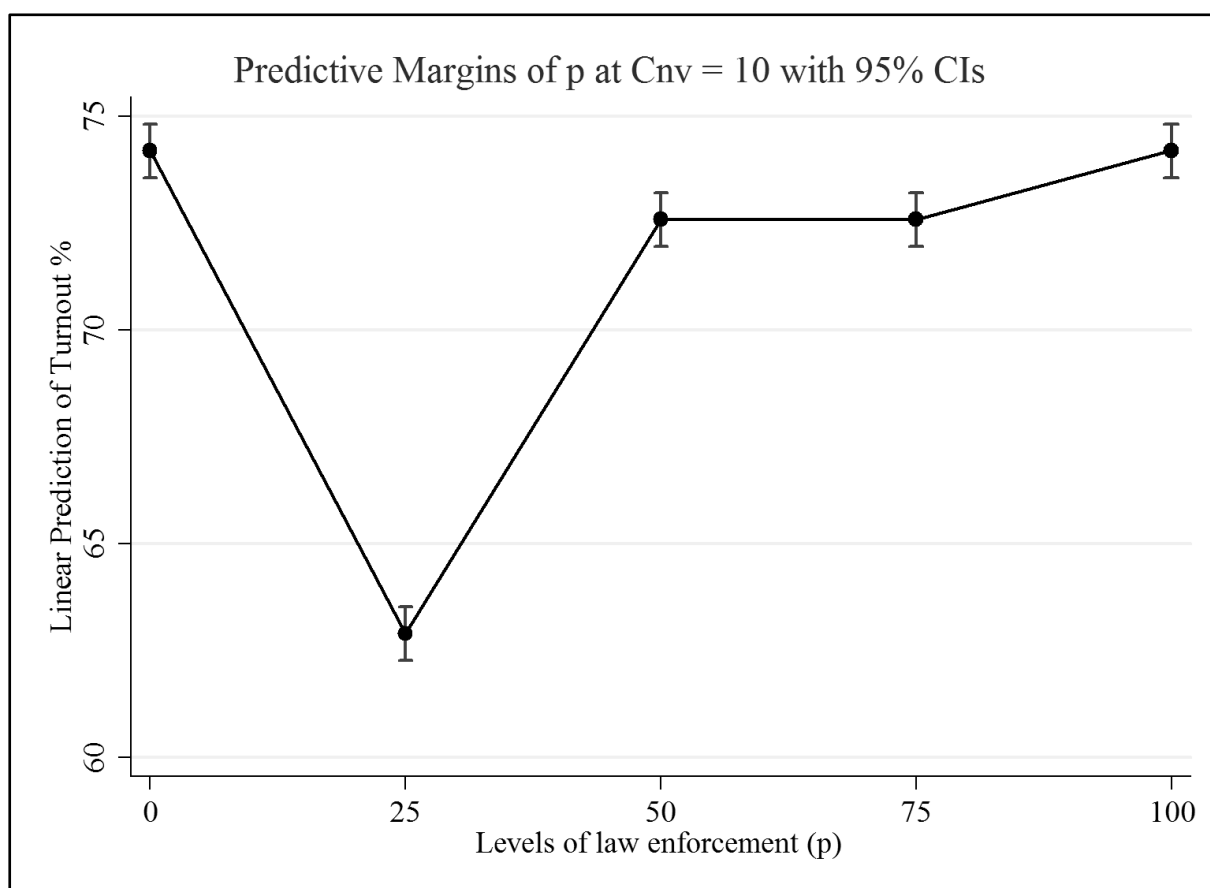

Note: The graph was obtained with the marginsplot command. It shows predictive margins for the variable *Turnout* at different levels of law enforcement low levels of penalties.

creased to its maximum. This pattern matches the expectation of the hypothesis. H5, which claims that increasing levels of law enforcement, in fact, should lead to higher turnout numbers. But contrary to penalties, where maximum turnout is over 90% at maximum penalties,

maximum marginal Turnout is below 90% when levels of law enforcement are very high. That indicates that penalties have a stronger effect on turnout than levels of law enforcement.

Akin to the effect of the penalties factor, the graph reveals that turnout is already positively affected by low levels of law enforcement. Even though the increase is not as strong as in the penalty plot, this still contradicts the prediction of the model and is therefore not in line with H6, which states that turnout should be low, when levels of law enforcement are low at the same time. Note, that this could be explained by the fact that the experiment did not consider situations in which $p > 0$ and $Cnv = 0$, and therefore turnout could be driven by levels of Cnv instead. The reason for excluding such cases is that this situation is simply unrealistic. It would mean that individuals know that there is a chance of getting punished but there is no punishment[70]. Thus, it is necessary to test for possible interactions between the two factors. Nonetheless, the marginal effects suggest that this study's findings are in line with the theoretical assumptions regarding the individual effects of the two factors presented by Panagopoulos (2008) and with respect to the sole effect of Cnv as reported by Shineman (2010).

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[70] Note, that this study did consider the reverse situation, in which $Cnv > 0$ and $p = 0$, because it could be the case that a state poses a threat to its citizens to obey the mandatory voting law biut is just not capable of enforcing the rule.

Figure 16 Marginal Information Acquisition at different levels of Cnv
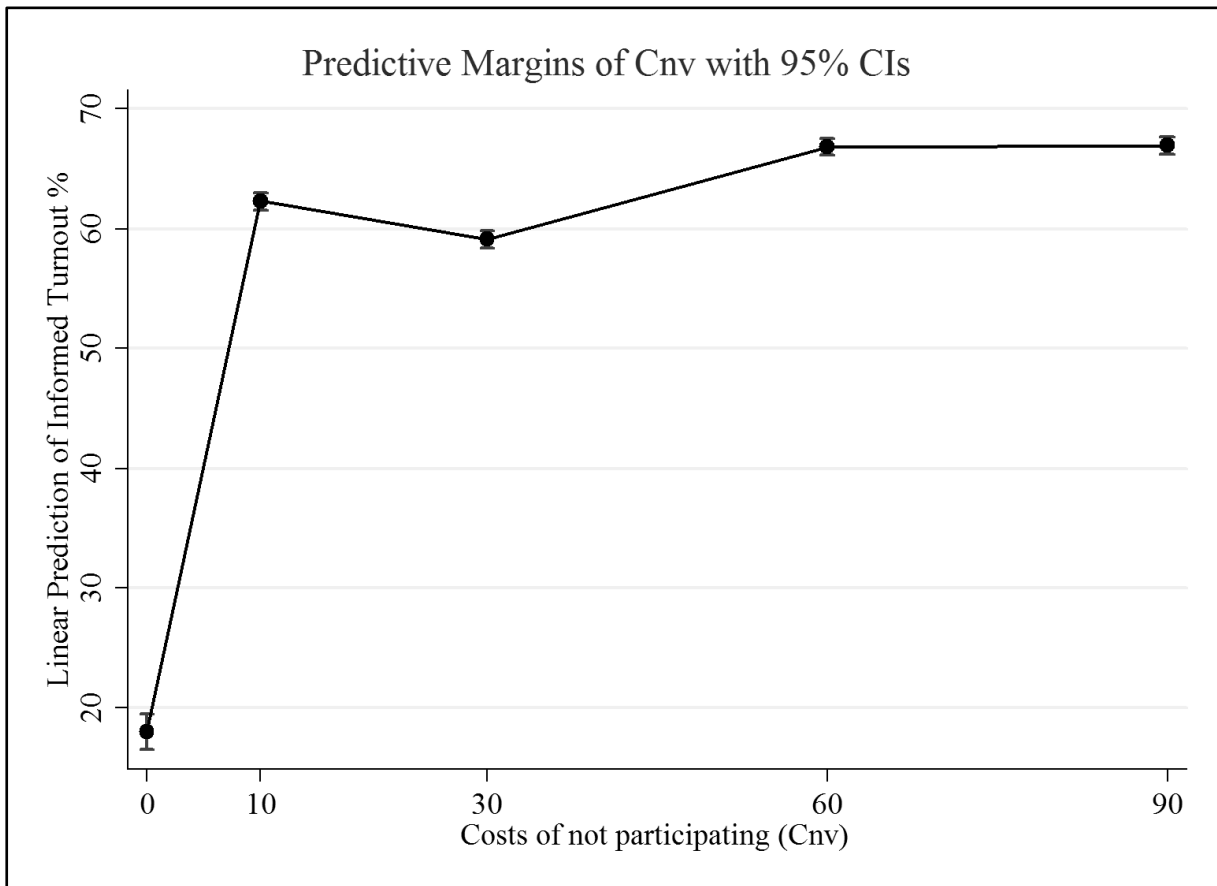
Note: The graph was obtained with the marginsplot command. It shows predictive margins for the variable *Informed Turnout* at different penalty levels.

With respect to *Informed Turnout* and testing for main effects, Table 39 also points out that there are statistically significant differences in mean information acquisition due to different voting rules in general and different levels of Cnv and p in particular. Figures 16 and 17 contain the predictive margins for *Informed Turnout* due to different levels of Cnv and p. Recall, that the model assumed that levels of information acquisition should be higher when costs of not participating and levels of law enforcement increase. The graph suggests that there is a substantial difference in marginal information acquisition due to the introduction of compulsory voting. For instance, predicted information gathering by initially uninformed subjects rapidly increases from about 16% in the voluntary voting condition to over 60% in the compulsory voting conditions. This suggests that Hypothesis H2a can be accepted. That is, in general, levels of information acquisition are higher in the compulsory voting modes. Besides that, the graph reveals that marginal information acquisition among initially uninformed subjects is not as strongly affected by increasing penalties as general turnout. After a huge increase due to the general introduction of compulsory voting, the level of information acquisition remains at a high level but not really continues to increase. Therefore, Hypothesis H4a

125

can only be partly confirmed. Remember that H4a expected that increasing penalties would lead to higher levels of information acquisition among initially uninformed subjects. Furthermore, it states that information acquisition should be highest when penalties are increased to their maximum. Predictive margins for Informed Turnout due to costs of not participating show that this is the case, but the increase in different levels of p is not as strong as expected by the model.

Figure 17 presents the predictive margins for Informed Turnout at different levels of law enforcement. The graph shows that the impact of the different levels of law enforcement

Figure 17 Marginal Information Acquisition at different levels of p
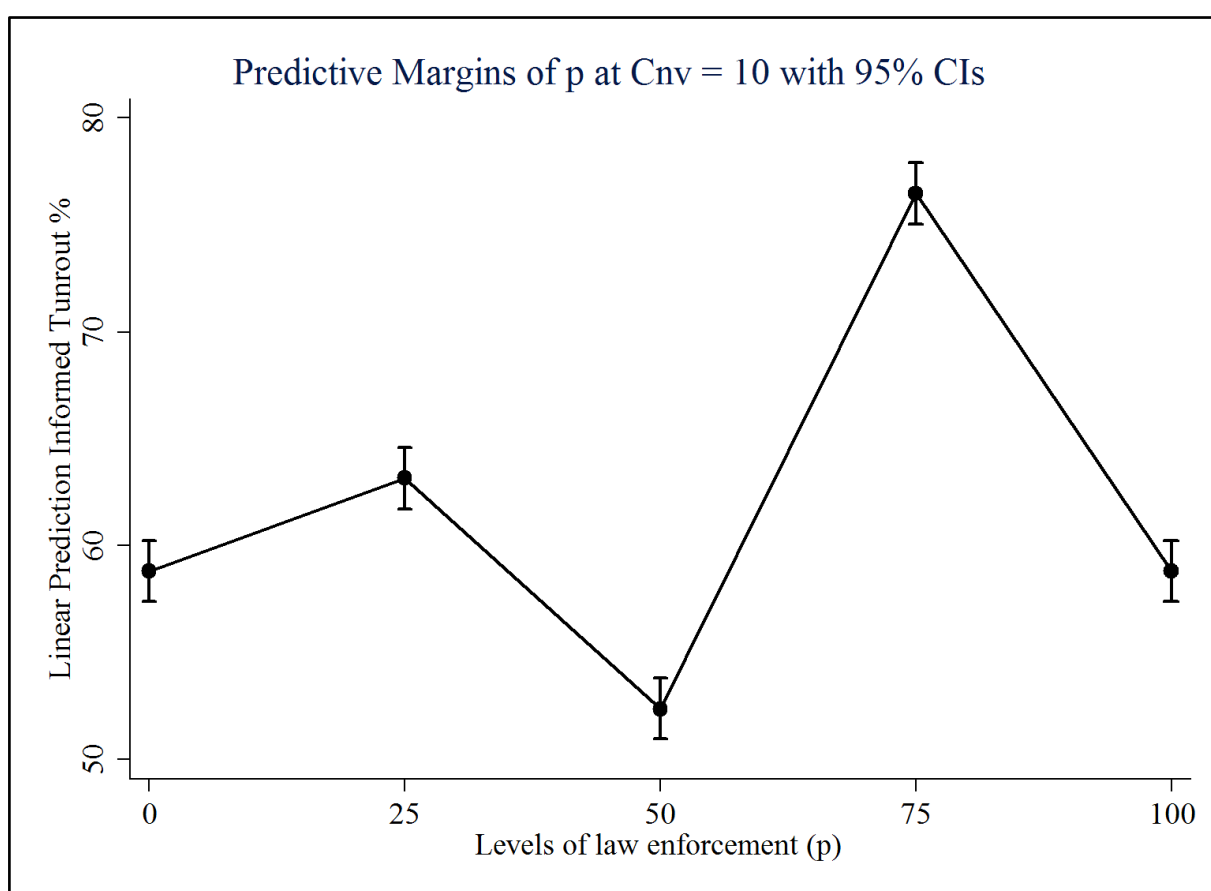

Note: The graph was obtained with the marginsplot command. It shows predictive margins for the variable *Informed Turnout* at different levels of law enforcement low levels of penalties.

on the variable *Informed Turnout* is much more volatile. At p = 50 levels of information acquisition are even lower than in the voluntary voting condition. On the other hand, information acquisition is high at low levels of law enforcement (p = 25%). Thus, H6a must be rejected, since it expects information acquisition to be low if levels of law enforcement are low at the same time. Even though information acquisition is strongly increased in between p = 50 and p = 75, hypothesis H5a cannot be confirmed, since levels of information acquisition

collapse at p = 100. That is not in line with H5a, which expects information to be highest when p is also at its maximum.

According to the calculus of compulsory voting, however, compulsory voting is supposed to be most effective in activating voters, if both factors are mutually high. Thus, this study will focus on the examination of the interaction effect of costs of not participating and levels of law enforcement. Table 41 presents the predictive margins for the variable Turnout at different combinations of Cnv and p.

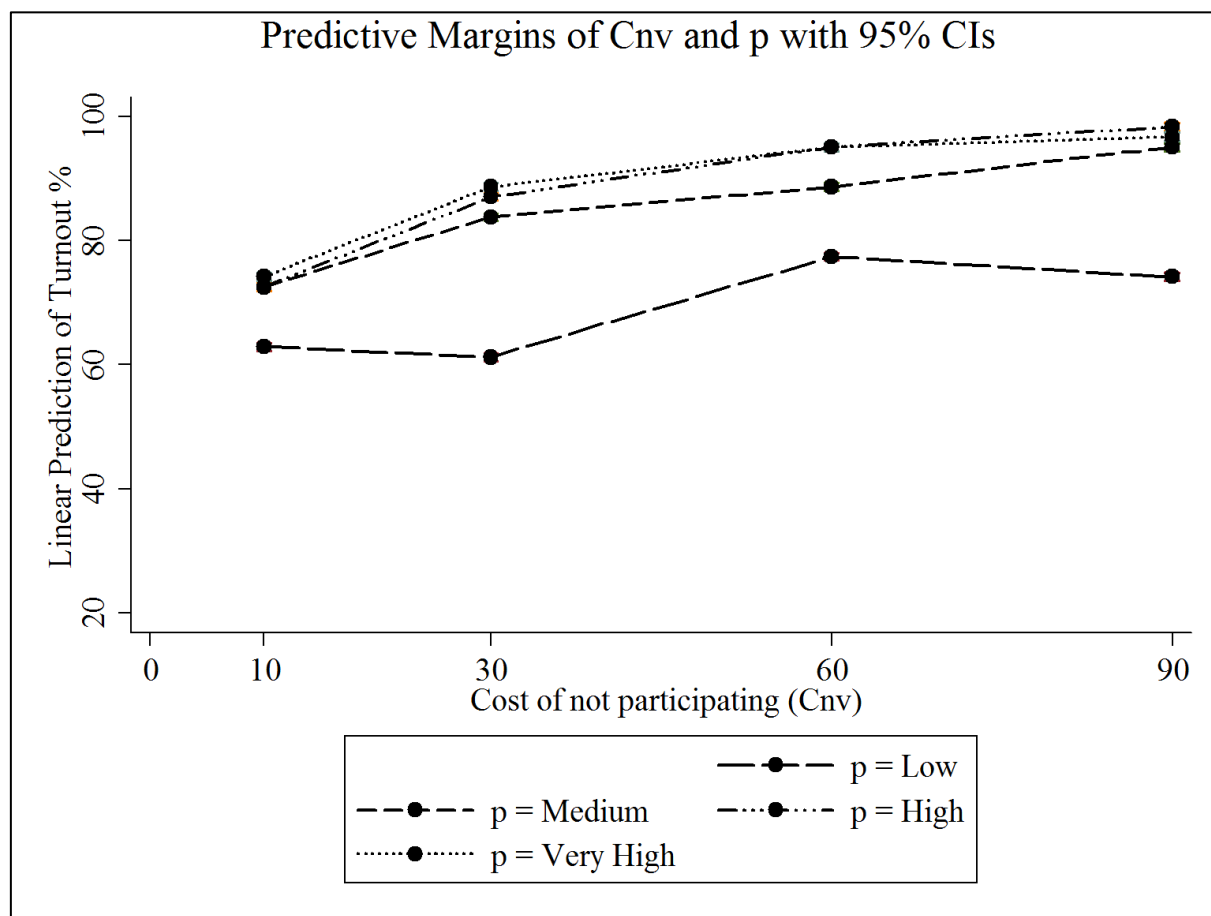**Table 41 Predictive Margins of Turnout at different combinations of Cnv and p**

Factor		Margin	Std. Err.	z	P > z
Turnout					
Cnv	**p**				
Low	Low	62.90322	0.3185936	197.44	0.000
Low	Medium	72.58065	0.3185936	227.82	0.000
Low	High	72.58065	0.3185936	227.82	0.000
Low	Very High	74.19355	0.3185936	232.88	0.000
Medium	Low	61.29033	0.3185936	192.38	0.000
Medium	Medium	83.87096	0.3185936	263.25	0.000
Medium	High	87.09677	0.3185936	273.38	0.000
Medium	Very High	88.70968	0.3185936	278.44	0.000
High	Low	77.41935	0.3185936	243.00	0.000
High	Medium	88.70968	0.3185936	278.44	0.000
High	High	95.16129	0.3185936	298.69	0.000
High	Very High	95.16129	0.3185936	298.69	0.000
Very High	Low	74.19355	0.3185936	232.88	0.000
Very High	Medium	95.16129	0.3185936	298.69	0.000
Very High	High	98.3871	0.3185936	308.82	0.000
Very High	Very High	96.77419	0.3185936	303.75	0.000
Informed Turnout					
Cnv	**p**				
Low	Low	63.15789	0.7315855	86.33	0.0000
Low	Medium	52.38095	0.7315855	71.60	0.0000
Low	High	76.47059	0.7315855	104.53	0.0000
Low	Very High	58.82353	0.7315855	80.41	0.0000
Medium	Low	58.82353	0.7315855	80.41	0.0000
Medium	Medium	57.14286	0.7315855	78.11	0.0000
Medium	High	57.69231	0.7315855	78.86	0.0000
Medium	Very High	61.53846	0.7315855	84.12	0.0000
High	Low	66.66667	0.7315855	91.13	0.0000
High	Medium	67.74194	0.7315855	92.60	0.0000
High	High	68.18182	0.7315855	93.20	0.0000
High	Very High	65.51724	0.7315855	89.56	0.0000
Very High	Low	75.00000	0.7315855	102.52	0.0000
Very High	Medium	67.85714	0.7315855	92.75	0.0000
Very High	High	60.00000	0.7315855	82.01	0.0000
Very High	Very High	65.62500	0.7315855	89.70	0.0000

Note: For Cnv Low = 10; Medium = 30; High = 60 and Very High = 90. For p Low = 0.25; Medium = 0.5; High = 0.75 and Very High = 1.00. Mean Turnout in the voluntary voting condition was about 35%, whereas mean information acquisition was about 16%.

With respect to *Turnout* the table shows that, on average, participation rates are relatively high at all combinations of Cnv and p. However, there is a huge difference between marginal turnout in the case in which Cnv and p are low and the case in which both factors are high. This is in line with the expectations stated in this chapter. In fact, H7 states that there are still

relevant levels of abstention when Cnv and p are zero. The table also presents findings relevant for H8, which claims that turnout is expected to go up as Cnv and p increase simultaneously. Figure 18 shows the predictive margin plot for the variable *Turnout* at the interaction of Cnv and p.

Figure 18 Predictive Margins for Turnout for the interaction of Cnv and p

Note: The graph was obtained with the marginsplot command. It shows predictive margins for the variables *Turnout* and *InformedTurnout* at different levels of law enforcement low levels of penalties. For Cnv Low = 10; Medium = 30; High = 60 and Very High = 90. For p Low = 0.25; Medium = 0.5; High = 0.75 and Very High = 1.00.

The marginal plot suggests that in fact, participation is highest when both factors are high and lowest if both factors are low. Thus, findings are in line with the expectations of the hypotheses H7 and H9. Moreover, it also suggests that, in accordance with H10, turnout is increasing at a slower pace if only one factor is increasing but the other remains low. Thus, even though penalties for non-participation are introduced as law enforcement is somewhat effective, abstention levels are not zero. For example, if p is low and Cnv is medium,

participation rates are about 60%. So, turnout is higher than the mean turnout in the voluntary

Figure 19 Marginal Information Acquisition at the Interaction of Cnv and p
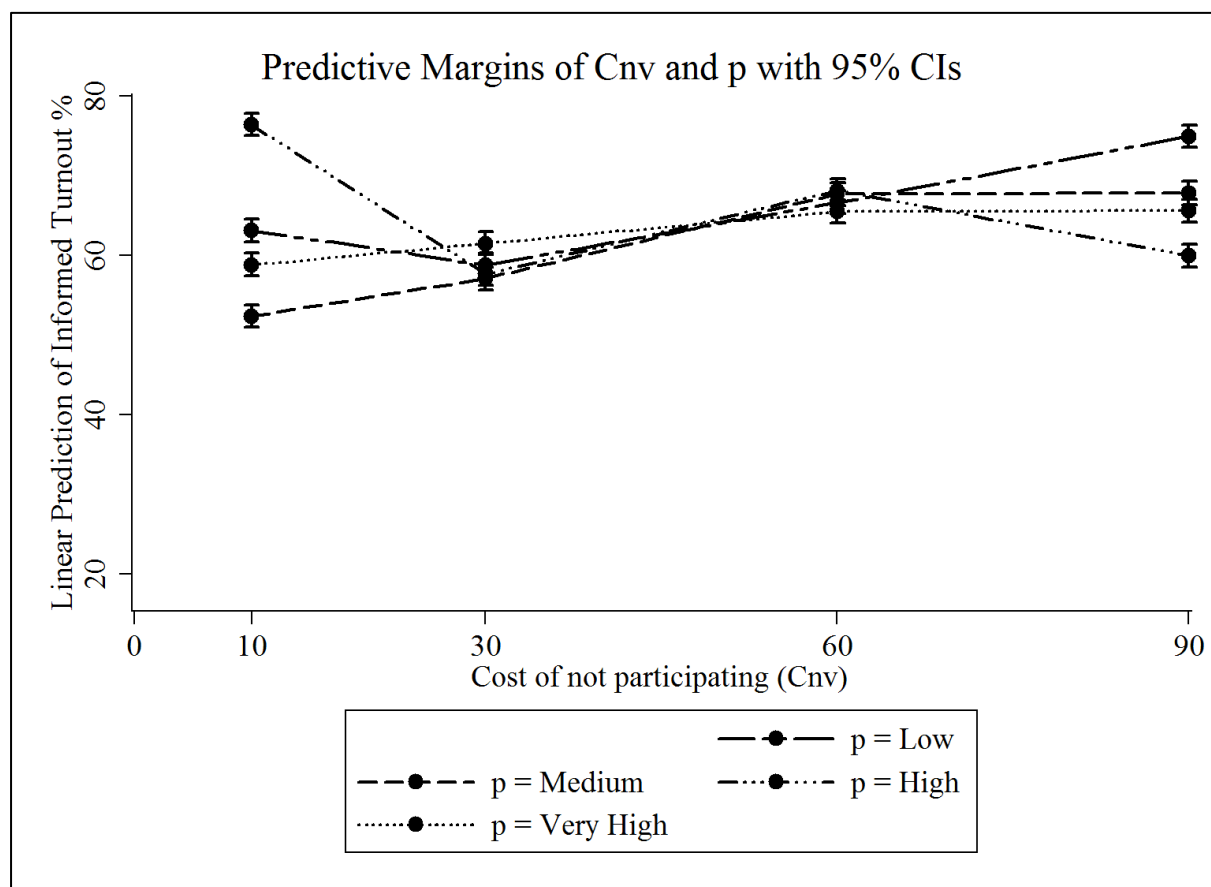
Note: p Low = 25, p Medium = 50, p High = 75 and p Very High = 100.

voting condition (about 34%) but it is still much lower compared to cases in which both pa-rameters are mutually increased. Thus, H10 can be accepted. Recall, that H5 claimed that turnout is increased compared to the voluntary voting condition but not as strongly as, for example, in cases in which both factors are very high. Figure (…) shows the marginal effects plot for the variable *Informed Turnout* at different interactions of costs of not participating and levels of law enforcement. In general, the model predicted low levels of information ac-quisition if both penalties and law enforcement are low at the same time. The margins output above and the graph in Figure 19 suggest that this is only partly true. On the one hand, infor-mation acquisition among initially uninformed subjects is, in fact, lower, when Cnv and p are simultaneously low than in all other compulsory voting conditions. But on the other hand, the level (almost 63%) is much higher than the level of information acquisition in the voluntary voting mode (only 16%). Thus, hypothesis H7a is not completely rejected but strongly chal-lenged. This also accounts for the claim of hypothesis H8a. Remember that H8a states that information acquisition is considered to be increased as the two factors are mutually increased

at the same time. The output and the graph, however, indicate no clear relationship in that direction. Instead, levels of information acquisition are rather volatile. For instance, the highest level of information acquisition is not a result of an interaction between very high levels of Cnv and very high levels of p but low levels of Cnv and very high levels of p. Thus, this study finds no clear evidence for H9a, which expects information acquisition to be at its maximum if both factors are at very high levels. It also follows that H10a can also not be confirmed since it expected a lower increase in information acquisition due to different realizations of the two parameters. But as shown above, information acquisition is highest when the difference between Cnv and p at maximum.

4.4 Discussion

In this chapter, this study examined the way compulsory voting rules affect turnout and information acquisition. By drawing on the calculus of compulsory voting approach (Panagopoulos, 2008) and previous experimental studies (Shineman, 2010), first and foremost tested the impact of costs of not participating and levels of law enforcement. In order to answer this question, the study provided a decision theoretical model of voting building on the model provided by Shineman (2010). In a second step, this model was expanded by the specific consideration of varying levels of law enforcement. To test the model's expectations, a series of controlled laboratory experiments were conducted.

Thereby it, first of all, replicated main findings of the established literature, that compulsory voting, indeed, substantially increases turnout in the expected way. That is, as penalties increase from trivial to non-trivial numbers of turnout rise rapidly. Second, this chapter also examined the impact of variations in levels of law enforcement. Findings show that the impact of law enforcement alone is not as strong as the effect of the severity of penalties. Nonetheless, as expected by the theory, compulsory voting is most effective, in terms of mobilization, when both factors are high. Furthermore, this study finds no evidence for the claim that compulsory voting could lead to an increase in uninformed voting (Jakee and Sun, 2006). Instead, in the experiment, informed voting also increased as penalties and levels of law enforcement went up.

This chapter's findings strengthen the theoretical assumptions of the calculus of compulsory voting approach, which, so far, only has been specifically tested with observational data generated from cross-country comparison. The experimental results obtained in this chapter indicate that costs of not participating and levels of law enforcement are, in fact, the

main factors explaining the mobilizing effect of compulsory voting laws. However, the experimental results lack external validity in two ways. First, it is generally problematic to transfer findings gained from a controlled laboratory experiment and make resilient predictions for the real world. Second, the experiment was based on a decision theoretical model which does not accurately reflect the strategic nature of elections. However, it was not the aim of this chapter to provide a real-world explanation of voting behavior affected by compulsory voting laws, but instead to provide a test of the main predictions of theory about how compulsory voting affects individual voting behavior. Therefore, this chapter's results reinforce the general notion of compulsory voting and, furthermore, adds an in-depth examination of the impact of levels of law enforcement to the existing literature. By that, it can serve as an expansion of the baseline model provided by Shineman (2010). The next chapter will tackle the limitations of the decision-theoretic approach by transferring the main assumptions of the calculus of compulsory voting approach into a game theoretic model.

5. Reassessing the Calculus of Compulsory voting in a game theoretical model

In the previous chapter, this study was able to replicate the main findings regarding general turnout and informed turnout in a decision-theoretic model. However, this model neglects the strategic nature of elections. Thus, building on the general assumptions of the calculus of compulsory voting approach, this chapter comes up with a game-theoretic model of voting in general and considers compulsory voting in particular.

Thereby this chapter expands the basic idea of examining compulsory voting in a formal way but utilizing it in a strategic environment. In the previous section, the model considers a decision-theoretic environment in which individual actors can directly influence the outcome. Meaning it isolates the main factors driving individual turnout and information acquisition identified by the calculus of compulsory voting approach and can, therefore, be seen as a valuable baseline. However, it does not reflect the strategic nature of elections or voting decisions. Thus, the basic situation will be transferred into a strategic environment in which the individual outcome will not only depend on one's own decision but on the decision of others

as well. In doing so it can be examined whether the general findings will also hold in a situation that reflects the reality of elections more accurately.

To answer this question, the chapter proceeds as follows: First, it presents the game-theoretic model which systematically assesses the effect of costs of not participating and levels of law enforcement in a situation in which two voters can decide between two candidates and voting is compulsory. Second, the chapter deducts testable hypotheses from the model. Third, the chapter presents the experimental procedure testing the predictions of the model. Fourth, this chapter presents the empirical analysis of the data generated by the experiments. The chapter closes with a brief discussion of the empirical results.

5.1 Analytical Framework

This study argues that voting, in general, can be compared to the provision of a public good. Therefore, the strategic situation that will be considered in the model will correspond to the well-known free rider problem. Generally speaking, the free rider problem reflects the notion that, in a group which should provide itself some sort of public good, group members have a strong incentive not to contribute to the public good but enjoy the benefit of the collectively provided good anyway (Kim and Walker, 1984, Olson, 1965). A public good is defined as collective good from which no one can be excluded (Olson, 1965). Drawing on this definition of the free rider problem, one can also consider elections as the process of providing a public good. In an election, a group of voters has to pay some sort of voting costs in order to elect a candidate or new government. No citizen can be excluded from benefiting[71] from the elected government or candidate. Even if he or she did not vote for the candidate or party, or did not participate in elections altogether. Also, individuals benefit from a democratically elected and stable government even though it is probably not their most preferred one. Thus, elections can be seen as the collective provision of a public good in which self-interested rational actors have a strong incentive to be the free rider and abstain from voting.

Previous game theoretic models of voting have shown that, given certain parameters, large-scale abstention also occurs in two-person voting games (see for example Palfrey and Rosenthal, 1983). In general, the calculus of compulsory voting assumes that the legal re-

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[71] Of course voters how did not vote for the newly elected candidate or government might even feel like suffering from decision of the new government but in general he or she benefits from the maintenance of the political system and the peaceful and democratic transfer of power.

quirement to participate in the elections reduces individual incentive to abstain and thereby free ride. By transferring the main assumptions of the calculus of compulsory voting approach into a game-theoretic model, this study provides a novel test of the theoretical assumptions of how costs of not participating and levels of law enforcement affect individual voting behavior in a strategic voting situation. The specific research question is: How and to what extent does compulsory voting affect individual behavior in a two-person voting game.

5.1.1 The Model

This section considers a game theoretic model of voting in which the election is modeled as a two-person game with different cost and payoff parameters. In the model, two actors vote within the same group in a two-candidate election. The group size is common knowledge. Both actors share the same preference for two candidates, A and B. At the beginning of the game, both actors are uninformed about which candidate they prefer. However, the study assumes that actors are rationally self-interested and will always prefer electing the candidate that matches their preference over voting for the candidate not matching their preference. Costs are the same for both actors. At different points in the game, actors have to make different decisions. First, they have to decide whether to get informed or remain uninformed about which candidate they prefer. Second, they can decide to participate in the election or to abstain completely. Getting informed incurs a cost $(c_i) > 0$ as well as participating in the election $(c_v) > 0$. Participating in the election is either voluntary (VV) or Compulsory (CV). Not participating is only punished in the compulsory voting mode with a penalty $(0 < c_{nv} < H)$ Third, actors can decide to vote for A, B or cast an invalid vote. Voting either valid or invalid does not incur any additional costs. The individual reward depends on the individual decision made throughout the game and the decisions of the other player. For instance, if the candidate matching the actors' preference, say A, gets the majority of the votes, both actors receive a high reward $(H > 0)$. If, however, the candidate not matching the actors' preference, say B, wins the election, actors receive a low reward $(L < H)$. In the case of a tie, both actors receive a reward $(L < T < H)$.

Considering these decisions and rewards, actors can choose different strategies that lead to different payoffs in the game. Actors can decide to get informed but abstain from participating in the election $(i, \emptyset)$, get informed and participate in the election (i, b), without casting a vote, or to get informed participate and enter the voting stage (i, v), . With respect to the strategies entailing uninformed voting, like the model presented in the previous chapter, this model assumes two distinct possible states of the world (sotw). That is, if an uninformed

actor casts a vote, he or she can only be in one of two states of the world – casting a random vote for the candidate matching the prior preference (voting better) or randomly voting for the false candidate (voting worse). For instance, an actor can decide to remain uninformed and cast a random vote (u, v), in that case, chance decides whether the actor votes for the "better" or the "worse" candidate. If an actor remains uninformed, they can also abstain completely $(u, \emptyset)$ or enter the ballot stage (u, b) but refrain from casting a valid vote. Note, since the study assumes self-interested actors, it can be assumed that informed actors will never vote for the candidate that is matching their initial preference. Without loss of generality, Table 42 shows the matrix for the case in which both actors prefer candidate A[72]. Since the outcome not only depends on one actor's decision but on the decision of both, the table shows a strategic situation.

Table 42 Possible outcomes (voluntary voting)

		Player 2					
		i, v	**i, Ø**	**i, b**	**u, v**	**u, Ø**	**u, b**
Player 1	**i, v**	A, A	A, A	A, A	A, A ⟶ T, T	A, A	A, A
	i, Ø	A, A	T, T	T, T	A, A ⟶ B, B	T, T	T, T
	i, b	A, A	T, T	T, T	A, A ⟶ B, B	T, T	T, T
	u, v	A, A ⟶ T, T	A, A ⟶ B, B	A, A ⟶ B, B	A (0.25) B (0.25) T (0.5)	A, A ⟶ B, B	A, A ⟶ B, B
	u, Ø	A, A	T, T	T, T	A, A ⟶ B, B	T, T	T, T
	u, b	A, A	T, T	T, T	A, A ⟶ B, B	T, T	T, T

Note: A, B and T refer to the outcomes that get realized in the case of the specific strategy combination. The matrix considers the case in which both actors prefer candidate A. In the case of a split cell both payoff combinations are possible depending on the individual decision.

Note that the situation in which both actors decide to vote without getting informed is a specific case among the possible strategy combinations. In that situation, three outcomes are possible. Numbers in the cell refer to the different probabilities of each outcome being realized. For all strategy in which two different outcomes are possible (e.g. u,v; i, v) outcomes are realized with the same probability (0.5). In general, outcomes can be deduced by

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[72] The game could also be solved for the case that both actors prefer candidate B. Cell entries would be different but the general logic of the game would remain the same.

determining the expected utility of the realized outcome subtracted from the associated decision costs.

Table 43 Payoff Matrix (voluntary voting)

		Player 2					
		i, v	**i, Ø**	**i, b**	**u, v**	**u, Ø**	**u, b**
Player 1	**i, v**	$H-c_i-c_v,$ $H-c_i-c_v$	$H-c_i-c_v,$ $H-c_i$	$H-c_i-c_v, H-c_i-c_v$	$\frac{1}{2}*(H-c_i-c_v)+\frac{1}{2}*(T-c_i-c_v),$ $\frac{1}{2}*(H-c_v)+\frac{1}{2}*(T-c_v)$	$H-c_i-c_v, H$	$H-c_i-c_v, H-c_v$
	i, Ø	$H-c_i, H-c_i-c_v$	$T-c_i, T-c_i$	$T-c_i, T-c_i-c_v$	$\frac{1}{2}*(H-c_i)+\frac{1}{2}*(L-c_i), \frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v)$	$T-c_i, T$	$T-c_i, T-c_v$
	i, b	$H-c_i-c_v,$ $H-c_i-c_v$	$T-c_i-c_v,$ $T-c_i$	$T-c_i-c_v, T-c_i-c_v$	$\frac{1}{2}*(H-c_i-v)+\frac{1}{2}*(L-c_i-c_v),$ $\frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v)$	$T-c_i-c_v, T$	$T-c_i-c_v, T-c_v$
	u, v	$\frac{1}{2}*(H-c_v)+\frac{1}{2}*(T-c_v),$ $\frac{1}{2}*(H-c_i-c_v)+\frac{1}{2}*(T-c_i-c_v)$	$\frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v),$ $\frac{1}{2}*(H-c_i)+\frac{1}{2}*(L-c_i)$	$\frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v),$ $\frac{1}{2}*(H-c_i-c_v)+\frac{1}{2}*(L-c_i-c_v)$	$\frac{1}{4}*(H-c_v)+\frac{1}{4}*(L-c_v)+\frac{1}{2}*(T-c_v),$ $\frac{1}{4}*(H-c_v)+\frac{1}{4}*(L-c_v)+\frac{1}{2}*(T-c_v)$	$\frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v),$ $\frac{1}{2}*(H)+\frac{1}{2}*(L)$	$\frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v),$ $\frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v)$
	u, Ø	$H, H-c_i-c_v$	$T, T-c_i$	$T, T-c_i-c_v$	$\frac{1}{2}*(H)+\frac{1}{2}*(L), \frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v)$	T, T	$T, T-c_v$
	u, b	$H-c_v, H-c_i-c_v$	$T-c_v, T-c_i$	$T-c_v, T-c_i-c_v$	$\frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v), \frac{1}{2}*(H-c_v)+\frac{1}{2}*(L-c_v)$	$T-c_v, T$	$T-c_v, T-c_v$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

Depending on the relation between the parameters, the game is in equilibrium for exactly one parameter combination in the voluntary voting mode. Recall, that this study assumes $H > T > L$ with respect to the relationship of different possible rewards. Furthermore, this study assumes voting costs to be a combination of information cost and participation costs $(c_i + c_v)$ like in the model presented in the last chapter. Note also that the model assumes combined voting costs of $c_i + c_v > T > L < H$. Thus, Table 43 shows the payoff matrix considering the possible outcomes established in Table 42 above and deducts the payoffs depending on the realized strategy combination. Given this specific parameter set, the game is in equlibrium[73] when both players decide to remain uninformed and abstain from participating in the elections in the voluntary voting mode. Thus, both players would get T as a reward. It follows that the model predicts low levels of turnout and information acquisiton for the given strategic situation. Thereby it also predicts that self-interested individuals will not contribute to the public good and instead will free ride in order to increase their individual payoff. These assumptions are in line with the genral notion of the collective action theory proposed by Olson (1965). Also it is in line, with findings in formal models regarding two candidate elections with uncertainty about prefences and cost parameters (Palfrey and Rosenthal, 1985).

According to the calculus of compulsory voting and the findings provided in the previous chapter, compulsory voting activates individuals to invest in costly information and to participate in the elections by offsetting initial voting costs, given that levels of law enforcement are not trivial. Therefore the model considered different combinations of the level of costs for not voting and levels of law enforcement. Since the calculus of voting generally indicates that trivial or very low levels in both factors do substantially change the prediction of the model regarding voluntary voting, the model presented here only considers low, moderate and high levels of penalties and law enforcement. First, the model considers the case of low penalties and combines it with varying levels of law enforcement. Table 44 presents the payoff matrix for low costs of not voting and a low level of law enforcement. Note that the matrix considers combined probabilities for the realization of a certain sotw (vote better or vote worse) and if an actor gets punished, he or she does not participate in the election. Thus, for example in the case of the strategy combination in which Player 1 plays informed abstention $(i, \emptyset)$ and Player 2 decides on applying uninformed voting (u, v) the

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[73] There are strategy combinations that would create higher payoffs for a single player, but they would not be realized because it would disadvantage the other player. The combination u,v; u,v corresponds to a situation in which no actor could increase his or her payoff without disadvantaging the other player. Thus, uninformed abstention strictly dominates all other strategies.

payoff function for player 1 is: $Eu(i, \emptyset) = \frac{1}{4} * (H - c_i - c_{nv}) + \frac{1}{4} * (L - c_i - c_{nv}) + \frac{1}{4} * (H - c_i) + \frac{1}{4} * (L - c_i)$. Normally the probabilty of the realization of a certain state of the world is (0.5). This is still true but, now, the model considers two more possible states – an uninformed voter would vote better and gets punished for not participating or voting worse and getting punished. The other two states are the same as in voluntary voting mode. Thus, probabilites get combined. Thus, the two general states are still equally alike, but now, it is also equally likey to get punished for not participating in the election. With respect to the above noted equation that means that the two parts at the beginning of the equation refer to the possibility of punishment for not participation and the second two parts refer to the situation in which non-particpation would not be punished due to low levels of law enforcement. Eliminating dominated strategies suggests that there are multiple Nash-equlibria in mixed strategies. Table 45 presents the reduced game due to the elimination of dominant stratgies.

Table 44 Payoff matrix compulsory voting mode (low level of law enforcement)

		Player 2					
		i, v	**i, Ø**	**i, b**	**u, v**	**u, Ø**	**u, b**
Player 1	**i, v**	$H - c_i - c_v, H - c_i - c_v$	$H - c_i - c_v, \frac{1}{2}*(H-c_i-c_{nv}) + \frac{1}{2}*(H-c_i)$	$H - c_i - c_v, H - c_i - c_v$	$\frac{1}{2}*(H-c_i-c_v) + \frac{1}{2}*(T-c_i-c_v),$ $\frac{1}{2}*(H-c_v) + \frac{1}{2}*(T-c_v)$	$H-c_i-c_v, \frac{1}{2}*(H-c_{nv}) + \frac{1}{2}*(H)$	$H-c_i-c_v, H-c_v$
	i, Ø	$\frac{1}{2}*(H-c_i-c_{nv}) + \frac{1}{2}*(H-c_i), H-c_i-c_v$	$\frac{1}{2}*(T-c_i-c_{nv}) + \frac{1}{2}*(T-c_i),$ $\frac{1}{2}*(T-c_i-c_{nv}) + \frac{1}{2}*(T-c_i)$	$\frac{1}{2}*(T-c_i-c_{nv}) + \frac{1}{2}*(T-c_i), T-c_i-c_v$	$\frac{1}{4}*(H-c_i-c_{nv}) + \frac{1}{4}*(L-c_i-c_{nv}) + \frac{1}{4}*(H-c_i) + \frac{1}{4}*(L-c_i), \frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v)$	$\frac{1}{2}*(T-c_i-c_{nv}) + \frac{1}{2}*(T-c_i),$ $\frac{1}{2}*(T-c_{nv}) + \frac{1}{2}*(T)$	$\frac{1}{2}*(T-c_i-c_{nv}) + \frac{1}{2}*(T-c_i),$ $T-c_v$
	i, b	$H-c_i-c_v, H-c_i-c_v$	$T-c_i-c_v,$ $\frac{1}{2}*(T-c_i-c_{nv}) + \frac{1}{2}*(T-c_i)$	$T-c_i-c_v, T-c_i-c_v$	$\frac{1}{2}*(H-c_i-v) + \frac{1}{2}*(L-c_i-c_v), \frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v)$	$T-c_i-c_v, \frac{1}{2}*(T-c_{nv}) + \frac{1}{2}*(T)$	$T-c_i-c_v, T-c_v$
	u, v	$\frac{1}{2}*(H-c_v) + \frac{1}{2}*(T-c_v),$ $\frac{1}{2}*(H-c_i-c_v) + \frac{1}{2}*(T-c_i-c_v)$	$\frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v),$ $\frac{1}{4}*(H-c_i-c_{nv}) + \frac{1}{4}*(L-c_i-c_{nv}) + \frac{1}{4}*(H-c_i) + \frac{1}{4}*(L-c_i)$	$\frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v),$ $\frac{1}{2}*(H-c_i-c_v) + \frac{1}{2}*(L-c_i-c_v)$	$\frac{1}{4}*(H-c_v) + \frac{1}{4}*(L-c_v) + \frac{1}{2}*(T-c_v),$ $\frac{1}{4}*(H-c_v) + \frac{1}{4}*(L-c_v) + \frac{1}{2}*(T-c_v)$	$\frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v),$ $\frac{1}{4}*(H-c_{nv}) + \frac{1}{4}*(L-c_{nv}) + \frac{1}{4}*(H) + \frac{1}{4}*(L)$	$\frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v), \frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v)$
	u, Ø	$\frac{1}{2}*(H-c_{nv}) + \frac{1}{2}*(H), H-c_i-c_v$	$\frac{1}{2}*(T-c_{nv}) + \frac{1}{2}*(T),$ $\frac{1}{2}*(T-c_i-c_{nv}) + \frac{1}{2}*(T-c_i)$	$\frac{1}{2}*(T-c_{nv}) + \frac{1}{2}*(T),$ $T-c_i-c_v$	$\frac{1}{4}*(H-c_{nv}) + \frac{1}{4}*(L-c_{nv}) + \frac{1}{4}*(H) + \frac{1}{4}*(L),$ $\frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v)$	$\frac{1}{2}*(T-c_{nv}) + \frac{1}{2}*(T),$ $\frac{1}{2}*(T-c_{nv}) + \frac{1}{2}*(T)$	$\frac{1}{2}*(T-c_{nv}) + \frac{1}{2}*(T),$ $T-c_v$
	u, b	$H-c_v, H-c_i-c_v$	$T-c_v,$ $\frac{1}{2}*(T-c_i-c_{nv}) + \frac{1}{2}*(T-c_i)$	$T-c_v, T-c_i-c_v$	$\frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v), \frac{1}{2}*(H-c_v) + \frac{1}{2}*(L-c_v)$	$T-c_v,$ $\frac{1}{2}*(T-c_{nv}) + \frac{1}{2}*(T)$	$T-c_v, T-c_v$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

Table 45 Payoff matrix compulsory voting reduced game (low level of penalty low level of law enforcement)

		Player 2	
		iv	uØ
Player1	**iv**	$H - c_i - c_v, H - c_i - c_v$	$H - c_i - c_v, \frac{1}{2} * (H - c_{nv}) + \frac{1}{2} * (H)$
	uØ	$\frac{1}{2} * (H - c_{nv}) + \frac{1}{2} * (H), H - c_i - c_v$	$\frac{1}{2} * (T - c_{nv}) + \frac{1}{2} * (T), \frac{1}{2} * (T - c_{nv}) + \frac{1}{2} * (T)$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

Note that the general cost parameters, that is the combined voting costs, and the benefit parameters are assumed to be the same as in the baseline model. Hence, $c_i + c_v > T > L < H$. Note also, that in this specific parameter combination the costs for not voting are less than the combined voting costs. Thus, let $c_{nv} < c_i + c_v$. It follows that the model predicts that actors should mix their strategies between informed voting and uninformed abstention. The specific prediciton in which ratio actors should mix their strategies so that the game is in equlibrium will be preseneted in the operationalization section of this chapter, since the specific equilibrium in mixed stratgies highly depends on the actual parameter specificiaticon. However, given this general view, turnout and levels of, information should be increased compared to the voluntary voting mode even though penalties and levels of law enforcement are low. In Table 46 you find the full payout matrix for the c_{nv} (low) and p (moderate). The general matrix remains the same with respect to strategies in which one or both players decide not to participate in the election. Corresponding to the payout matrix above, probabilities for the realization of the states of the world and the probablity of getting punished for not participating get combined. Recall, that, in general, an uninformed vote for the better candidate and an uninformed vote for the worse candidate are equally likely. Note that the probablitiy for getting punished in this case is $p = 0.75$. Thus, the probablity for getting punished in the state that an uninformed actor randomly votes for the better or worse candidate is (0.375). In contrast, the probablity of not getting punished for a random vote in either stateis (0.125). It follows that for example for the expected utility function for a strategey combination in which no random element is entailed, that is none of the players casts a random vote, the probality ratio $p = 0.75$ and $1 - p = 0.25$ can be used.

In the case of a random vote, the utility function also has to consider the random choice that also corresponds to a probability (0.375 to 0.125). Again, eliminating dominated strategies suggests that there are multiple Nash-equilibria in mixed strategies. Table 47 entails the reduced game for the parameter combination $c_{nv} = 30$ and $p = 0.75$.

Table 46 Payoff Matrix compulsory voting (moderate level of law enforcement)

		Player 2					
		i, v	**i, Ø**	**i, b**	**u, v**	**u, Ø**	**u, b**
Player 1	**i, v**	$H - c_i - c_v, H - c_i - c_v$	$H - c_i - c_v, \frac{3}{4}*(H - c_i - c_{nv}) + \frac{1}{2}*(H - c_i)$	$H - c_i - c_v, H - c_i - c_v$	$\frac{1}{2}*(H - c_i - c_v) + \frac{1}{2}*(T - c_i - c_v),$ $\frac{1}{2}*(H - c_v) + \frac{1}{2}*(T - c_v)$	$H - c_i - c_v, \frac{3}{4}*(H - c_{nv}) + \frac{1}{4}*(H)$	$H - c_i - c_v, H - c_v$
	i, Ø	$\frac{3}{4}*(H - c_i - c_{nv}) + \frac{1}{4}*(H - c_i), H - c_i - c_v$	$\frac{3}{4}*(T - c_i - c_{nv}) + \frac{1}{4}*(T - c_i),$ $\frac{3}{4}*(T - c_i - c_{nv}) + \frac{1}{4}*(T - c_i)$	$\frac{3}{4}*(T - c_i - c_{nv}) + \frac{1}{4}*(T - c_i), T - c_i - c_v$	$\frac{3}{8}*(H - c_i - c_{nv}) + \frac{3}{8}*(L - c_i - c_{nv}) + \frac{1}{8}*(H - c_i) + \frac{1}{8}*(L - c_i), \frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$	$\frac{3}{4}*(T - c_i - c_{nv}) + \frac{1}{4}*(T - c_i),$ $\frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T)$	$\frac{3}{4}*(T - c_i - c_{nv}) + \frac{1}{4}*(T - c_i),$ $T - c_v$
	i, b	$H - c_i - c_v, H - c_i - c_v$	$T - c_i - c_v,$ $\frac{3}{4}*(T - c_i - c_{nv}) + \frac{1}{4}*(T - c_i)$	$T - c_i - c_v, T - c_i - c_v$	$\frac{1}{2}*(H - c_i - v) + \frac{1}{2}*(L - c_i - c_v), \frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$	$T - c_i - c_v, \frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T)$	$T - c_i - c_v, T - c_v$
	u, v	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(T - c_v),$ $\frac{1}{2}*(H - c_i - c_v) + \frac{1}{2}*(T - c_i - c_v)$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v),$ $\frac{3}{8}*(H - c_i - c_{nv}) + \frac{3}{8}*(L - c_i - c_{nv}) + \frac{1}{8}*(H - c_i) + \frac{1}{8}*(L - c_i)$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v),$ $\frac{1}{2}*(H - c_i - c_v) + \frac{1}{2}*(L - c_i - c_v)$	$\frac{1}{4}*(H - c_v) + \frac{1}{4}*(L - c_v) + \frac{1}{2}*(T - c_v),$ $\frac{1}{4}*(H - c_v) + \frac{1}{4}*(L - c_v) + \frac{1}{2}*(T - c_v)$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v),$ $\frac{3}{8}*(H - c_{nv}) + \frac{3}{8}*(L - c_{nv}) + \frac{1}{8}*(H) + \frac{1}{8}*(L)$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v), \frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$
	u, Ø	$\frac{3}{4}*(H - c_{nv}) + \frac{1}{4}*(H), H - c_i - c_v$	$\frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T),$ $\frac{3}{4}*(T - c_i - c_{nv}) + \frac{1}{4}*(T - c_i)$	$\frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T),$ $T - c_i - c_v$	$\frac{3}{8}*(H - c_{nv}) + \frac{3}{8}*(L - c_{nv}) + \frac{1}{8}*(H) + \frac{1}{8}*(L),$ $\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$	$\frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T),$ $\frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T)$	$\frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T),$ $T - c_v$
	u, b	$H - c_v, H - c_i - c_v$	$T - c_v,$ $\frac{3}{4}*(T - c_i - c_{nv}) + \frac{1}{4}*(T - c_i)$	$T - c_v, T - c_i - c_v$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v), \frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$	$T - c_v,$ $\frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T)$	$T - c_v, T - c_v$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

Table 47 Payoff matrix compulsory voting reduced game (low level of penalty moderate level of law enforcement)

		Player 2	
		iv	**uØ**
Player1	**iv**	$H - c_i - c_v, H - c_i - c_v$	$H - c_i - c_v, \frac{3}{4} * (H - c_{nv}) + \frac{1}{4} * (H)$
	uØ	$\frac{3}{4} * (H - c_{nv}) + \frac{1}{4} * (H), H - c_i - c_v$	$\frac{3}{4} * (T - c_{nv}) + \frac{1}{4} * (T), \frac{3}{4} * (T - c_{nv}) + \frac{1}{4} * (T)$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

Here it also follows that the model predicts actors should mix their strategies in order to keep the other actor indifferent. In fact, there are multiple Nash-equilibria in mixed strategies for the strategies informed voting and uninformed abstention. Even though the level of law enforcement is increased, uninformed abstention is still part of the actors' best strategies.

To see whether this changes when p is set to 1, the next paragraph provides the corresponding full payoff matrix and the reduced matrix respectively. In that condition, probabilities with respect to the combination of strategies in which one player is casting a random vote and the other is not participating is rather unproblematic in this parameter set. Since the probability of getting punished for not participating is 1, the utility function for all those strategies only has to consider the outcome in which the actor that is not participating and connect that with the penalty. Only in combinations in which the other actor is casting a random vote does the utility function for the abstaining player have to consider combined probabilities. For instance, if Player 1 abstains and Player 2 votes randomly, then the utility function for Player 1 can be denoted like this: $\frac{1}{2} * (H - c_{nv}) + \frac{1}{2} * (L - c_{nv})$. This corresponds to the notion that a randomly casted vote could equally likely lead to an outcome that matches the prior preferences or not. However, regardless of whether the candidate will win the election, Player 1 gets punished for not particpating in the election. Table 48 summarizes the full payoff matrix[74].

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[74] Since the other situations only consider different levels of c_{nv} but the same variations f p, all other full matrices resemble one of the examples discussed above. Thus, no further full payoff matrices will be displayed in this section. Instead the section presents all reduced matrices for the remaining parameter combinations.

		Player 2					
		i, v	**i, Ø**	**i, b**	**u, v**	**u, Ø**	**u, b**
Player 1	**i, v**	$H - c_i - c_v,$ $H - c_i - c_v$	$H - c_i - c_v, H - c_i - c_{nv}$	$H - c_i - c_v, H - c_i - c_v$	$\frac{1}{2}*(H - c_i - c_v) + \frac{1}{2}*(T - c_i - c_v),$ $\frac{1}{2}*(H - c_v) + \frac{1}{2}*(T - c_v)$	$H - c_i - c_v,$ $H - c_{nv}$	$H - c_i - c_v, H - c_v$
	i, Ø	$H - c_i - c_{nv}$ $, H - c_i - c_v$	$T - c_i - c_{nv}, T - c_i - c_{nv}$	$T - c_i - c_{nv}, T - c_i - c_v$	$\frac{1}{2}*(H - c_i - c_{nv}) + \frac{1}{2}*(L - c_i - c_{nv}),$ $\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$	$T - c_i - c_v,$ $\frac{3}{4}*(T - c_{nv}) + \frac{1}{4}*(T)$	$\frac{1}{2}*(T - c_i - c_{nv}),$ $T - c_v$
	i, b	$H - c_i - c_v,$ $H - c_i - c_v$	$T - c_i - c_v, T - c_i - c_{nv}$	$T - c_i - c_v, T - c_i - c_v$	$\frac{1}{2}*(H - c_i - v) + \frac{1}{2}*(L - c_i - c_v), \frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$	$T - c_i - c_v,$ $T - c_{nv}$	$T - c_i - c_v, T - c_v$
	u, v	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(T - c_v),$ $\frac{1}{2}*(H - c_i - c_v) + \frac{1}{2}*(T - c_i - c_v)$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v),$ $\frac{1}{2}*(H - c_i - c_{nv}) + \frac{1}{2}*(L - c_i - c_{nv})$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v), \frac{1}{2}*(H - c_i - c_v) + \frac{1}{2}*(L - c_i - c_v)$	$\frac{1}{4}*(H - c_v) + \frac{1}{4}*(L - c_v) + \frac{1}{2}*(T - c_v),$ $\frac{1}{4}*(H - c_v) + \frac{1}{4}*(L - c_v) + \frac{1}{2}*(T - c_v)$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v),$ $\frac{1}{2}*(H - c_{nv}) + \frac{1}{2}*(L - c_{nv})$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v),$ $\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$
	u, Ø	$H - c_{nv},$ $H - c_i - c_v$	$T - c_{nv}, T - c_i - c_{nv}$	$T - c_{nv}, T - c_i - c_v$	$\frac{1}{2}*(H - c_{nv}) + \frac{1}{2}*(L - c_{nv}), \frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$	$T - c_{nv}, T - c_{nv}$	$T - c_{nv}, T - c_v$
	u, b	$H - c_v, H - c_i - c_v$	$T - c_v,$ $T - c_i - c_{nv}$	$T - c_v, T - c_i - c_v$	$\frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v), \frac{1}{2}*(H - c_v) + \frac{1}{2}*(L - c_v)$	$T - c_v, T - c_{nv}$	$T - c_v, T - c_v$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

In the reduced form one can see, that the very high level of law enforcement adds uninformed balloting to dominant strategies.

Table 49 Payoff matrix compulsory voting reduced game (low level of penalty, high level of law enforcement)

Player1		iv	uØ	ub
		Player 2		
	iv	$H - c_i - c_v, H - c_i - c_v$	$H - c_i - c_v, H - c_i - c_{nv}$	$H - c_i - c_v,$ $H - c_v$
	uØ	$H - c_{nv}, H - c_i - c_v$	$\frac{1}{2} * (H - c_{nv}) + \frac{1}{2} * (L - c_{nv}), \frac{1}{2} * (H - c_v) + \frac{1}{2} * (L - c_v)$	$T - c_{nv}, T - c_v$
	ub	$H - c_v, H - c_i - c_v$	$T - c_v, T - c_{nv}$	$T - c_v, T - c_v$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

So instead of making informed voting more likely, higher law enforcement seems to increase the level of roll-off or invalid voting. This is in line with some general theoretical critique and empirical observations with respect to compulsory voting. The rationale for this behavior seems straightforward. In order to avoid penalties, actors might enter the voting stage. But they also do not want to pay information costs. However, in order to avoid uninformed voting mistakes, actors could adopt the strategy uninformed balloting in that situation. Thus, overall, the model would predict increasing turnout as the level of law enforcement increases, even though costs of not voting could be low. However, a side-effect could also be an increase in invalid voting.

Actually, this is the same pattern for moderate levels of costs for not voting and low levels of law enforcement. Remember that the theory assumes that if the costs of not voting are at least equal to initial voting costs, turnout should increase. Table 50 shows the reduced matrix for moderate levels of c_{nv} and low levels of law enforcement.

Table 50 Payoff matrix compulsory voting reduced game (Cnv = moderate and p = low)

		Player 2		
Player1		iv	uØ	u, b
	iv	$H - c_i - c_v, H - c_i - c_v$	$H - c_i - c_v, \frac{1}{2} * (H - c_{nv}) + \frac{1}{2} * (H)$	$H - c_i - c_v, H - c_v$
	uØ	$\frac{1}{2} * (H - c_{nv}) + \frac{1}{2} * (H),$ $H - c_i - c_v$	$\frac{1}{2} * (T - c_{nv}) + \frac{1}{2} * (T), \frac{1}{2} *$ $(T - c_{nv}) + \frac{1}{2} * (T)$	$\frac{1}{2} * (T - c_{nv}) + \frac{1}{2} * (T),$ $T - c_v$
	u, b	$H - c_v, H - c_i - c_v$	$T - c_v, \frac{1}{2} * (T - c_{nv}) + \frac{1}{2} * (T)$	$T - c_v, T - c_v$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

This matrix suggests that even if law enforcement levels are low, the higher levels of costs for not participating also adds uninformed balloting as a considerable strategy. It also suggests that there are multiple Nash-equilibria in mixed strategies for this parameter set. It also follows that the model generally expects that turnout and information acquisition will increase compared to the voluntary voting model. However, turnout is not expected to be universal. Furthermore, there are equilibrium strategies entailing invalid balloting.

Keeping the level of costs for not participating at a moderate level but increasing the level of law enforcement at the same time, eliminates uninformed abstention from the universe of dominant strategies. Table 51 shows the reduced matrix for moderate levels of Cnv and also moderate levels of p.

Table 51 Payoff matrix compulsory voting reduced game (Cnv = moderate and p = moderate)

		Player 2	
Player1		iv	ub
	iv	$H - c_i - c_v, H - c_i - c_v$	$H - c_i - c_v, H - c_v$
	ub	$H - c_v, H - c_i - c_v$	$T - c_v, T - c_v$

Note: In the cells, the first entry always refers to the payoff for Player 1 and the second entry to the payoff of Player 2

This indicates that in equilibrium, turnout should be universal for this parameter set. However, in mixed strategies, uninformed balloting but not casting a valid vote could occur. Thus, the model generally expects very high levels of turnout for the situation in which costs for not voting and levels of law enforcement are both moderate. Since casting a valid vote does, in the model, not incur an extra cost, the reason for that is most likely that actors choosing that strategy want, on the one hand, to avoid the penalty and on the other also want to avoid voting mistakes. Furthermore, they can avoid information costs.

This also accounts for all further combination of penalties and high levels of law enforcement[75]. So after increasing costs for not voting and levels of law enforcement at least to a moderate level, uninformed abstention is not a dominant strategy anymore. Thus, turnout and information acquisition should be increasing as nontrivial levels of penalties and law enforcement are introduced. However, in contrast to the decision-theoretical model presented in the last chapter, uniformed balloting (without casting a valid vote) plays an important role as the levels of the factors increase. Invalid balloting is not part of the previous model. Thus, this game theoretic model adds an important new perspective to the systematic analysis of the impact of compulsory voting. The next chapter draws on the general model predictions and develops testable hypotheses.

5.1.2 Hypotheses

Drawing on the game-theoretic extension of the decision-theoretic reference model, this section presents testable hypotheses to disentangle the impact of compulsory voting laws on individual voting behavior in a strategic situation. According to the model, this section will present a baseline hypothesis referring to the voluntary voting mode and three distinct blocks of hypotheses considering low, moderate and high costs of not participating. Within these blocks, this section will also present varying hypotheses with respect to low, moderate and high levels of law enforcement. Recall that the model assumes a two-person voting game with different cost levels in which individuals are self-interested. Thus, it considers a strategic situation which corresponds to the social dilemma of free riding. The model suggests that, to a certain degree, elections can be compared to the collective provision of a public good. Olson (1965) claims that collective action, if it is costly, mostly suffers from the social dilemma also labeled as the "free rider problem". That is, individuals not participating in the provision of a public good cannot be excluded from the collectively provided goods. Thus, rational self-interested actors have a strong incentive to not participate in the collective action (Olson, 1965). Basically, this also accounts for elections. By voting, the electorate collectively helps a new candidate become president or a party to enter the government. In doing so voters, ideally speaking, also provide a public good – a functioning and democratically elected political leadership. Nonvoters cannot be excluded from "enjoying" the service of the new government but do not have to participate in the process of the election. Since voting is costly and the di-

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[75] The remaining reduced matrices are the same for all remaining parameter combinations.

rect personal impact on the actual result is very low, in fact, a lot of eligible voters decide not to turn out on Election Day[76]. This is particularly true for non-compulsory voting countries.

Thus, for the voluntary voting mode, the model, in general, predicts no substantial turnout because of costly voting. In the case of voluntary voting, voting and information acquisition is costly and abstention is not being punished. In contrast to the decision-theoretic model presented in Chapter Four, actors can no longer determine the outcome on their own but are also contingent on the decision of another actor. Since the model assumes actors to be self-interested, they should prefer a higher payoff over a low payoff. Thus, in the voluntary voting mode, rational self-interested actors should not turnout since information acquisition and participation costs exceed the payoff that can be gained by abstaining from participation. For instance, a single actor would always be better off abstaining no matter what the decision of the other actor in the voting group is. In the case of mutual abstention, the outcome is a tie (T). Both actors would receive a payoff $T > L < H$. If only one actor abstains and the other votes for the candidate that matches the mutual preference, both actors would receive a high payoff (H) and only the actor that casted a vote would have to pay the voting costs. Additionally, if the actor who decides to vote also gets informed first they would also have to pay information costs. Thxus the payoff would be lower as the one coming from a tie[77]. This also accounts for the expected utility of an uninformed vote compared to the expected utility of uninformed abstention[78]. Because it entails the possibility of a voting mistake. That is voting for the candidate that does not match the actors' preferences. Therefore, rationally self-interested actors should abstain from voting and should not invest in additional information in order to increase their expected utility.

H1: This study expects high levels of abstention and low levels of information acquisition in the voluntary voting mode.

In fact, the model predicts uninformed abstention as a stable Nash-equilibrium in that mode. That is in line with the expectations of the decision-theoretic model and also agrees with the general notion of game theoretic models of two candidate elections (Palfrey and Rosenthal, 1983, Palfrey and Rosenthal, 1985) even though, depending on the chosen cost parameter, e.g. voting costs or group size, substantial turnout can also be observed in such models (Ledyard, 1984).

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[76] For various reasons.
[77] Note that the expected utility of an informed vote $Eu(i, v) < Eu(u, \emptyset)$, since the combined voting costs ($c_i + c_v$) are larger than T.
[78] Note that the expected utility of an uninformed vote $Eu(u, v) < Eu(u, \emptyset)$, since the chances of receiving a high reward are only (0.5).

According to the model, this prediction slightly changes for situations in which low or moderate levels of penalties are introduced specific predictions only change with different levels of law enforcement. The calculus of compulsory voting claims that trivial levels of penalties and law enforcement do not change the general prediction of the decision-theoretic voting calculus. Thus, turnout is not supposed to increase dramatically if only minor penalties and/or levels of law enforcement are applied because, for example, penalties still do not exceed initial voting costs. However, turnout increases as the level of penalties increases as well. In this section's game theoretical model, a similar pattern can be seen. For instance, in all parameter sets entailing low penalties and at most moderate levels of law enforcement, the model predicts multiple Nash equilibria also entailing uninformed abstention. Nevertheless, informed voting is a dominant strategy for those parameter sets as well. So, in contrast to the voluntary voting mode, turnout and information acquisition should be increased, yet remain very far from being universal. Instead, the model predicts mixed levels of turnout and information acquisition behavior due to multiple Nash-equilibria in mixed strategies.

> **H2: This study expects higher levels of turnout and information acquisition when voting is compulsory but expects only a slow increase in turnout and information acquisition if only moderate or lower levels of cost of not participating and law enforcement are implemented in the compulsory voting mode.**

In cases of low penalties and low or moderate levels of law enforcement, the model also predicts two dominant strategies, informed voting or uninformed abstention. Increasing the level of law enforcement, ceteris paribus, however, should lead to an increase in invalid voting since it produces a higher possible outcome. However, since compulsory voting, empirically, is first and foremost judged on the basis of increased turnout numbers this will not affect the overall prediction with respect to turnout. But it could change the prediction with respect to information acquisition. By remaining uninformed, but still entering the voting stage and casting an invalid ballot, rational self-interested actors could try to avoid the penalties for not participating. At the same time, they avoid paying information and making voting mistakes due to uninformed votes. In doing so, they could try to gain a higher payoff by casting invalid votes as costs of not voting and/ or levels of law enforcement increase.

> **H3: This study expects invalid balloting to increase if costs of not participating or level of law enforcement increase.**

In fact, the reduced payoff matrix presented in the general model section before shows that in the case of low penalties and high levels of enforcement, uninformed balloting is among the dominant strategies. This also accounts for cases in which penalties are moderate and enforcement is low. In this two parameter sets the model predicts multiple Nash equilibria in mixed strategies with respect to informed voting, uninformed abstention, and uninformed balloting. It follows that actors should mix between those strategies in order to increase their potential payoff.

In all other conditions, uninformed abstention is no longer a dominant strategy. Instead, informed voting and uninformed balloting (roll-off) remain as dominant strategies for all following parameter conditions. Thus the model generally predicts increasing levels of turnout if both parameters of compulsory voting (costs and enforcement) are high. In particular levels of Cnv have to be at least moderate.

H4: This study expects higher levels of turnout and information acquisition if costs of not voting are at least moderate and levels of law enforcement are high.

In that sense, the combination of both parameters being least moderate can be seen as a cut point. Because after this point uninformed abstention is no longer a dominant strategy in any of the following parameter sets. In general, this is in line with the expectations of the calculus of compulsory voting (Panagopoulos, 2008) and the predictions of the decision-theoretic model as well. However, in contrast to turnout in general predictions with respect to informed voting in particular, are mixed because uninformed balloting is also a dominant strategy. Thus, the model predicts multiple Nash equilibria for all parameter sets above this cut point.

H5: This study expects higher levels of informed turnout and higher levels of invalid voting for moderate or higher levels of costs of not participating and law enforcement.

Basically, the decision-theoretic model suggests that if costs of not participating are high enough to offset initial voting costs, turnout becomes the rational choice. Moreover, it claims that since it is rational to vote, actors should also invest in information because an informed vote generates a higher expected utility than an uninformed random vote. However, this does not seem to unconditionally hold in the game-theoretic model presented in this section. Again, the reason for that is the strategic dilemma of the model. Both actors depend on the decision of the other in order to determine their payoff. Furthermore, the provision of the election

result is costly. Since "good" results can also be provided by the other actor and also without investing in costly information, abstention would be the best answer in that situation. However, costs of not participation impede this strategy. Thus, in order to avoid the penalty for not participating without reducing the individual payoff by investing in information, actors might cast more invalid votes in the compulsory voting mode. That is, they roll off at the voting stage. That would be in line with some of the criticism arguing that compulsory voting indeed increases turnout but compromises the quality of the voting choice. The next section presents the operationalization of these hypotheses and general model parameters with respect to the experimental implementation of the model.

5.1.3 Operationalization

Drawing on the reference model and the model presented in this section, the main experimental manipulation is the introduction of different voting modes. In contrast to the design of the previous chapter, this experiment implements different levels of costs of not participating in a between-subject design, and only manipulates different levels of law enforcement within the treatments. The model presented in the previous section considers costs of not participating and levels of law enforcement as the two main factors explaining the functioning of compulsory voting with respect to increasing turnout in general and information acquisition in particular. In contrast to the decision-theoretic model presented in the previous chapter, this chapter's model cares for strategic interaction within the voting process. Thus, in order to control for confounding aspects specific to the strategic interaction within the experiment, this study implements parts of the central manipulation between different treatment groups. According to the predictions of the model, different penalty levels have a stronger impact on the predicted variation in individual voting behavior. Penalty levels vary between subjects to account for that. For c_{nv} in particular, the experiment considers values of 30 points, 60 points and 90 referring to a single treatment each whereas 30 points refer to a low-cost treatment, 60 points to a moderate costs level treatment and 90 points to the high-level treatment. With respect to the within manipulation, different levels of law enforcement are operationalized as varying probabilities p of getting punished for not entering the experimental voting stage, whereas $p = 0.5$ refer to low, $p = 0.75$ refer to moderate and $p = 1.00$ refers to high levels of law enforcement. For both factors $c_{nv} = 0$ and $p = 0$ to the control condition. Table 52 summarizes the different treatment conditions.

Table 52 Treatment conditions

Session	Treatment	Manipulation Between Treatments	Manipulation Within Treatments	Periods	Obs.	N
1	T1	Cnv = 0	p = 0 (control)	6	72	
		Cnv = 30	p = 0.5 (med)	6	72	
			p = 0.75 (high)	6	72	12
			p = 1 (very high)	6	72	
2	T2	Cnv = 0	p = 0 (control)	6	120	
		Cnv = 60	p = 0.5 (med)	6	120	
			p = 0.75 (high)	6	120	20
			p = 1 (very high)	6	120	
3	T3	Cnv = 0	p = 0 (control)	6	84	
		Cnv = 90	p = 0.5 (med)	6	84	
			p = 0.75 (high)	6	84	14
			p = 1 (very high)	6	84	

Note: The sequence periods implementing different levels of p were varied over treatments.

Akin to the previous model, this chapter's model also isolates the effect of the two main factors explaining the function of compulsory voting identified by the calculus of compulsory voting approach. Other parameters are fixed at certain amounts reflecting basic theoretical assumptions of the underlying theory. For instance, in each period, subjects can earn 100 experimental points (B). However, participating in the elections incurs voting costs. These voting costs consist out of two different parameters[79] – information costs (c_i) and participation costs (c_v). Both parameters are fixed at a level of 30 experimental Tokens. In contrast to the decision-theoretic model in Chapter 4, actors are always uninformed at the beginning of the game.

The model presented in the previous section, like the decision-theoretic model, suggests that turnout will increase as the two main predicting factors also increase. However, the strategic interaction between two actors within a voting group makes uninformed balloting also more likely as the levels of penalties and the levels of law enforcement increase. Even though the strategic interaction of voters yields predictions for the compulsory voting modes, in some way the general notion of the decision-theoretic model concerning the voluntary voting modes also accounts for the game theoretic model. H1 states that there will be high levels of abstention and low levels of information acquisition in the case of voluntary voting.

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[79] For a discussion why voting costs can be considered as two different parameters see the operationalization in chapter 4.

Table 53 Payoff matrix voluntary voting mode

		Player 2					
		i, v	i, Ø	i, b	u, v	u, Ø	u, b
Player 1	i,v	40, 40	40, 40	40, 40	15, 45	40, 100	40, 70
	i, Ø	70, 40	20, 20	20, -10	20, 20	20, 50	20, 20
	i, b	40, 40	-10, 20	-10, -10	-10, 20	-10, 50	-10, 20
	u, v	45, 15	20, 20	20, -10	20, 20	20, 50	20, 20
	u, Ø	100, 40	50, 20	50, -10	50, 20	50, 50	50, 20
	u, b	70, 40	20, 20	20, -10	20, 20	20, 50	20, 20

Note: That the first cell entry always refers to the reward for player 1 and the second
cell entry refers to the payoff for player 2.

Table 53 shows the payoff matrix for the voluntary voting mode. The reason for low turn-out and low levels of information acquisition are twofold. First, the combined voting costs (c_i+c_v) exceed the expected utility of informed votes. Thus, self-interested actors have a strong incentive to abstain. Furthermore, the strategic interaction incentivizes self-interested actors to abstain as well, since they could benefit from abstention even more, in the case of the other group member making an informed decision and thereby maximizing the expected utility of both actors. Hence self-interested actors should have a strong incentive to "free ride" in the voluntary voting condition. Since both actors are assumed to be instrumentally self-interested, they should be hesitant to pay the costs for the provision of a public good and thereby getting exploited by the other actor. It follows that uninformed abstention is the best answer to that strategic dilemma in the voluntary voting mode. In doing so, both actors would gain a utility of 50 experimental points each. There are combinations in which a single actor could gain higher utilities but not without exploiting the other player. For example, if Player 1 plays the strategy (u, Ø) and Player 2 would play the strategy (i, v), Player 1 would gain a reward of 100 experimental points and Player 2 would only gain 40 experimental points. That example shows why, assuming self-interested actors, remaining uninformed and abstaining from participation is the best answer to the behavior of the other player. In fact, uninformed abstention dominates all other strategies. Therefore, in equilibrium subjects should not get informed and should also not enter the election stage in the experimental periods enabling voluntary voting.

This general pattern only changes marginally if penalty levels and levels of law enforcement only increased marginally. In fact, H2 claims that levels of turnout and information acquisition will only be slightly higher in the case of minor penalties and low lev-

els of law enforcement. For instance Table 54 presents the payoff matrix for $c_{nv} = 30$ and $p = 0.5$.

Table 54 Payoff matrix compulsory voting mode ($c_{nv} = 30$ and $p = 0.5$)

		Player 2					
		i, v	i, Ø	i, b	u, v	u, Ø	u, b
	i,v	40, 40	40, 55	40, 40	15, 45	40, 85	40, 70
	i, Ø	55, 40	5, 5	5, -10	5, 20	5, 35	20, 20
Player 1	i, b	40, 40	-10, 5	-10, -10	-10, 20	-10, 35	-10, 20
	u, v	45, 15	20 , 5	20, -10	30, 20	20, 35	20, 20
	u, Ø	85, 40	35, 5	35, -10	35, 20	35, 35	35, 20
	u, b	70, 40	20, 5	20, -10	20, 20	20, 35	20, 20

Note: That the first cell entry always refers to the reward for player 1 and the second
cell entry refers to the payoff for player 2.

After iteratively eliminating dominated strategies[80] only the strategies informed voting (i, v) and uninformed abstention remain. Table 55 shows the reduced payoff matrix.

Table 55 Reduced payoff matrix compulsory voting mode ($c_{nv} = 30$ and $p = 0.5$)

		Player 2	
		iv	uØ
Player1	iv	40; 40	40; 85
	uØ	85; 40	35; 35

Note: That the first cell entry always refers to the reward for player 1 and the second
cell entry refers to the payoff for player 2.

In fact, the matrix suggests that there are different best answer strategies for the actors in order to maximize their potential payoff. For instance, if Player 1 decides on casting an informed vote, Player 2 would be better off abstaining without getting informed beforehand, as the utility for Player 2 playing $u, Ø$ is 85 in the case of Player 1 playing i, v. In that case, Player 1 would gain a utility of 40. Anticipating that, the Player has an incentive to deviate from informed voting and also adopt the strategy of uninformed abstention. Thu, it can be expected that both actors have a strong incentive to remain uninformed and abstain from participating in order to maximize their utility. However, in doing so, they would only gain a utility of 35 experimental points each, which is less than the utility both actors can gain by casting an informed vote (40, 40). In both cases, both actors playing $u, Ø$ or both players playing i,v, the game is in equilibrium. This matrix indicates that there are two Nash-Equilibria in pure strategies in this game, and multiple Nash equilibria in mixed strategies for this game.

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[80] This process was conducted in the freeware Gambit (http://www.gambit-project.org.). It is a tool to display games in normal or extensive form

However, it is not clear which will be realized. Thus, this study considers for Nash equilibria in mixed strategies. In fact, actors should mix their strategies in order to make their opponent indifferent between their own strategies. Thereby they can maximize their potential payoff. To keep the other player indifferent, both actors should mix the adoption of the two strategies, informed voting and uninformed abstention with the same frequency $\left(\left(\frac{1}{10},\frac{9}{10}\right),\left(\frac{1}{10},\frac{9}{10}\right)\right)$. In other words, if the game would be played for ten periods, players should cast an informed vote only once and remain uninformed and abstain nine times in order to make their opponent indifferent between strategies. It follows that introducing only minor penalties and low levels of law enforcement increases turnout and information acquisition only slightly in the compulsory voting mode. That is, abstention is expected to be not marginal in this setup. Increasing the level of law enforcement does not change the universe of dominant strategies. Table 56 shows the reduced payoff matrix for Cnv = 30 and p = 0.75.

Table 56 Reduced payoff matrix compulsory voting mode ($c_{nv} = 30$ and $p = 0.75$)

		Player 2	
		iv	uØ
Player1			
	iv	40; 40	40; 77,5
	uØ	77,5; 40	27,5;27,5

Note: That the first cell entry always refers to the reward for player 1 and the second cell entry refers to the payoff for player 2.

Again, informed voting and uninformed abstention are dominant strategies. In contrast to the parameter set $c_{nv} = 30$ and $p = 0.5$, the potential reward of both players abstaining is lower in the condition of $c_{nv} = 30$ and $p = 0.75$. Thus, in general, informed turnout should increase. However, the individually most preferred outcome, e.g. Player 1 abstains and Player 2 casts an informed vote exploits the player casting an informed vote. It follows that the unique equilibrium is in mixed strategies. Players should mix between informed voting and uninformed abstention to keep the other player indifferent. For instance, they should adopt the strategy informed voting with the frequency $\frac{1}{4}$ and uninformed abstention with the frequency $\frac{3}{4}$. With respect to the experimental implementation (T1), the game is in equilibrium if players hold on to abstaining in over 4 periods and cast informed votes in over one but less than two periods in Periods 7 to 12. Hence, in equilibrium, turnout should increase more if the level of law enforcement is higher. However, abstention should still take place in this parameter setup.

Meanwhile, if penalties or levels of law enforcement increase, invalid voting also increases. For instance, H3 states that subjects will remain uninformed but still enter the voting stage more often if penalties or levels of law enforcement increase in order to avoid paying the fee for not participating. Besides that, it also enables subjects to avoid voting mistakes and maximizes their potential payoff in cases in which their opponent elects the mutually preferred candidate. For example, in the case of low penalty levels but high levels of law enforcement, uninformed balloting becomes a dominant strategy[81]. Table 57 presents the reduced matrix for that parameter combination.

Table 57 Reduced payoff matrix compulsory voting mode ($c_{nv} = 30$ and $p = 1.00$ and $c_{nv} = 60$ and $p = 0.5$)

		Player 2		
		iv	uØ	ub
Player1	iv	40, 40	40, 70	40, 70
	uØ	70, 40	20, 20	20, 20
	ub	70, 40	20, 20	20, 20

Note: That the first cell entry always refers to the reward for player 1 and the second cell entry refers to the payoff for player 2.

The matrix suggests that subjects have still a strong incentive to abstain, especially if the other player picks up information and votes for the better candidate. Yet, the matrix also shows that uninformed balloting generates the same possible reward. It follows that not participating is not the single best response in this set up anymore. Instead, subjects are expected to mix between different strategies in order to maximize their potential reward. Thus, there are multiple Nash-equilibria in this game. Overall, there are up to eight different equilibria consisting of mixed and pure strategies. Table 58 presents pure and mixed equilibria strategies and different frequencies in a matrix excluding weak and strictly dominated strategies.

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[81] This also accounts for cases in which Cnv is moderate (60) and the level of law enforcement is low (p = 0.5).

Table 58 Nash-equilibria in pure and mixed strategies, compulsory voting mode ($c_{nv} = 30$ and $p = 1.00$ and $c_{nv} = 60$ and $p = 0.5$)

Number	Strategy Player 1			Strategy Player 2		
	iv	uØ	ub	iv	uØ	ub
1	1	0	0	0	1	0
2	1	0	0	0	0	1
3	$\frac{2}{5}$	$\frac{3}{5}$	0	$\frac{2}{5}$	$\frac{3}{5}$	0
4	$\frac{2}{5}$	$\frac{3}{5}$	0	$\frac{2}{5}$	0	$\frac{3}{5}$
5	$\frac{2}{5}$	0	$\frac{3}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	0
6	$\frac{2}{5}$	0	$\frac{3}{5}$	$\frac{2}{5}$	0	$\frac{3}{5}$
7	0	0	1	1	0	0
8	0	1	0	1	0	0

Note: Cell entries refer to the frequencies with which a player should adopt a certain strategy in order to hold the other player indifferent.

With mixed strategies, the game is in equilibrium if the two players mix strategies with a given frequency. In doing so, they manage to keep the other player indifferent between strategies. Thus, they can maximize their potential outcome.

As shown in the model, this is the last parameter combination in which uninformed abstention is among dominant strategies. In all other setups, this is not the case. Therefore, the study assumes two different things as costs of not voting and levels of law enforcement increase further. On the one hand, turnout in general and information acquisition should increase as penalties get more severe and chance of getting punished higher. On the other hand, uninformed balloting (invalid voting) is also expected to increase. In particular, H4 states that turnout and information acquisition is higher if the cost of not participating is at least moderate and levels of law enforcement are high or very high. Table 59 shows the reduced payoff matrix for all values of $c_{nv} \geq 60$ and $p > 0.75$ (high). Note that this matrix also accounts for the case in which $c_{nv} = 90$ and $p = 0.75$.

Table 59 Reduced payoff matrix compulsory voting mode for $c_{nv} = 60$ or higher and $p = 0.75$ higher[82]

		Player 2	
		iv	ub
Player1	**iv**	40, 40	40, 70
	ub	70, 40	20, 20

Note: That the first cell entry always refers to the reward for player 1 and the second cell entry refers to the payoff for player 2.

As one can see, uninformed abstention is no longer among dominant strategies when costs of not participating are moderate and levels of law enforcement are high. In this situation, both players, individually have an incentive to enter the voting stage but refrain from casting a valid vote. Thereby, if the other player votes for the mutually preferred candidate, they maximize their individual outcome. Thus, higher levels of uninformed balloting (ub) are not unlikely. However, since this is the best strategy for both players, they run the risk of realizing a less preferred outcome by simultaneously not casting a valid vote (20, 20). In contrast, picking up information and voting for the preferred candidate creates a higher outcome for both players (40, 40). Thus, higher levels of informed voting can be expected. Anticipating this, rational players again have an incentive to deviate from that strategy since they can gain a higher utility if they roll off at the voting stage and the other player votes for the preferred candidate. Hence, subjects face a strategic dilemma in this situation. It follows that there is hardly a stable situation in which one outcome will get realized all the time. Instead, players should play mixed strategies. In fact, the unique Nash equilibrium is in mixed strategies. Players should mix between informed voting and uninformed balloting in order to keep the other player indifferent. For instance, they should adopt the strategy informed voting with the frequency $\frac{2}{5}$ and uninformed balloting with the frequency $\frac{3}{5}$. In other words, in treatments, T2 and T3 subjects should adopt the strategy informed voting in about 2 periods and the strategy informed voting in about 4 periods. Therefore, it is expected that turnout and information acquisition will increase significantly if penalties and law enforcement increase as well. However, this study also expects an increase in uninformed balloting as both parameters increase. The next section presents the experimental procedure.

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[82] This matrix also reflects the parameter combination $c_{nv} = 90$ and $p = 0.5$.

5.2 Experimental Procedure

To disentangle the effect of the severity of penalties and the level of law enforcement on turn-out in general and informed turnout in particular, this study uses a series of computer-based lab experiments drawing on a game theoretic model.

The experiment was computed in ztree (Fischbacher, 2007). Sessions were conducted in the computer laboratory (OLExS) at the University of Oldenburg. In total 46 subjects, mostly undergraduate students from the University of Oldenburg participated in three experimental sessions. The experiment was organized and recruited with the software "hroot" (Bock et al., 2012). On average, subjects earned between 8€ and 8.50€. A session lasted for about 45-minutes.

In the experimental procedure, subjects were randomly matched with a new partner every 7 rounds and can make various decisions at different stages of the experiment. Initially, subjects are uninformed about their randomly assigned preference of one of the two candidates, A or B. The preference is not assigned individually but as a group preference with the same probability (0.5). Thus, subjects always share the same preference. In the first phase, subjects can decide whether to buy information about which of the two candidates, A or B, they prefer or to remain uninformed. Getting informed incurs a cost of (c_i) 30 experimental points which get withdrawn from the payoff in that period in which a subject gets informed. If subjects decide to get informed they are fully informed about the assigned preference. After the information, in Phase 2, subjects can decide to participate in the election or to abstain from participating in that period. Abstaining subjects skip the voting stage and wait for the experiment to continue. Participating in the election incurs a participation cost (c_v) of 30 experimental points which also get withdrawn from the corresponding period payoff. Abstaining in Phase 2 only incurs a penalty (c_{nv}) in the compulsory voting conditions and is not charged in the voluntary voting conditions (control conditions). In Phase 3, the voting stage, subjects can cast a vote for either A, B or an invalid vote. There are no additional costs in Phase 3. Figure 20 displays the experimental procedure in a stylized manner.

The individual reward in a period depends on the individual decision and the decision of the other group member. According to the game theoretic model micro-funding, subjects cannot directly affect their individual payoff. The election winner is determined by simple majority. If the elected candidate matches the previously determined group preference, both group members earn a high payoff (H) of 100 experimental points. Depending on the individual decisions a subject has made, different cost parameters get subtracted from that reward.

For example, if a subject gets informed and casts a valid vote for the candidate that matches the group preference, say A, and the other subject abstains, Candidate A wins the election. Both subjects receive 100 experimental points as a reward. But the subject that got informed and voted has to pay information costs and participation costs. Thus, he will only receive a payoff of 40 (100 - 30 - 30) in that period. In contrast, the other subject that did not get informed and did not participate receives 100 points as a payoff in that period. All subjects are fully informed about all possible costs and rewards in all periods. After finishing all experimental repetitions, the subjects learn about their total payoff and proceed to the post-experimental questionnaire which entails general socio-demographic questions, questions regarding attitudes towards politics in general and elections in particular, as well as questions to risk attitudes and attitudes about fairness and reciprocity. Answers to this questionnaire are used to create control variables for the statistical analysis.

Figure 20 Experimental Procedure
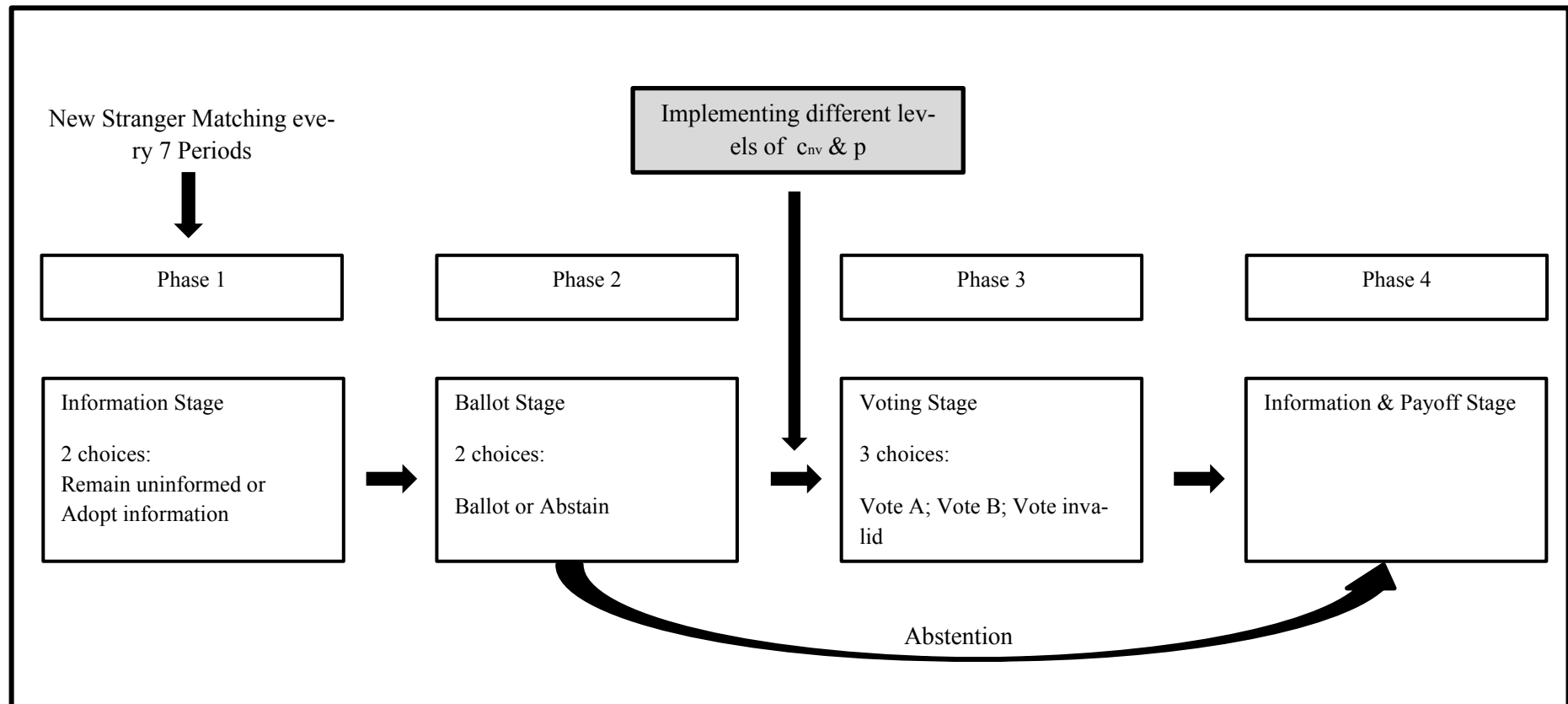
Note: The experiment consists out of 24 periods corresponding to different levels of costs of not participating and different levels of law enforcement. If a subject abstains he/she directly proceeds to the payoff stage. After finishing the last period subjects proceeded to a post-experimental survey.

5.3 Empirical Analysis

In order to examine the relationship between compulsory voting laws and individual voting behavior and information acquisition, individual data was collected by utilizing a series of controlled computer experiments. In contrast to the previous chapter, experiments were based on a game-theoretic model. Thereby, to test whether the main assumptions of the calculus of compulsory voting still hold in the strategic environment of voting decisions. Drawing on the game theoretic model various hypotheses were deduced. In order to test these hypotheses, three main depended variables were created. Both the dependent and independent variables are described in the following sections. Afterward, descriptive findings and results of the statistical analysis will be discussed. The chapter closes with a brief discussion of the findings.

5.3.1 Dependent Variables

Turnout

Crucial to the calculus of compulsory voting approach is the claim that compulsory voting rules increase turnout when penalties and levels of law enforcement are not trivial. Previous studies have extensively shown that turnout is generally positively affected by compulsory voting laws (for a good review of the literature see Birch, 2009). In particular, Panagopoulos (2008) argues that increasing levels of penalties and levels of law enforcement are in fact responsible by comparing observational data from different countries. Furthermore, the previous chapter of this study also finds evidence, like Shineman (2010), for the general notion of the calculus of compulsory voting, by systematically testing the impact of costs of not participating and levels of law enforcement in a decision-theoretic model. However, it remains unclear if the main assumption of the approach also applies to a game theoretic model which actually captures the strategic nature of elections more accurately.

Thus, this study will test the impact of compulsory voting rules on levels of turnout in the experimental periods. Like in the previous chapter, the conceptualization of the dependent measure *Turnout*, this chapter also examines the percentage of subjects turning out in each experimental period. Therefore *Turnout* is a metric variable ranging from 0 to 100.

Informed Turnout

Besides the examination of turnout, in general, this study also tries to add further evidence to the ongoing discussion of how compulsory voting laws affect levels of informed voting. The previous chapter finds mixed evidence on this matter. For instance, on the one hand, compulsory voting is able to boost informed turnout. But on the other hand, the analysis in the previous chapter also revealed increasing levels of random or ill-informed turnout during the experiment.

The model, in general, assumes that instrumentally motivated actors will always vote when they decide to invest in costly information because otherwise information costs would be sunk costs. For instance, informed abstention mostly produces a lower expected utility than all other strategies. Thus, this study assumes that all subjects getting informed will also enter the voting stage and exclude all other cases. It also follows levels of information acquisition and informed turnout are used analogously. Akin to the previous chapter, this chapter, again, operationalizes levels of information acquisition as the percentage of subjects picking up additional information and entering the voting stage afterward. The variable, again, is thus a metric variable and is labeled as *Informed Turnout.*

Roll Off

On the pessimistic end of the discussion about the impact of compulsory voting on levels of informed turnout, scholars claim that compulsory voting could lead to uninformed and therefore random voting (see for example Jakee and Sun, 2006). Since this chapter's model does not predict random voting in the game-theoretic model it is not considered a dependent variable for this analysis, even though any possible implications could be interesting. But since it is not entailed in the model, it is not a part of the further investigation

Also directly related to the discussion of how compulsory voting affects individual voting behavior is the question whether CV-laws increase levels of voters attending the polls but rolling off in the voting booth. In fact, it is the nature of compulsory voting that it only mandates the attendance of voters at the voting station on Election Day, but not the actual voting behavior within the voting booth (Lijphart, 1997). So, voters could obey the law by going to the poll but still do not cast valid votes.

In fact, the model shows that rolling off in the voting stage becomes more likely as costs of not participating and levels of law enforcement increase. The reason for that is that voters avoid penalties for not participating and information costs by entering the voting stage

without picking up additional information. Also, they avoid voting mistakes by no casting a random vote. Thus, rolling off, in some conditions, provide a higher potential outcome than other strategies.

In the analysis, this study considers rolling off by examining the percentage of uninformed subjects entering the voting stage but casting an invalid vote. It follows that the variable Roll-Off is a metric measure ranging from 0 to 100. Table 60 summarizes the dependent measure.

Table 60 Dependent Variables

Dependent Variables	Definition	Coding
Turnout	Percentage of subjects entering the ballot stage in a period	metric (0-100)
Informed turnout	Percentage of uninformed subjects buying information in a period	metric (0-100)
Roll Off	Percentage of uninformed subjects remaining uninformed, entering the voting stage and cast an invalid vote	metric (0-100)

Note: Subjects are uninformed at the beginning of each repetition of the game.

5.3.2 Independent Variables

Factors

In contrast to the design utilized in the previous chapter, the main manipulation of this experiment was to observe individual voting behavior at different voting rules- voluntary voting and compulsory voting – in a mixed design. It was mixed in the sense that costs of not participating were varied between different treatments whereas levels of law enforcement were varied within the treatments. According to the calculus of compulsory voting approach, the two main predictors of changes in turnout are the cost of not participating and levels of law enforcement. Thus, these are the two dependent variables examined in this chapter. Like the previous chapter, this chapter is based on experimental results. Due to the factorial design of the experiment, this study not only considers one single value of the indicators but instead examines the possible impact of different levels of the two factors. In fact, for both factors, this study examines the impact of low, medium, high and very high levels of costs of not participating and law enforcement with respect to variation in turnout. In the case of cost of not participating (C_{nn}), low levels refer to a value of 10 experimental points, medium levels refer

to 30 experimental points, high level refers to 60 experimental points and very high levels refer to 90 experimental points. Furthermore, this study also considers the control condition in which $(c_{nv}) = 0$. With respect to levels of law enforcement (p), low levels refer to a probability of of 25% ($p = 0.25$) of getting caught for not participating, medium levels refer to $p = 0.5$, high levels to $p = 0.75$ and very high levels to $p = 1.00$. In the control condition, the probability of getting caught for not participating is 0. Thus, both factors have 5 levels where the control condition is coded as 1 and the very high level is coded as 5. In between values 2, 3 and 4 refer to the remaining levels in ascending order. Table 61 at the end of this section gives an overview over all independent variables.

Risk Aversion

Like the previous chapter, individual risk attitudes are crucial to this chapter's analysis as well. Recall, that, in the experiment, subjects faced a strategic dilemma. They had to provide a common good (election outcome). In order to achieve that, subjects could either invest in additional information and vote for the preferred candidate or remain uninformed and cast a random vote, an invalid vote or abstain altogether. In the latter case, the abstaining subjects hope for the other subject to make an informed decision because it would maximize the first subjects´ outcome. On the one hand, this is a rational behavior for instrumentally motivated actors. On the other hand, this also accounts for the motivation of the opponent. Thus, both subjects run the risk of realizing a sub-optimal outcome by playing the rational but risky strategy of abstaining. That is even riskier when voting is compulsory and not complying with the law is punished. Hence, only risk-seeking subjects would stick to the abstention strategy as costs of not participating and levels of law enforcement are increasing throughout the treatments.

With respect to the strategy of uninformed balloting (roll-off) subjects, by any means, avoid the penalties for participating and also avoid voting mistakes. Thus, one could argue that risk-averse subjects could have an incentive to play that strategy. This also accounts for the strategy of informed voting. Probably even more so, since subjects could increase their chance of gaining a higher payoff by making an informed decision, and not only rely on the other's decision. Thus, it seems reasonable to test whether individual risk attitudes have an impact on individual behavior in the experiment. Especially since subjects are confronted with a strategic situation.

As already discussed in the previous chapter, Kam (2012) argues that individual risk attitudes are a good predictor of individual political participation. In order to account for that,

subjects, again, were asked to report their general level of risk aversion on a scale ranging from 0 to 10 in the post-experimental-survey[83]. Based on this scale, a risk attitude score is easily computed. The risk attitude score is scaled from 0 to 10, where 0 refers to a high level of risk awareness and 10 to a high level of risk acceptance. This score is measured for all statistical models.

Civic Duty

Like in the previous chapter, this analysis tries to control for the influence of individual attitudes of civic duty towards participating in elections. Recall, that the main argument of the civic duty approach is that individuals not only gain an instrumental utility but can gain a positive utility from the act of voting itself and thereby performing their civic duty (Riker and Ordeshook, 1968). Recall also that different studies have shown that social pressure has a positive effect on turnout (Gerber et al., 2008). Various "get out the vote" field experiments have established the notion that social pressure increases turnout (Gerber and Green, 2000). Thus, some scholars point to the possible reinforcement of perceiving voting as a civic duty (Shineman, 2012b).

To test whether a strong perception of voting as an act of civic duty has an impact on the subjects' behavior in the laboratory as well, subjects were asked whether they see voting as their civic duty in the post-experimental survey. Based on the answers[84], a binary civic duty variable is computed, whereas a score of 0 refers to subjects not perceiving voting as a civic duty and a score of 1 denotes voting as a civic duty.

Controls

In addition to the above-mentioned theoretically deduced indicators, individual socio-demographic control variables were also tested in the model. For instance, age and gender were incorporated in the statistical analysis, whereas gender was coded as a "female dummy". Here 0 refers to male subjects and 1 to female subjects. Both variables are discussed in the existing literature. For example (Quintelier et al., 2011) show that compulsory voting, gender, and age do not interact in the expected way. Advocates of compulsory voting claim that compulsory voting could lead to an equal turnout with respect to various characteristics, like differences in turnout probabilities between men and women, or younger and older individuals

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[83] Examples for the asked questions can be found in the appendix.
[84] A detailed description of the question and possible answers can be found in the appendix.

(Lijphart, 1997). However, the expected positive relationship has not been revealed yet (Quintelier et al., 2011).

Furthermore, subjects were asked about their major in the post-experimental questionnaire. Taking into account that it is mostly social science majors that are subscribed in the experimental register tool, and that participation in the election is a highly social science major related topic, I controlled for a possible effect of being a social science major on the behavior in the experiments. Therefore, a social science dummy was computed. Here all social science majors were coded as 1 and all other majors were coded as 0. Table 61 gives an overview of all independent variables.

Table 61 Independent Variables

Independent Variables	Definition	Coding	Source
Treatment	Cost for not participating	1 = 30 (T1); 2 = 60 (T2); 3 = 90 (T3)	Experiment
p	Probability of punishment	1 = 0; 2 = 0.5; 3 = 0.75; 4 = 1.00	Experiment
Risk aversion	Individual risk attitude	Scale 0 – 10 (0 = high risk aversion; 10 = very low risk aversion	(Kam, 2012)
Civic Duty	Individual attitude towards voting	0 = no duty 1= duty	Post-experimental questionnaire
Gender	Individual gender	0 = male ; 1 = female	Post experimental questionnaire
Age	Age	Age of the participants in years	Post-experimental questionnaire
Major	Individual field of study	0 = other major ; 1 = social science major	Post experimental questionnaire

Note: Cost of not participating (Treatment) were manipulated between treatments. T1 refers to treatment 1, T2 refers to treatment 2 and T3 refers to treatment 3.

5.3.3 Empirical Results

In this section, the study presents the empirical results with respect to the four dependent variables, *Turnout, Informed Turnout and Roll Off.* Thereby, the study mainly focusses on the influence of the theoretically deducted predictors. First, this study examines whether the alteration of voting rules, in general, has an effect on the dependent measures. Second, this study specifically focusses on the effect of the three different treatments used in the experiments. The section begins with a general overview of the treatment groups.

The experiment was conducted in three sessions. In total, 46 subjects participated in the three sessions[85]. Due to the fact that subjects played the experiment for 24 periods, 1.104 observations were created for most variables. On average, subjects were about 24 years old ranging from 19 years to a maximum of 37 years. Most of the participants were females (about 63%). Furthermore, most subjects were social science majors (26%)[86] or majoring in philology (26%).

Descriptive Findings

To analyze the impact of compulsory voting laws on a strategic voting situation, this study starts with reporting some crucial descriptive results for the dependent variables *Turnout*, *Informed Turnout,* and *Roll Off*. First of all, *Turnout* captures the percentage of subjects entering the election stage. Second of all, the variable *Informed Turnout* captures the percentage of uninformed subjects[87] getting informed before entering the voting stage. Additionally, the variable *Roll Off* is operationalized as the percentage of informed or uninformed subjects entering the experimental voting stage and not casting a valid vote.

According to the general claim that compulsory voting generally increases turnout, this study starts with a simple comparison of overall turnout numbers. Furthermore, it examines overall informed turnout in order to get a first impression whether the results of the previous chapter meaning CV-laws can increase informed turnout under certain circumstances, still holds in a two-person game. In that regard, this study also examines overall numbers of invalid voting in the experimental periods. For all variables, it is tested whether the introduction of compulsory voting laws, in general, leads to a noticeable change in the dependent variables. Figure 21 reports the distribution of the dependent measures compared by the different voting modes. It suggests that, especially in the case of overall turnout, differences in numbers of turnout are massive between the two voting modes. It also indicates that there is a difference in the other two dependent measures due to the introduction of compulsory voting, even though it is not as eminent as the differences in turnout. However, the boxplots are median based graphics, and therefore only conditionally suitable to address substantial differences in distributions, especially considering the differences in the number of observations regarding the two voting modes.

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[85] Note, the first treatment was run with 12 participants, the second with 20 participants and the third was run with 14 participants.

[86] About 13% of the participants were majoring in natural sciences, roughly 17% of the participants had a economics related background. The rest of the participants selected themselves into the other category.

[87] Note, that other than in the experiment discussed in chapter 4, subjects are always uninformed about their preference at the beginning of a new period in this model and in the experimental implementation.

Figure 21 Distribution of the dependent measures by voting modes
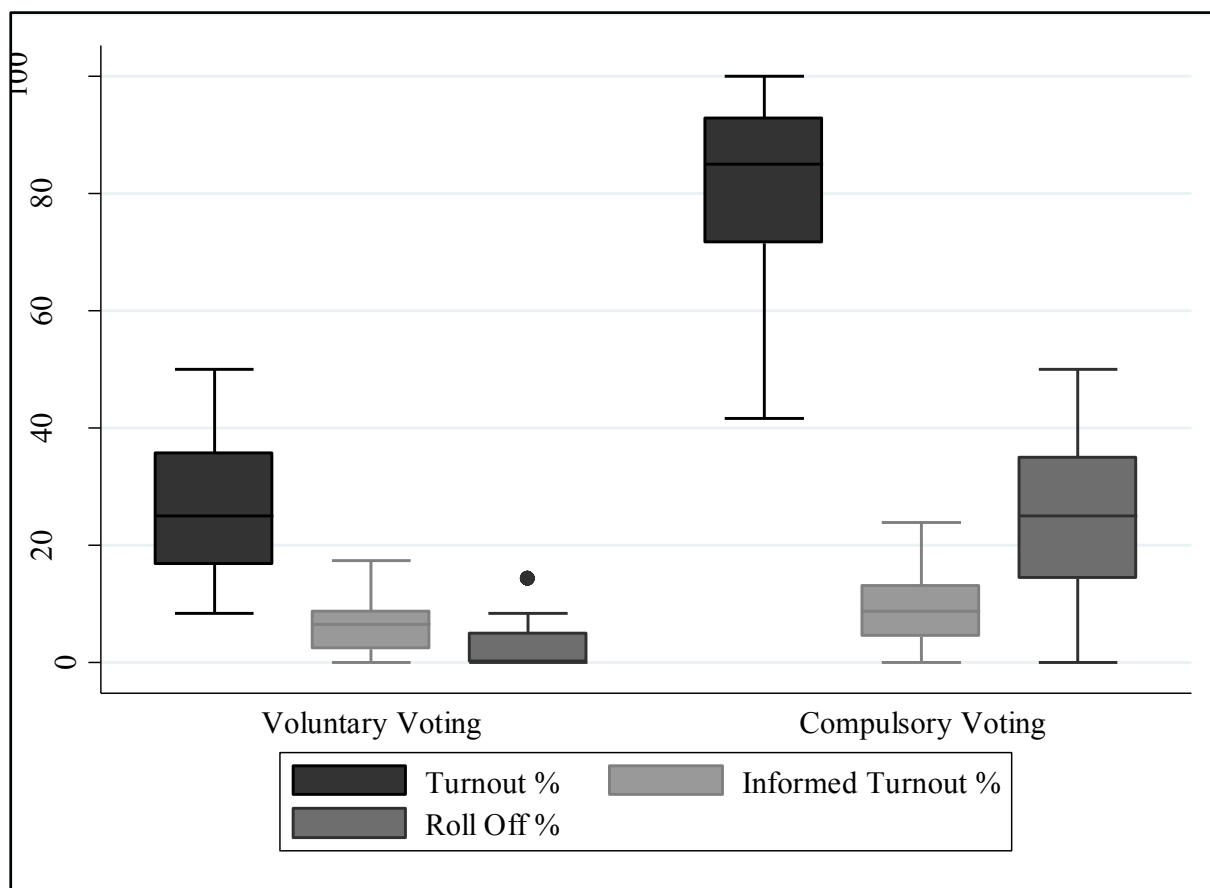
Note: The graph compares the three dependent measures between voting modes.

Therefore, this study proceeds by comparing the means of the dependent variables by voting modes without accounting for the different values of costs of not participating in the different treatments at this point. Table 62 reports the summary statistics for the dependent measures and also the t-score and p-values from the conducted T-test for paired data[88].

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[88] Usually, T-tests compare the mean of one or more dependent variables between unrelated groups. In this case groups were not unrelated. Instead, the same subjects were measured before and after the introduction of a treatment (compulsory voting laws). Thus, for comparing means, this study conducts dependent T-tests or paired data. Note also that T-scores and p-values where obtained from within fixed level regression fitted for each dependent variable with a dummy variable for the two voting modes (CV; 0 = voluntary voting, 1 = compulsory voting).

Table 62 Summary Statistics for the dependent measures before and after introducing compulsory voting

Variable	Voluntary Voting			Compulsory Voting			T-score	P-value
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.		
Turnout	276	27.89	12.37	828	81.40	14.46	61.30	0.000
Informed Turnout	276	6.33	4.22	828	9.65	5.71	10.96	0.000
Roll Off	276	2.17	3.96	828	23.91	12.30	28.51	0.000

Note: Differences in the numbers of observations are due to the fact that voluntary voting was only played for 6 periods in each treatment, whereas compulsory voting was implemented for 18 periods in each treatment.

The summary statistics support the notion of Figure 21 above, that there is an observable difference in individual behavior comparing the two voting modes. For instance, only 27.89% of the subjects on average decided to enter the election stage in the experimental periods employing voluntary voting. Instead, over 81% entered the voting stage in the compulsory voting runs. This is completely in line with previous results regarding compulsory voting and the general theoretical assumption that CV-laws boost turnout substantially. The accompanied p-value of the paired t-test indicates that the differences in the mean turnout levels are significantly different between voting modes.

With respect to levels of information acquisition differences in the means are not as strong as in the other two measures. Nonetheless, the difference is statistically significant. Regarding invalid voting the table shows, that levels of subjects rolling off at the voting stage increase notably when voting rules are changed from voluntary to compulsory. That is in line with the model assumption.

In general, the summary statistics suggest that the introduction of compulsory voting rules strongly affect individual voting behavior within the experiment. However, this does not help to understand how compulsory voting rules affect individual behavior in this setup. Therefore, it is crucial to focus on the examination of the impact of costs of not participating (c_{nv}) and levels of law enforcement (p) as suggested by the model presented at the beginning of this chapter.

To get a first impression of how different levels of c_{nv} affect individual behavior within the experiment, Table 63 provides summary statistics for the dependent measures by the three different treatment conditions. In general, summary statistics show that the mean levels of the dependent variables between voting modes vary over treatment conditions.

Table 63 Summary Statistics for the dependent measures by voting rules and Treatments

	Compulsory Voting			
	Mean	**Std. Dev.**	**Obs.**	**N**
Treatment = 1				
Turnout	68.06	15.31	216	12
Informed Turnout	5.68	2.92	216	12
Roll Off	22.22	14.47	216	12
Treatment = 2				
Turnout	85.56	10.54	360	20
Informed Turnout	13.89	5.39	360	20
Roll Off	23.61	10.53	360	20
Treatment = 3				
Turnout	86.90	10.99	252	14
Informed Turnout	7.00	3.52	252	14
Roll Off	25.79	12.43	252	14

Note: In Treatment 1 Cnv = 30. In Treatment 2 Cnv = 60. In Treatment 3 Cnv = 90.

For instance, comparing the mean turnout levels in the compulsory voting mode over treatment conditions, the table shows the mean turnout increases over treatment conditions, even though the increase in the mean turnout between T2 and T3 is only marginal. Furthermore, the table indicates that in the case of the variable *Turnout*, even low penalties (T1) are able to mobilize subjects to enter the election stage compared to the control condition - but this mobilization effect is much stronger in the treatment conditions employing higher penalties (T2 and T3). For the variables, *Informed Turnout* and *Roll Off* differences are not that striking with respect to the different treatment conditions. In the case of levels of information acquisition, mean levels of informed turnout are frankly highest in the second treatment condition. With respect to invalid voting, the table shows that the mean of invalid votes increases slowly by treatments.

Figures 22, 23 and 24 show the development of all three dependent measures over periods considering the impact of c_{nv} and p. Recall that costs of not participating were manipulated between treatments, whereas levels of law enforcement were varied within treatments. Note that this chapter is particularly interested in two things. First of all, it wants to test whether the main predictions of the calculus of compulsory voting approach regarding turnout and the notion of the decision theoretical approach regarding information acquisition also hold in a game theoretic model. Second of all, drawing on the critical literature on compulsory voting, it also wants to examine whether compulsory voting laws could also lead to higher levels of invalid voting.

Figure 22 entails a line graph for the variable *Turnout* over periods. Note, also that the figure also considers the different treatment conditions. Recall, that in treatment condition one (T1) $c_{nv} = 30$, in treatment condition two (T2) $c_{nv} = 60$ and in treatment condition three (T3) $c_{nv} = 90$. The vertical reference lines within the graph refer to the different levels of p, implemented analogously in all three treatment conditions. It follows that Periods 1 to 5 re-
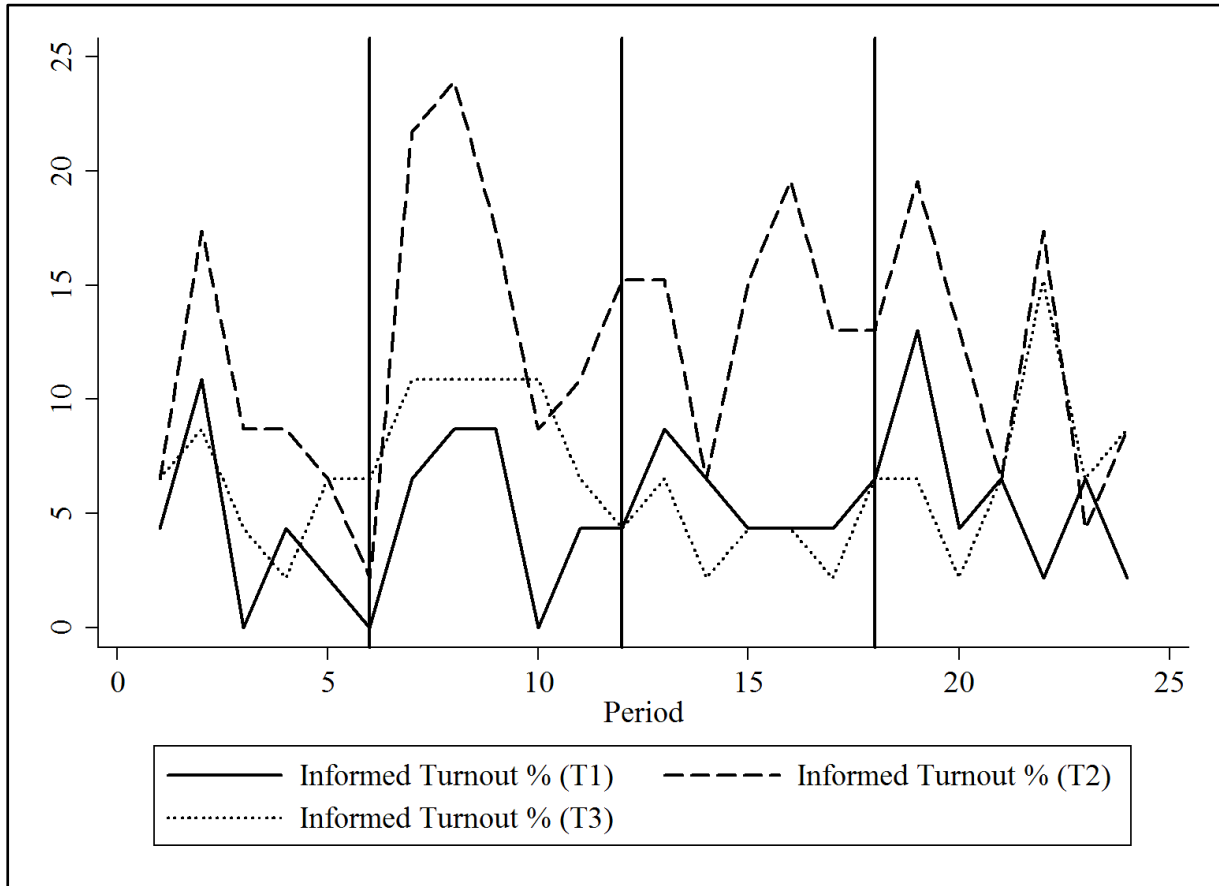
Figure 22 Turnout over Periods by Treatments
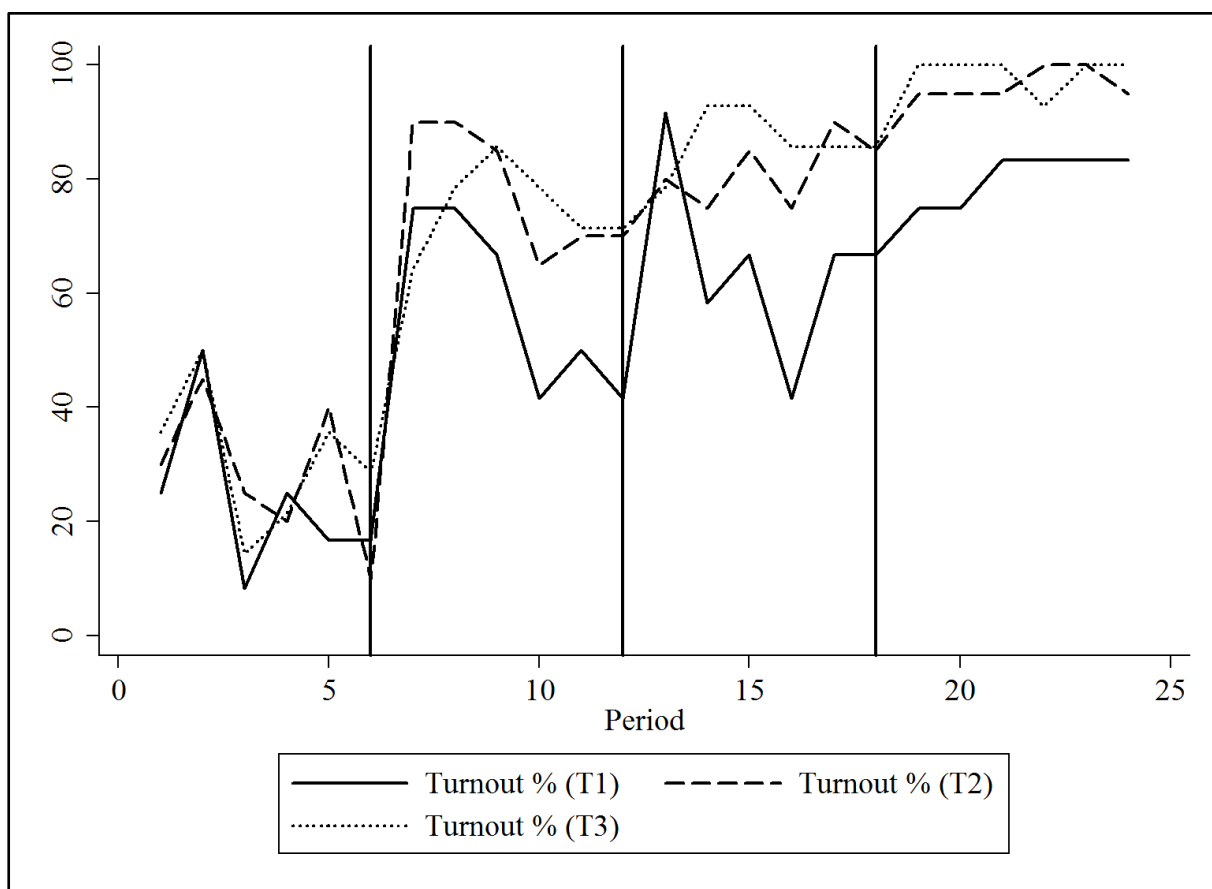
Note: T1 refers to Treatment 1 in which $c_{nv} = 30$. T2 refers to Treatment 2 in which $c_{nv} = 60$. T3 refers to Treatment 3 in which $c_{nv} = 90$. Vertical reference lines mark the introduction of new levels of law enforcement (p), which remains active until the next reference line. In period 6 $p = 0.5$, in period 12 $p = 0.75$ and in period 18 $p = 1.00$.

172

flect the control condition. That is, voting is voluntary in these periods. The graph indicates that in the control condition, turnout is surprisingly high in the first period but rather low in general, which is in line with the overall expectation of H1 regarding abstention level in the voluntary voting conditions. Moreover, it also agrees with the main prediction of the calculus of compulsory voting approach and empirical findings of the previous chapter. It also is in line with the general prediction of game theoretical models of voting, which only expect substantial turnout if voters are certain about voting costs and preferences of all voters (for a review of this literature see Geys, 2006b). Furthermore, this also reflects the assumptions regarding the free rider problem (Olson, 1965). Individuals that collectively provided a collective good, say an election outcome, fail to coordinate and thus have a strong incentive to abstain from participating in the provision of the collective good.

After the introduction of compulsory voting in Period 6, levels of turnout seem to be substantially affected. Turnout numbers increase rapidly from under 20% in Period 5 to almost 90% in Period 7 across all treatment conditions. One the one hand, this supports the general notion that compulsory voting laws positively affect turnout, but it partly contradicts the assumptions posed by this chapter's model and the calculus of voting approach with respect to the level of increase in turnout due to low penalties and rather ineffective law enforcement. Recall, that H2 states that levels of turnout and levels of information acquisition are supposed to be only slightly higher if costs of not participating and levels of law enforcement are only marginally increased. With respect to the variable Turnout, however, the graph indicates a massive increase in turnout in Period 7 for all values of c_{nv} even if p is low. However, with respect to increasing levels of p over the treatments the graph shows that individual behavior in the experiments is mostly in line with the expectations stated in H4. One part of H4 expects turnout to be increasing as costs of not voting and levels of law enforcement are moderate and higher. The graph obviously shows that numbers of turnout increase as penalties and levels of law enforcement increase at the same time.

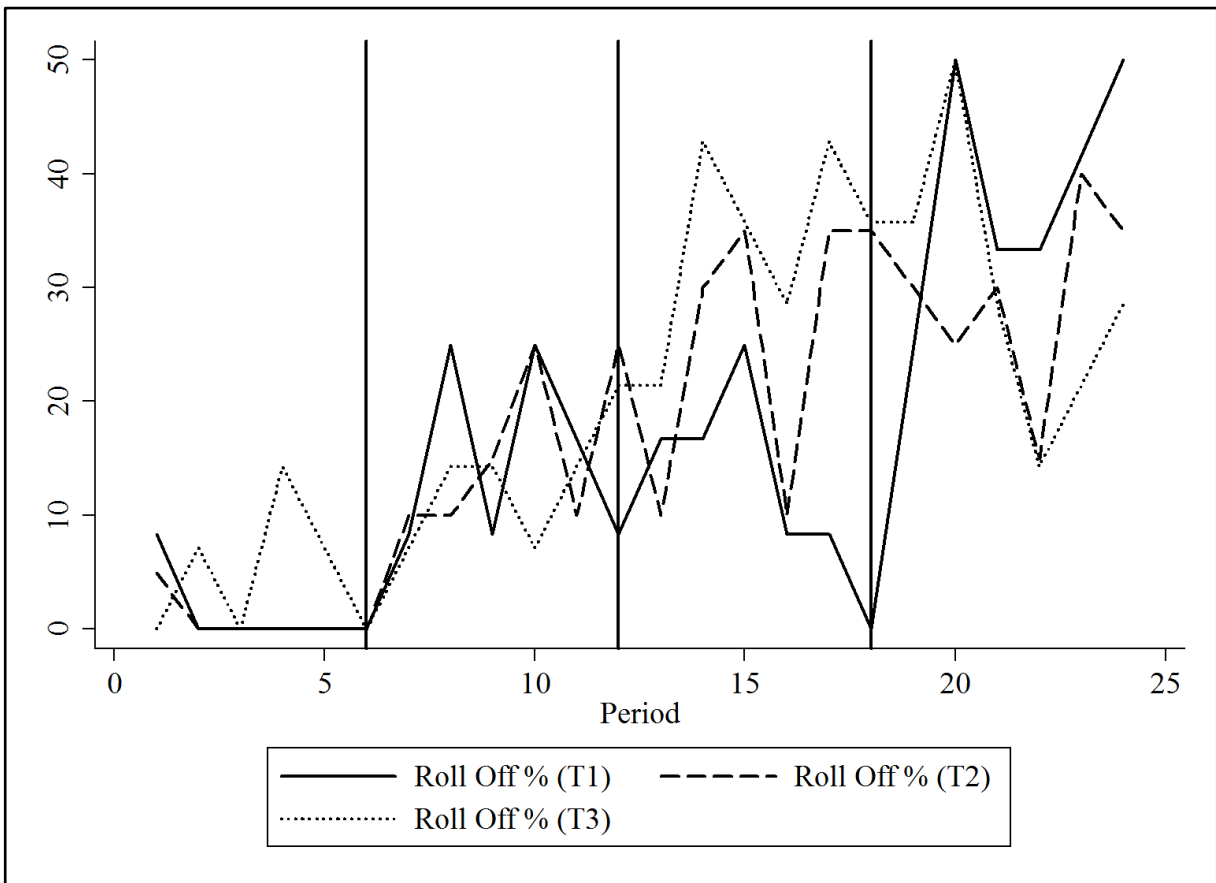**Figure 23 Informed Turnout over Periods by Treatments**

Note: T1 refers to Treatment 1 in which $c_{nv} = 30$. T2 refers to Treatment 2 in which $c_{nv} = 60$. T3 refers to Treatment 3 in which $c_{nv} = 90$. Vertical reference lines mark the introduction of new levels of law enforcement (p), which remains active until the next reference line. In period 6 $p = 0.5$, in period 12 $p = 0.75$ and in period 18 $p = 1.00$.

The graph in Figure 23 shows that levels of information acquisition are considerably low in the voluntary voting condition. In fact, far less than 20 % of the subjects picked up information in the first five periods. This is in line with the expectation drawn from this chapters´ model and formulated also in hypotheses H1. It also agrees with the empirical findings of the previous chapter, showing that information acquisition is rather low if voting is voluntary. It also reflects the main predictions of game theoretical models considering the importance of information acquisition in the process of voting. For example, Matsusaka (1995), Feddersen and Pesendorfer (1996) argue that voting becomes more likely as individuals become more certain for whom to vote. Uninformed voters, however, do not have an incentive to engage in the election since they are very likely to make voting mistakes and thereby reduce their own expected payoff. Since the voluntary voting condition proposed by this chapter's model offers the uninformed voter have a higher incentive to abstain, they also have no incentive to pick up additional information.

Regarding the variable *Informed Turnout,* the graph also shows that levels of information acquisition seem to be affected by compulsory voting, yet the impact is not as strong as on general turnout. However, there is a slight increase in levels of information acquisition after Period 6. Nonetheless, the graph shows that numbers of uninformed turnout have to be substantially higher than levels of informed turnout. In fact, information acquisition increases the most in low levels of p and moderate levels of Cnv. This partly contradicts the predictions of the model which expects the highest levels of information acquisition, when Cnv and p are beyond moderate (H5). Overall, however, the graph shows that individual levels of information acquisition do, in fact, match the model's expectations since numbers of Informed Turnout are higher in the compulsory voting mode.

With respect to variable *Roll Off,* which captures the percentage of subjects entering the voting stage but casting invalid ballots, the graph in Figure 24 shows that levels of invalid balloting are generally higher in the experimental runs employing compulsory voting.

Figure 24 Roll Off over Periods by Treatments

Note: T1 refers to Treatment 1 in which $c_{nv} = 30$. T2 refers to Treatment 2 in which $c_{nv} = 60$. T3 refers to Treatment 3 in which $c_{nv} = 90$. Vertical reference lines mark the introduction of new levels of law enforcement (p), which remains active until the next reference line. In period 6 $p = 0.5$, in period 12 $p = 0.75$ and in period 18 $p = 1.00$.

This is in line with the expectation stated in H3, claiming that numbers of invalidly casted votes should be increasing as levels of Cnv and p increase at the same time. Furthermore, the graph reveals that levels of invalid voting are highest when levels of law enforcement are increased to their maximum. The reason for that is, as predicted by the model, by entering the voting stage without handing in a valid vote, subjects avoid penalties for not participating. Moreover, they avoid information costs by entering the voting stage while remaining uninformed. Because of the strategic nature of this game, uninformed subjects that have entered the voting stage, can, by rolling off, "delegate" their vote to their partner and can, therefore, avoid voting mistakes. In contrast to the expectation of H5 however, the variable *Roll Off* is highest when p is also highest while Cnv is low. This is not in line with H5. Generally, the graph indicates that compulsory voting laws, besides boosting turnout, also increases levels of invalid voting. Additionally, the graphs show that different values of Cnv or p affect individual behavior differently. to the different levels of penalties and law enforcement.

Statistical Analysis

To test whether this effect is, in fact, statistically significant, the study proceeds by reporting the results of three ANOVA-analyses conducted in stata. Therefore, three ANOVA-analyses were run with a sample of 46 participants to examine the effect of costs of not participating and different levels of law enforcement on the variables *Turnout*, *Informed Turnout,* and *Roll Off*. Table 64 contains the joint output of the three ANOVA-analyses. For all three dependent measures, numbers suggest that there is a significant interaction between different levels of Cnv (Treatment) and different levels of law enforcement. Furthermore, the output shows that focusing on simple main effects the two factors also individually have a positive effect on the dependent variables. For instance, increasing penalties lead to higher turnout levels (p = 0.000), higher levels of information acquisition (p = 0.000) but also higher levels of invalid voting (p = 0.000). This also accounts for the analysis of the simple main effect of levels of law enforcement on the dependent variables. Corresponding p-values (p 0.000 for all dependent variables) show that changing law enforcement also affects individual behavior in terms of turning out, getting informed or voting validly. In addition to the significant simple main effect and the significant interaction effects, the corresponding r-squared values reported underneath the joint ANOVA-output show a very good overall fit of the estimated models. This means that in the case of the experimental implementation of the game-theoretic model, costs of not participating and levels of law enforcement are still good predictors to explain the functioning of compulsory voting.

Table 64 ANOVA-Output for all dependent variables

Source	Turnout					Informed Turnout					Roll Off				
	SS	df	MS	F	p	SS	df	MS	F	p	SS	df	MS	F	p
Model	712295.26	11	64754.11	741.73	0.0000	17272.95	11	1570.26	101.31	0.0000	163293.48	11	14844.86	253.43	0.0000
Treatment	48392.51	2	24196.25	277.16	0.0000	11857.86	2	5928.93	382.53	0.0000	2191.29	2	1095.64	18.70	0.0000
p	608636.28	3	202878.76	2323.88	0.0000	2510.90	3	836.96	54.00	0.0000	134010.37	3	44670.12	762.61	0.0000
Treatment # p	8006.03	6	1334.33	15.28	0.0000	2059.15	6	343.19	22.14	0.0000	22768.84	6	3794.80	64.79	0.0000
Total	807628.60	1103	732.21			34197.96	1103	31.00			227257.76	1103	206.03		

Note: For Turnout number of obs. = 1104. R^2 = 0.88. Adj. R^2 = 0.88. For Informed Turnout number of obs. = 1104. R^2 = 0.50. Adj. R^2 = 0.50. For Roll Off number of obs. = 1104. R^2 = 0.71. Adj. R^2 = 0.71. Treatment # p refers to the interaction of the two factors.

For a more thorough analysis of simple main effects Table, 65 reports contrasts[89] for the variable p considering the three different treatment conditions. The contrasts analysis shall show whether levels of law enforcement have a significant effect on the outcome variables comparing every level of p to their base category. In this case, that means comparing the impact of levels of law enforcement to no law enforcement (control condition) given the different treatments. The output shows that for all dependent variables, the effects of levels of law enforcement are significant on the outcome variables in all treatment conditions. However, contrasts differ in terms of strength and direction. For example, the analysis of contrasts with regard to the variable Turnout reveals that increasing levels of law enforcement, compared to the base category, lead to substantially higher mean turnout.

With respect to levels of information acquisition, the analysis of contrasts is not as conclusive. First of all, mean levels of information gathering are not strongly affected by changing levels of law enforcement. Second of all, the direction of the effect changes as well. For instance, in Treatment 3, mean levels of information acquisition are developing in a negative direction compared to the baseline category, even though p is increased. Furthermore, in Treatment 2 mean levels of information acquisition are highest when levels of law enforcement are still low. Thus, the analysis reveals no clear positive effect on the levels of law enforcement and information gathering in the experiment.

Regarding the variable *Roll Off*, the contrast's output shows a similar but not as strong pattern as the analysis of the variable *Turnout*. Overall, it can be concluded that increasing levels of p have a positive and significant effect on the mean level of invalid voting in the experiment. That is in line with the expectation of the model. But also provides evidence for opponents of compulsory voting rules.

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[89] Contrasts is a post-estimation test comparing means.

Table 65 Main Effects of p compared by Treatments

	Turnout				Informed Turnout				Roll Off			
	Contrasts	**Std. Err.**	**t**	**P > t**	**Contrasts**	**Std. Err.**	**t**	**P > t**	**Contrasts**	**Std. Err.**	**t**	**P > t**
Treatment 1												
Low vs. Control	34.72	1.55	22.30	0.000	1.81	0.65	2.76	0.006	13.88	1.27	10.89	0.000
Medium vs. Control	41.66	1.55	26.76	0.000	2.17	0.65	3.31	0.001	11.11	1.27	8.71	0.000
High vs. Control	56.94	1.55	36.57	0.000	2.17	0.65	3.31	0.001	37.5	1.27	29.40	0.000
Treatment 2												
Low vs. Control	50	1.20	41.45	0.000	7.97	0.50	15.68	0.000	15	0.98	15.18	0.000
Medium vs. Control	53.33	1.20	44.21	0.000	5.43	0.50	10.69	0.000	25	0.98	25.30	0.000
High vs. Control	68.33	1.20	56.65	0.000	3.26	0.50	6.42	0.000	28.33	0.98	28.68	0.000
Treatment 3												
Low vs. Control	44.04	1.44	30.55	0.000	3.26	0.60	5.37	0.000	8.33	1.18	7.06	0.000
Medium vs. Control	55.95	1.44	38.81	0.000	-1.44	0.60	-2.39	0.017	29.76	1.18	25.20	0.000
High vs. Control	67.85	1.44	47.07	0.000	1.81	0.60	2.98	0.003	25	1.18	21.17	0.000

Note: Table shows contrasts obtained after the ANOVA- command. For each treatment different levels of p were tested against the base level of p, which is p = 0 (control condition).

After examining the main effects of the different levels of law enforcement, Table 66 reports the contrasts analysis output regarding the effect of the treatment variables on the dependent measures, given different levels of p[90]. Recall, that the different treatments simply refer to different implementations of costs of not participating (c_{nv}). Again, the contrasts analysis compares the mean values of the dependent measures, but this time considering different levels of c_{nv}.

With respect to the *Turnout* variable, the output generally indicates statistically significant differences in numbers of mean turnout comparing Treatment 2 and Treatment 3 to the baseline category (Treatment 1). It follows that higher levels of c_{nv} lead, on average, to higher levels of turnout in the conducted experiments. That is in line with the expectations of the calculus of compulsory voting and this chapters´ model. Moreover, the output also shows that in almost all cases, mean levels of turnout are highest when levels of c_{nv} are also at their maximum. Yet, if p is low mean levels of turnout, compared to the base category, are higher in Treatment 2 than in Treatment 3.

Like in the analysis of the main effects of levels of law enforcement, the output below, reporting the main effects of costs of not participating, reveals statistically significant but mixed evidence for the variable *Informed Turnout*. For instance, the output shows that mean levels of information acquisition go up as levels of penalties increase, as expected by the model. However, information gathering appears to be higher in cases in which penalties are at a medium level and not at a high level. Instead, levels of informed turnout appear to be only slightly higher in Treatment 3 compared to the baseline condition. Moreover, considering medium levels of p, mean levels of information acquisition are even higher in the baseline category. It follows that there is no clear positive relationship between the main effects of costs of not participating on the variable *Informed Turnout* as initially presumed by the model.

This also accounts for the analysis of the difference in the mean of the variable *Roll Off*. Recall that the model also expects increasing levels of invalid voting due to increasing levels of penalties. The output, however, suggests that this is only the case if levels of law enforcement are medium. Given that condition, the output reveals a significant difference in mean levels of invalid voting compared to the baseline category. In the case of high or low levels of law enforcement, the difference in the mean levels of invalid voting is negative when compared to mean levels of rolling off in the first treatment or difference in the mean are statistically not significant.

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[90] Since the treatment variable can only have a logical effect on individual behavior if p > 0, p = 0 is not included in the analysis of contrasts at this point.

The analysis of contrasts with respect to the main effects of the treatment variable generally suggests that considering both factors at the same time is supposed to be a better explanation for the functioning of compulsory voting laws in the experiments. Thus, the study will proceed by reporting the marginal effects of the interaction of c_{nv} and .

Table 66 Main Effects of Treatment compared by levels of p

	Turnout				Informed Turnout				Roll Off			
	Contrasts	Std. Err.	t	P > t	Contrasts	Std. Err.	t	P > t	Contrasts	Std. Err.	t	P > t
P = low												
T2 vs. T1	20	1.39	14.36	0.000	10.86	0.58	18.52	0.000	0.55	1.14	0.49	0.626
T3 vs.T1	16.66	1.50	11.11	0.000	3.62	0.63	5.73	0.000	-2.18	1.22	-1.78	0.076
P = Medium												
T2 vs. T1	16.38	1.39	11.77	0.000	7.97	0.58	13.58	0.000	13.33	1.14	11.69	0.000
T3 vs.T1	21.62	1.50	14.41	0.000	-1.44	0.63	-2.29	0.022	22.02	1.22	17.92	0.000
P = High												
T2 vs. T1	16.11	1.39	11.57	0.000	5.79	0.58	9.88	0.000	-9.72	1.14	-8.52	0.000
T3 vs.T1	18.25	1.50	12.16	0.000	1.81	0.63	2.87	0.004	-9.12	1.22	-7.43	0.000

Note: Table shows contrasts obtained after the $ANOVA$- command. For each treatment different levels of Cnv were tested against the base level of Cnv, which is Cnv = 30.

Table 67 contains the results of the predictive margins for that interaction. Recall that predictive margins basically compute the predicted value of a dependent variable for each observation. Thus, the output below reports the predicted outcomes for the dependent variables, given the different treatment conditions (different levels of c_{nv}) and the different levels of law enforcement.

With respect to the variable *Turnout,* the output reports higher levels of turnout in the compulsory voting conditions in general and increasing levels of turnout for increasing levels of the two factors in particular. Moreover, the output shows that numbers of turnout are highest in the experiments when both factors, c_{nv} and p, are increased to their maximum. Overall, these predictions are statistically significant. Furthermore, they fit the expectations drawn from the calculus of compulsory voting and transferred into a game theoretical model at the beginning of this chapter.

Like in the analysis of simple main effects, the marginal effects output of the interaction of c_{nv} and p also finds mixed evidence with respect to the variable *Informed Turnout*. Generally, predicted levels of information acquisition are higher in the compulsory voting mode than in the control condition, except for the interaction of high penalties at medium levels of law enforcement. But within the compulsory voting conditions, information acquisition does not follow the prediction drawn from the model. Recall, that the model expected increasing levels of information acquisition as penalties and levels of law enforcement also increase. The output, however, reveals statistically significant but mixed predictions for levels of information gathering given the interaction of c_{nv} and p.

Akin to the prediction of the variable *Turnout,* the predictive margins for the variable *Roll Off* show that levels of invalid turnout are higher in the compulsory voting mode compared the voluntary voting mode. Furthermore, the output indicates that levels of invalid voting are supposed to be highest when both factors are maximally increased. These findings match the overall prediction of the model with respect to invalid voting.

Table 67 Predictive Margins for dependent Measures compared by Treatments at levels of p

	Turnout				Informed Turnout				Roll Off			
	Margins	**Std. Err.**	**z**	**P > z**	**Margins**	**Std. Err.**	**z**	**P > z**	**Margins**	**Std. Err.**	**z**	**P > z**
Treatment 1												
Control	23.61	1.10	21.44	0.000	3.62	0.46	7.81	0.000	1.38	0.90	1.54	0.12
Low	58.33	1.10	52.98	0.000	5.43	0.46	11.71	0.000	15.27	0.90	16.94	0.000
Medium	65.27	1.10	59.28	0.000	5.79	0.46	12.49	0.000	12.5	0.90	13.86	0.000
High	80.55	1.10	73.16	0.000	5.79	0.46	12.49	0.000	38.88	0.90	43.12	0.000
Treatment 2												
Control	28.33	0.85	33.22	0.000	8.33	0.35	23.19	0.000	0.833	0.69	1.19	0.233
Low	78.33	0.85	91.84	0.000	16.30	0.35	45.37	0.000	15.83	0.69	22.66	0.000
Medium	81.66	0.85	95.75	0.000	13.76	0.35	38.31	0.000	25.83	0.69	36.98	0.000
High	96.66	0.85	113.33	0.000	11.59	0.35	32.26	0.000	29.16	0.69	41.75	0.000
Treatment 3												
Control	30.95	1.01	30.36	0.000	5.79	0.42	13.50	0.000	4.76	0.83	5.70	0.000
Low	75	1.01	73.57	0.000	9.05	0.42	21.09	0.000	13.09	0.83	15.68	0.000
Medium	86.90	1.01	85.25	0.000	4.34	0.42	10.12	0.000	34.52	0.83	41.34	0.000
High	98.80	1.01	96.92	0.000	7.60	0.42	17.71	0.000	29.76	0.83	35.64	0.000

Note: In Treatment 1 $c_{nv} = 30$. In Treatment 2 $c_{nv} = 60$. In Treatment 3 $c_{nv} = 90$. Control refers to p = 0. Low refers to p = 0.5. Medium refers to p = 0.75. High refers to p = 1.00

For a closer look at the interaction effect between costs of not participating and levels of law enforcement Figure 25 provides a plot of the marginal prediction regarding the variable *Turnout*. The graph shows the predicted turnout for different levels of p and compares that by

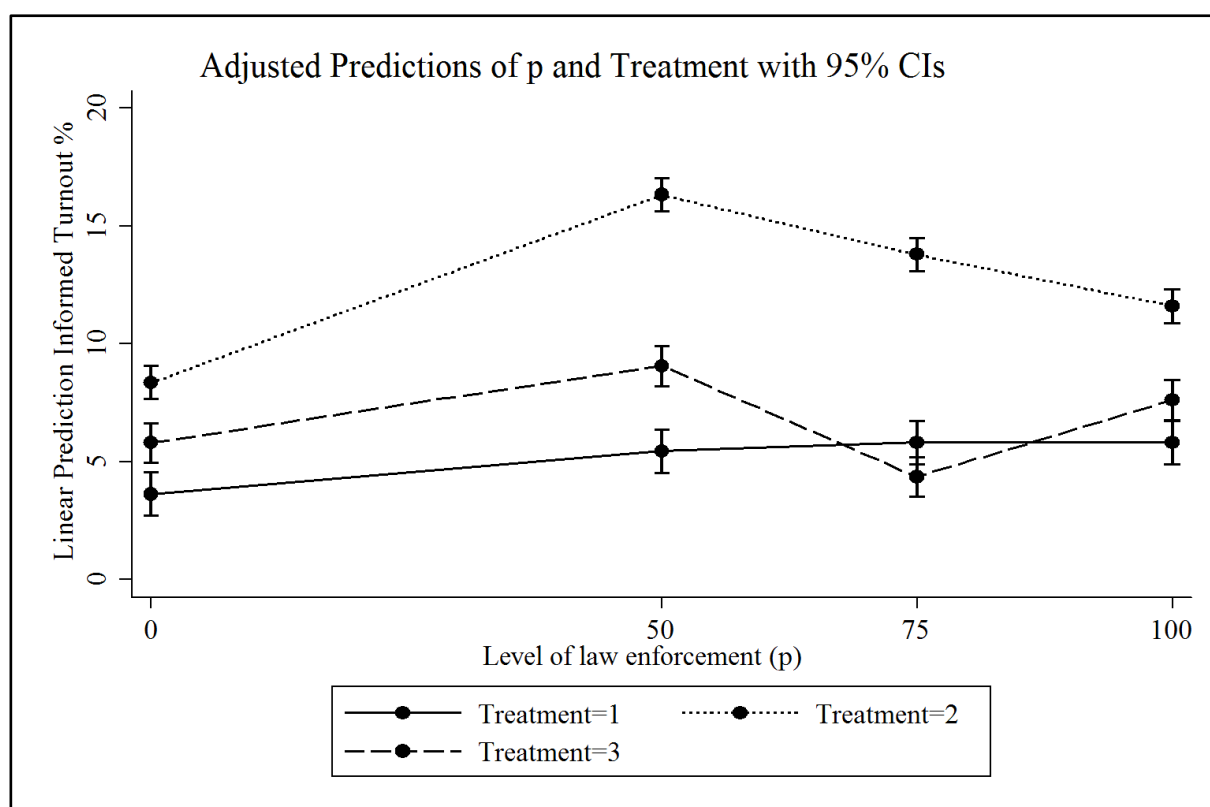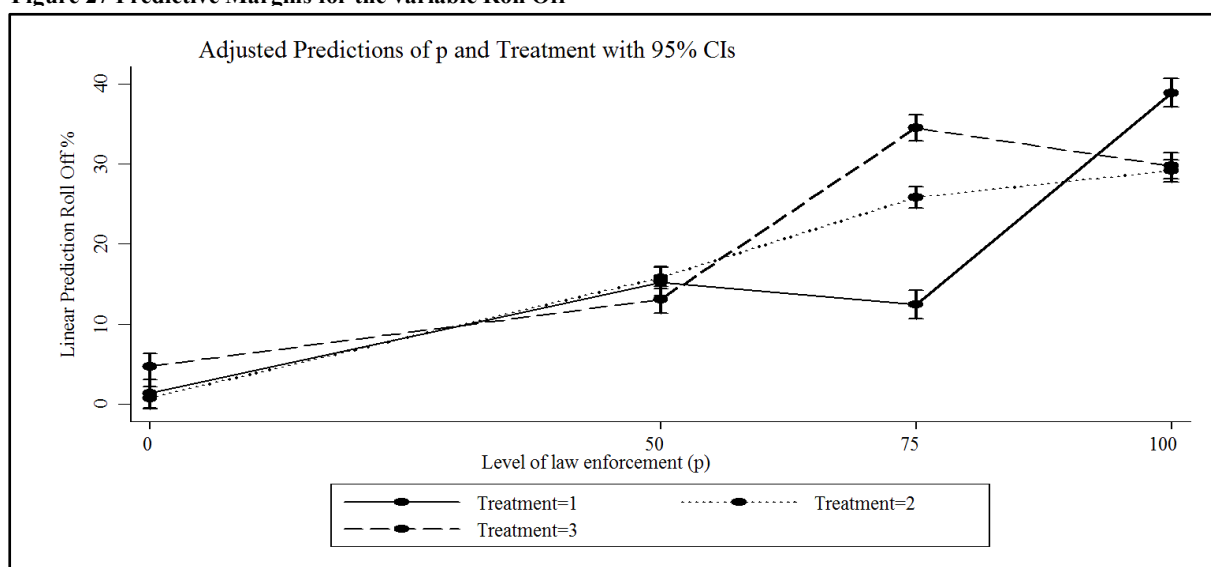**Figure 25 Predictive Margins for the variable Turnout**
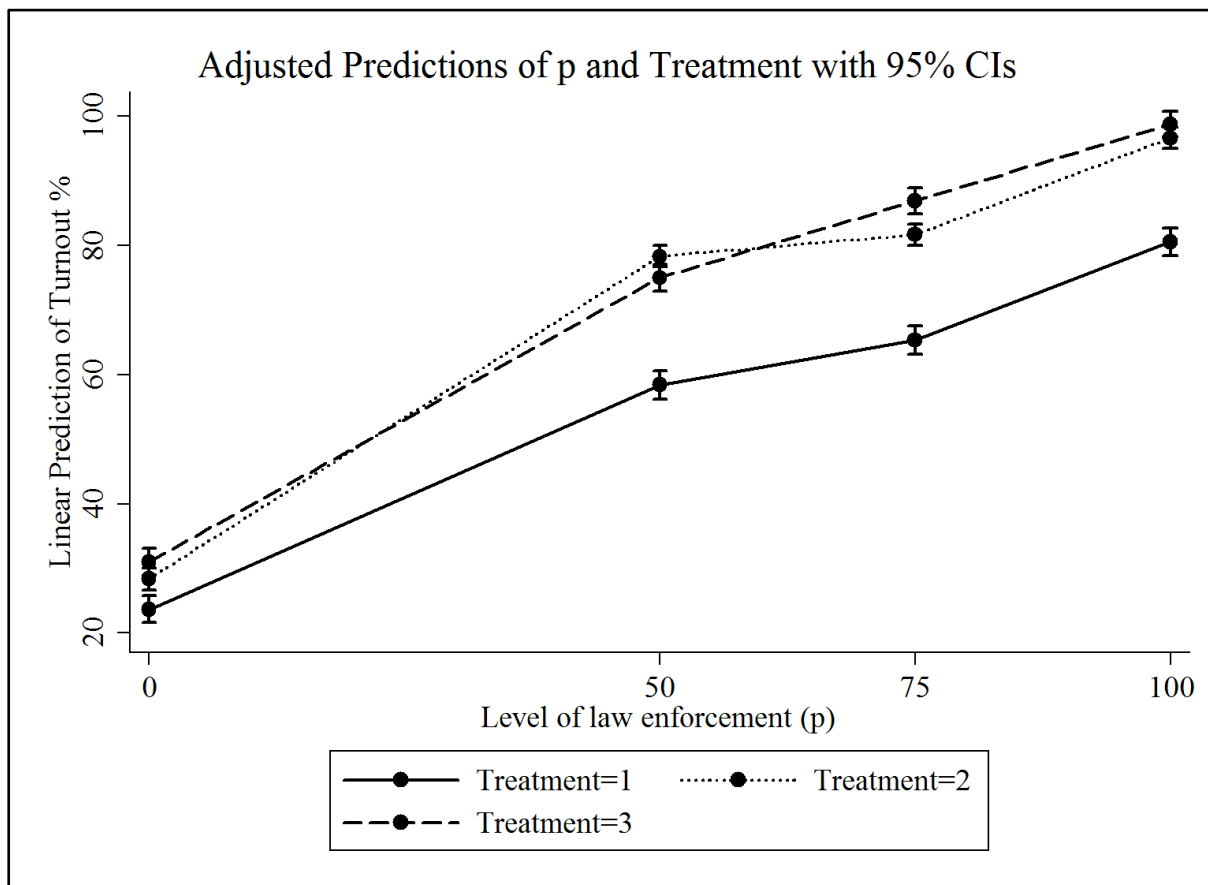
Note: In Treatment 1 $c_{nv} = 30$. In Treatment 2 $c_{nv} = 60$. In Treatment 3 $c_{nv} = 90$. The control condition is p = 0.

different levels of c_{nv}. As in the output above, the graph shows that there is a strictly positive relationship between the introduction of the compulsory voting law in general and the development of turnout rates. In fact, turnout increases from roughly 30% in the voluntary voting periods to 55% in the compulsory voting periods in all treatment conditions. This finding is in line with H1, which partly claims that turnout will be low in the experimental runs employing voluntary voting. It also generally coincides with H2, which states that turnout will be increased when voting is compulsory. However, H2 also expects only a small increase in turnout due to moderate or low levels of penalties and law enforcement. This is true for Treatment 1 represented by the solid line in the graph. The prediction shows that turnout will be higher when voting is compulsory, but the increase will not be as strong if c_{nv} and p are only low. In that case, for instance, turnout rates are about 58%. In the case of higher penalties, turnout levels immediately go up to over 70% even at low levels of law enforcement. The graph is

also in line with the expectation of H4, claiming that turnout numbers will be increasing as levels of Cnv and p go up. For all combinations of Cnv and p, the graph indicates an almost linearly relationship between increasing levels of the two factors and the *Turnout* variable. Overall, the graph suggests that the findings of this study regarding the effect of compulsory voting on turnout in general and the effect of Cnv and p on turnout, in particular, are in line with the assumptions of the calculus of compulsory voting approach and the empirical results gained from this concept. It also supports the findings of the study conducted by Shineman (2010) and the decision-theoretic model and experimental implementation presented in the previous chapter.

Regarding the variable *Informed Turnout,* Figure 26 contains the plot of the adjusted

Figure 26 Predictive Margins for the variable Informed Turnout

Note: In Treatment 1 $c_{nv} = 30$. In Treatment 2 $c_{nv} = 60$. In Treatment 3 $c_{nv} = 90$. Tbe control condition is p = 0.

prediction. The graph supports the general notion that the effects of costs of not participating and levels of law enforcement on levels of information acquisition are not as conclusive as they are for the findings regarding general turnout numbers. In general, the graph suggests that levels of information acquisition are marginal when voting is voluntary and this does not substantially change when compulsory voting rules are introduced. Thereby, the graph supports the general notion of the second part of H1 which states that subjects are not expected to

adopt information in the voluntary voting periods. With respect to the expected increase in informed voting as stated in H2, H4, and H5, this study finds no clear evidence that compulsory voting leads to substantially higher levels of information acquisition. In fact, the graph predicts information acquisition rates under 10% for cases in which costs of not participating and levels of law enforcement are mutually high. Only in the case of medium penalties levels of information acquisition exceed the 10% level. Thus, it follows, that compulsory voting, in this setup, does not change the predictions of former game theoretic voting models or the basic assumption of the collective action theory. Ultimately, it seems like in a strategic situation such as voting, individuals have a high incentive to even remain uninformed when participating. One reason for that could be the strategic element of this situation and individuals hoping for their counterpart to make an informed decision, so they could avoid paying information costs themselves. Since the variable Turnout in this study only measures the percentage of subjects entering the voting stage in the experiment, and information acquisition is generally low, it seems rather plausible that invalid voting plays an important role in this setup. Figure 27 shows the adjusted prediction plot for the variable *Roll Off*. Recall that *Roll Off* refers to the percentage of subjects entering the voting stage but not casting a valid vote. The model generally expects invalid voting to be an important issue because subjects can avoid potential penalties for not participating and also avoid information costs by remaining uninformed and entering the voting stage anyway. Thereby, given the specific parameter of the game, subjects could increase their potential payoff. In fact, results show that. Firstly, invalid voting occurs much more often in the compulsory voting periods than in the control periods.

Figure 27 Predictive Margins for the variable Roll Off

Note: In Treatment 1 $c_{nv} = 30$. In Treatment 2 $c_{nv} = 60$. In Treatment 3 $c_{nv} = 90$. Tbe control condition is p = 0.

Secondly, except for the little dent in the case of low penalties and medium levels of law enforcement, invalid voting increases rather drastically as penalties and levels of law enforcement increase. This is in line with the expectation of this chapter's model. For instance, H3 states that invalid voting would increase if the two factors would mutually rise as well. Also, this graph shows that the findings regarding the variable *Roll Off* largely agree with H5, too. That hypothesis claimed higher levels of invalid voting as Cnv and p are increased to their maximum Overall, this study finds empirical evidence for the notion that compulsory voting could lead to invalid voting. Thereby it opposes the findings of the study proposed by Shineman (2010) and instead finds support for opponents of compulsory voting laws like Jakee and Sun (2006) or Singh and Thornton (2013), who actually point to this possibility.

5.4 Discussion

In this chapter, this study examined the question whether the main predictions of the calculus of compulsory voting also applies to a game theoretic model of voting. This chapter focused on the impact of costs of not participating and levels of law enforcement on general turnout numbers, levels of information acquisition and numbers of invalid voting in a two-person election game. Previous studies have shown that compulsory voting substantially increases turnout. Furthermore, some studies found evidence for the notion that a legal requirement to participate in the elections could also lead voters to reason more about their vote choices and therefore increase informed voting as well (Shineman, 2010). Even though this claim is highly controversial, drawing on a decision-theoretic model, this study also finds empirical evidence for this claim in the previous chapter. However, a decision-theoretic approach neglects the strategic nature of elections. Thus, this chapter transfers the main predictions of the calculus of compulsory voting into a game theoretic model. Like the experimental test of the decision-theoretical model, this chapter also utilizes a series of controlled laboratory experiments in order to answer the question of how and to what extent compulsory voting affects individual behavior in a two-person voting game.

Drawing on previous game theoretic studies modeling voting in general (for example Palfrey and Rosenthal, 1983) and basic assumptions of the collective actions theory (Olson, 1965) in particular this study suspects that the decision-theoretic model, presented by Shineman (2010), is not accurate regarding the strategic nature of collective decision-making. For several reasons, it can be argued that individuals, in the provision of a collective good, have a strong incentive not to cooperate but still benefit from the collectively achieved good. This study argues that this free rider problem also accounts for elections since elections pro-

vide a collective good (stable government) that can be achieved without the necessity of every eligible voter turning out on Election Day. However, those voters staying at home might also benefit from the elections without paying the costs of participation. Thus, voting can be seen as a strategic dilemma in which individuals have to decide whether to contribute to the collective good (turning out) or to defect (abstain) and hoping that other individuals providing the collective good instead. Previous game theoretic models find that the strategic nature of voting often leads to low levels of turnout. This chapter tests whether this general claim is affected by the introduction of compulsory voting laws.

Like the decision-theoretic model presented in the previous chapter, the game theoretic approach also focused mainly on the impact of the costs of not participating and levels of law enforcement on individual voting behavior. By drawing on the calculus of compulsory voting, this chapter's model predicted low levels of turnout and information acquisition for cases in which voting was voluntary. Additionally, the model presumed that levels of turnout and information gathering would increase as penalties and levels of law enforcement increase, too. Unlike the decision-theoretic model, the game theoretical approach predicted serious levels of invalid voting as penalties and law enforcement get more severe. Recall that, the decision-theoretic model instead predicted random voting, which was not at all predicted by the game theoretic model.

In general, this chapter finds support for the notion that compulsory voting rules and turnout are strongly positively correlated. Contrary to the decision-theoretical model of the previous chapter, however, this chapter finds no evidence for the claim that CV-laws could also enhance informed voting. Instead, this chapter finds that numbers of invalid voting increase as compulsory voting penalties and levels of law enforcement move from trivial to non-trivial. The reason for that is, by entering the voting stage without getting informed beforehand, subjects, on the one hand, avoid penalties for not participating but on the other hand, face the risk of making voting mistakes. That is voting for the candidate not matching their preference. So individuals face multiple strategic dilemmas in that situation. They first have to decide whether they want to participate or not and secondly if they participate to do it with or without being informed about their preference. The introduction of compulsory voting rules entailing non-trivial penalties and relevant levels of law enforcement seem to diminish the first dilemma by adding penalties for non-participation, which individuals can avoid by entering the voting stage. The second dilemma, getting informed or remaining uninformed, does not seem to be affected by the non-trivial compulsory voting rules. Subjects still want to avoid the additional information costs and thus enter the voting stage without picking up in-

formation. Yet, in order to avoid voting mistakes, they cast invalid votes. Thereby they also hope for the other voter to make a good decision for the group. It follows that compulsory voting does not seem to eliminate the free rider problem in this setup.

This chapter's findings reinforce the assumptions of the calculus of compulsory voting rules with respect to turnout in general. It shows that even if voters face the strategic situation of voting they tend to rather pay participation costs instead of being penalized for not entering the voting stage in cases of compulsory voting with non-trivial penalties and law enforcement levels. Thus, this chapter strengthens the notion that the two factors from the calculus of compulsory voting approach, costs of not participating and levels of law enforcement, are in fact very good predictors for the functioning of compulsory voting laws, at least with respect to explaining turnout.

However, the findings obtained from the conducted experiments also indicate that compulsory voting does not necessarily increase informed voting. Instead, since elections can create strategic dilemmas, it could rather lead to invalid voting. Thus, this chapter finds empirical evidence for the concerns that compulsory voting is indeed effective in mobilizing voters but can also be harmful to the quality of the voting decision and thus to election results.

Again, these results are limited to the scope of the specific model and the associated experimental implementation and they, therefore, lack external validity. However, rather than provide an accurate "real world" explanation of the functioning of CV-laws, it was the aim of this chapter to provide a test of the main predictions of the calculus of compulsory voting approach in a game theoretic model and thereby widen the examination of CV-laws in a systematic way. Therefore, this chapter's results reinforce the general notion about compulsory voting and, furthermore, adds a novel examination of the assumptions of the calculus of compulsory voting in a game theoretical model to the existing literature. By that, it reinforces previous findings regarding turnout and challenges findings regarding a possible increase in informed turnout due to CV-laws. However, by examining the impact of compulsory voting laws on individual voting behavior in a systematic way, this chapter lacks the investigation of how those rules may affect the way subjects actually process information. The next chapter will tackle this limitation by testing the main assumptions of the calculus of compulsory voting approach within the framework of behavioral decision theory.

6. Compulsory Voting and Individual Information Processing

6.1 Analytical Framework

The previous chapter tried to answer the question whether the main assumptions of the calculus of compulsory voting regarding turnout and extended assumptions regarding informed turnout still hold in a game theoretic-model. Thereby, the quantity of acquired information served as a proxy for individual political sophistication. Findings indicate that compulsory voting does not lead to an increase in individual information acquisition. This, however, does not fully disentangle the relationship between compulsory voting and individual information behavior. The frequency of acquired information can be a sign of an alteration in individual behavior, but accruing a significant amount of information is not the only way to enhance one's own knowledge about politics. Sometimes it is more about how information is being processed. Thus, the question is: does compulsory voting lead to an alteration in the individual information acquisition and processing?

Many studies dealing with the individual level of the citizen's political sophistication argue that the majority of citizens lack factual knowledge about political institutions (Berelson et al., 1954, Bartels, 1996, Delli Carpini and Keeter, 1996, Converse, 1964, Campbell et al., 1960). In fact, some scholars doubt that western democracies can work properly given that citizens seem to lack the necessary political sophistication to make the decision they are supposed to (Boudreau, 2009, Huber, 2012). Since empirical research on the link between compulsory voting and individual information behavior has produced rather mixed results[91], theoretical expectations come from different backgrounds. On the one hand, this chapter adopts the broader framework provided by the calculus of compulsory voting as explained in the second chapter. On the other hand, the exploration into whether individuals adopt different decision rules under compulsory voting will be undertaken. Drawing on behavioral decision theory, the depth and comparability of individuals' information search will be measured in particular. Furthermore, it will be controlled by well-known concepts like general political sophistication that could have a strong influence on the adoption of distinct decision rules.

The chapter is organized as follows. First, a narrower theoretical framework will be derived from the behavioral decision theory in order to link compulsory voting and political

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[91] For a survey of the literature see section 2.2.2 in this study.

sophistication in general and individual information processing in electoral campaigns in particular. Secondly, building up on this framework, the main measurement instruments and hypotheses will be presented. Thirdly, following the theoretical block, the experimental tool will be presented. And finally, in another step, the empirical results will be presented and discussed. To close, a short discussion of the findings will be presented and a conclusion will be given.

Individuals make decisions in order to achieve certain goals (Jabes, p 86). Therefore, decisions can be seen as a goal orientated behavior. Usually, individuals must decide between alternative ways of achieving a certain goal. This behavior can be called a decision process. In order to make decisions, individuals must be able to rank alternatives that match their individual preferences. This can make the process very difficult.

Political decision making, in particular, falls into two domains: 1) how individual political actors form and make their decisions, and 2) how institutions and organizations make decisions (Redlawsk and Lau, 2013). Generally, the literature points to two main approaches of explaining how individuals make decisions. One provides a basic economic explanation of individual decision making. The underlying concept of the "homo economicus" refers to a rational actor as an omniscient calculating individual (Lupia et al., 2000). Thus, individual decision making is analyzed as an outcome-orientated process, in which individuals try to optimize their possible outcomes (utility) by making good rational decisions (Slovic et al., 1977, Einhorn and Hogarth, 1981). In that sense, the economic explanation of decision making has a normative focus. It tries to evaluate how decision makers should decide (Redlawsk and Lau, 2013). The problem utility is that one cannot assign numbers to all possible outcomes even if the utility is defined as the subjective expected utility (Von Neumann and Morgenstern, 2001). In order to make rational decisions, actors must acquire all available information about the possible outcomes. Furthermore, rational actors immediately must assign different utility values to all possible outcomes and update this process constantly. Even if individuals want to make good and rational decisions, it seems questionable if they always have the time, money and cognitive capabilities to do so. Downs (1957), for example, points out that information acquisition is costly and that rational individuals should therefore only acquire additional information until the point where the costs of acquiring that information exceed the expected payoff (Redlawsk and Lau, 2013). In terms of the voting decision, the problem is even worse. The cost/benefit calculation of acquiring additional information must be compared to the probability that a single vote ultimately affects the election outcome. Re-

call that this probability is marginal. Thus, from this perspective, individuals should not bother acquiring much information in election campaigns or to vote at all for that matter.

Another theoretical background for the measurement of the individual information behavior is the "behavioral decision theory". Its key goal is to understand how people make decisions (Payne, 1993). From this perspective, scholars also examine individual decision making with respect to achieving certain goals, but individuals are only expected to be incompletely informed about the environment they are facing (Redlawsk and Lau, 2013). Unlike the normative notion of the rational choice approach, the behavioral decision theory concentrates on the description and thereby understanding of individual decision making (Slovic et al., 1977). One important observation is that empirically, individuals are hardly fully informed when they try to make a decision. In other words, actors can only make decisions that are functional instead of good – rational – decisions (Einhorn and Hogarth, 1981). In fact, behavioral decision theory treats individuals as limited information processors (Edwards, 1961). That is, individuals lack the motivation and the cognitive capability of being truly rational decision makers. So, human decision behavior is probably better assessed accessed by the framework of bounded rationality (Simon, 1956)[92]. That is, individuals want to make rational decisions but are limited with respect to their knowledge about the situation and environment the decision has to be made in. However, individuals still try to make good decisions by relying on their experience, intuition or information shortcuts (Lau and Redlawsk, 2006).

In order to cope with the available information, individuals rely on mechanisms, e.g. categorizing of information to achieve good decisions without being fully informed. These mechanisms are mostly employed automatically (Redlawsk and Lau, 2013). Thereby, decomposition, editing and making use of heuristics play an important role[93].

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[92] In fact, the concept of bounded rationality can be seen as a theoretical foundation of the behavioral decision theory EINHORN, H. J. & HOGARTH, R. M. 1981. Behavioral Decision Theory: Processes of Judgement and Choice. *Annual Review of Psychology, 32*, 53-88..

[93] Especially, with respect to the use of heuristics, there is an extensive body of literature. One general strand of the literature sees the possibility that heuristics lead to biased decisions TVERSKY, A. & KAHNEMAN, D. 1973. Availability: A heuristic for judging frequency and probability. *Cognitive psychology, 5*, 207-232, ibid., TVERSKY, A. & KAHNEMAN, D. 1974. Judgment under uncertainty: Heuristics and biases. *science, 185*, 1124-1131, KAHNEMAN, D. & TVERSKY, A. 1973. On the psychology of prediction. *Psychological review, 80*, 237, KAHNEMAN, D. & TVERSKY, A. 1984. Choices, values, and frames. *American psychologist, 39*, 341, GILOVIC, T. D. & GRIFFEN, D. W. 2010. *Judgement and Decision Making* Hoboken, NJ, Wiley.. Other strands of the literature, specifically focusing on the voting decision identify different important heuristics in the context of voting, e.g. information about the former performance of the candidate WRIGHT, P. 1975. Consumer Choice Strategies: Simplifying vs. Optimizing. *Journal of Marketing Research, 12*, 60-67., endorsements of a candidate coming from relatives, the political elite or close friends SNIDERMAN, P. M., BRODY, R. A. & TETLOCK, P. 1993. *Reasoning and choice: explorations in political psychology,* Cambridge Cambridge Univ. Pr., the general degree of the candidate's familiarity GOLDSTEIN, D. G. & GIGERENZER, G. 1999. The Recognition Heursitic: How Ignorance Makes Us Smart. *In:* GIGERENZER, G., TODD, P. M. & GROUP, A. R. (eds.) *Simple heuristics that make us smart.* Oxford University Press., voting habitually for a certain candidate QUADREL, M. J., FISCHHOFF, B. & DAVIS, W. 1993. Adolescent (in)vulnerability. *Am Psychol, 48*, 102-16.

Decomposition refers to dividing a decision into smaller parts, which is supposed to simplify the decision process because individuals can focus on single parts of the decision instead of reasoning about the complete option (Redlawsk and Lau, 2013, Lau and Redlawsk, 2006). Editing basically means that some individuals simply ignore specific information in the decision process. Thus, they simplify the process and focus only on the e.g. familiar choices. With respect to explaining voting decisions, this comes close to the phenomenon of "single issue" voting (Lau and Redlawsk, 2006). Heuristics can be seen as cognitive shortcuts or rules of thumb for making good decisions. Individuals use heuristics automatically and unconsciously. Thereby, decision making can either use heuristics to identify the alternative that is good or satisfying enough, to use fast and frugal heuristics (Gigerenzer and Todd, 1999) or to simply chose the prominent or "best" candidate.

Drawing on the possibility of using heuristics, the narrow rational choice approach is criticized. However, the normative orientation of that approach is still acknowledged. But it is understood as the standard to which real decision making can be compared to. The behavioral decision theory, however, loosens the cost-benefit condition of the rational choice approach and focuses more on whether a given decision is coherent to the individual decision environment. Thereby, it concentrates on the individual decision strategy a person adopts.

A decision strategy is basically a set of mental and physical tasks/operation that a person uses to make a decision (Lau and Redlawsk, 2006). Fundamentally, it includes the identification of suitable alternatives in order to obtain information about them; with the aim of making a decision. Thereby, individuals, most of the time face the dilemma of making a good or an easy decision. Essentially, the complexity of a certain decision task has a strong influence on which decision strategy, for example, a voter adopts (Lau and Redlawsk, 2001b). The complexity of a task is determined by the amount of time that is available for making a decision (Payne et al., 1988), or how easy alternatives can be distinguished (Lau and Redlawsk, 2001a), the importance of a decision (Payne, 1993) or differences in the way information items are presented (Redlawsk and Lau, 2013).

Different decision strategies can be distinguished best by the degree of conflict they produce (Billings and Marcus, 1983). For example, if one candidate is preferred on all relevant attributes over all other candidates, a decision should be reached without problems. However, if a voter prefers a candidate on one dimension but another on a different attribute reaching a decision becomes a lot more difficult (Redlawsk and Lau, 2013). With respect to

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or the prospect of casting a vote for the winning candidate BARTELS, L. M. 1988. *Presidential primaries and the dynamics of public choice,* Princeton, NJ, Princeton Univ. Press..

large-scale elections, this should be a common problem. In this situation, behavioral decision theory identifies to basic decision rules – compensatory and non-compensatory[94].

6.1.1 Decision Rules

Within this analytical framework, two main decision rules are identified (1) the *compensatory rule* and (2) the *non-compensatory rule* (Payne, 1993). Using the compensatory rule, individuals compare different attributes of an alternative to one another on a commensurate scale (like utility). Thus, a low score in one attribute can be compensated by a high score in another attribute (Lau, 1995). Therefore, a lot of information acquisition is necessary, which makes the adoption of the compensatory rule cognitively more taxing (Redlawsk, 2004, Lau and Redlawsk, 2006). Moreover, value conflicts between two alternatives could easily occur. This is even more eminent if incomparable attributes have to be compared. The rational answer to this is to compute the utility of each attribute for each candidate to build an overall utility for each candidate (Redlawsk, 2004). After this, a decision based on the utility calculation should be pretty obvious. Since this is very challenging, the alternative way is adopted far more often.

With the *non-compensatory rule,* individuals attempt to avoid such tradeoffs. Instead, they compare attributes serially one after the other. Thus, alternatives that do not hold up to a minimum of exception in a certain attribute can be dropped right away (Redlawsk, 2004, Lau and Redlawsk, 2006). As a result, voters choose the first candidate that fits their main preferences in the most important attributes. In other words, the *non-compensatory rule* can be seen as cognitively less taxing (Redlawsk, 2004). One downside of this decision rule can be that important information regarding an alternative can be missed and an alternative may be dropped too quickly.

6.1.2 Decision Rules and Compulsory Voting

For the aim of this study, the individual choice of which decision rule will be adopted shall serve as an indicator as to whether compulsory voting rules alter individual information behavior in electoral campaigns. It is argued that it makes a difference which decision rule is adopted regarding the level of information towards an alternative in an election (Redlawsk, 2004). It shall be tested whether a shift of institutional settings, such as introducing compulso-

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[94] There are more decision strategies and more nuanced knowledge about those strategies in the framework of the behavioral decision theory. But this rough distinction provides a useful framework for analyzing individual voting decisions, because other decision strategies can be summarized under these broader categories LAU, R. R. & REDLAWSK, D. P. 2006. *How voters decide: Information processing in election campaigns,* New York, Cambridge University Press..

ry voting rules, can be an explanation for distinctly different ways of searching for information and process information. Therefore, the use of a *compensatory decision rule* serves as an indicator of a qualitatively higher level of the information search. On the other hand, the adoption of a *non-compensatory decision rule* will be interpreted as a qualitatively lower level of the information search. In doing so, the claim of Lijphart (1997) and others, that compulsory voting rules may enhance political sophistication, can be tested.

In order to make these assumptions measurable, two key measures, also used by Redlawsk (2004), will be adopted, but with some adjustments. Firstly, there is the *depth of search* score. It refers to how much relevant information is accessed by the voter (Redlawsk, 2004, Lau and Redlawsk, 2006). Note that relevant information refers to information that can be used to learn something about the party or candidate position on certain policies. In contrast to Lau and Redlawsk (2006), the measure is not computed as the number of unique attributes considered during a campaign. Instead, the measure is computed as the percentage of all relevant information items considered by an individual as compared to the total amount of information items an individual could have learned during a campaign. Thus, this measure captures the number of relevant items considered by an individual. A high score in the *depth of search* score indicates the adoption of a *compensatory decision rule*. Secondly, the *comparability of search* will be measured. This is computed as the percentage of relevant information items considered for any available alternative as compared to the overall number of considered information items. This measure is able to capture the number of specific items that were not only considered for one or two alternatives, but for all available alternatives. Hence, the measures show how comparable an information search with regard to certain policies is. A high score in this measure points to a comparable information search and vice versa. Obviously, it is argued that a more comparative search is a signal for the use of a compensatory decision rule.

Combining the assumptions about the effects of compulsory voting on the calculus of voting with the operationalization of the different decision rules, it will be tested whether compulsory voting rules increase the adoption of the *compensatory decision rule* in electoral campaigns.

As already explained before, compulsory voting is considered to be especially effective in activating voters that would abstain if voting was voluntary. Those voluntary non-voters are often characterized as politically less informed (Degan, 2006). Since they lack sufficient political information and are therefore not able to identify their most preferred candidate, they are more likely to abstain from voting. In doing so, voluntary non-voters minimize

their costs, since they are not paying participation costs. Furthermore, they minimize their risk of electing their less preferred candidate due to a voting mistake. Thus, voluntary non-voters behave according to the rational voting calculus. However, compulsory voting laws alter this calculus by adding additional costs to the equation – costs of not participating. It follows that if costs for not participating are higher than or equal to the initial voting costs turnout is also supposed to increase significantly among habitual voluntary non-voters. This also has been shown in the third chapter of this study. It has also been shown that this reshapes the composition of the electorate. In other words, more uninformed voters are added to the electorate. They are expected to participate in the elections in order to avoid the penalties for not participating in the election. However, they also face the risk of making voting mistakes and bearing the costs of the implementation of a less preferred candidate. Therefore, it could be rational for voluntary non-voters to acquire more information in electoral campaigns and process information more carefully. Matsusaka (1995) argues that the propensity to vote increases as the individual confidence regarding the voting decision increases. With respect to compulsory voting, this rationale could be turned around. Since compulsory voting formalizes the feeling of having a (civic-) duty to vote, and thus increases the voting probability, it could be the case that individuals start acquiring substantial information in order to gain confidence in their vote. Thus, it can be expected that subjects in the experimental conditions employing compulsory voting access more information in general and are also more likely to adopt a *compensatory decision rule*. However, this can hardly be measured directly. Therefore, this study tests different proxies for the adoption of a *compensatory* or *non-compensatory decision rule* respectively. First, it will be expected that, in order to adopt a compensatory decision rule, individuals need to acquire more information. Therefore, this study compares the overall amount of accessed information in the experimental groups.

H1: Subjects acquire more information when voting is compulsory

This, however, does not add further knowledge to the question whether CV-laws incentivize individuals to get qualitatively more informed. Therefore, this study differentiates between the gathering of politically meaningful information and less meaningful information. Drawing on the calculus of compulsory voting, individuals should consider more specific information items in order to identify their most preferred candidate and be therefore more confident with respect to their voting decision.

H2: Subjects acquire more specific information when voting is compulsory

Drawing on the information regarding the amount and quality of the acquired information, this study focuses on the question of whether individuals conduct a deep or comprehensive information search. Building on the behavioral decision-theoretic approach, Lau and Redlawsk (2006) argue that these two aspects come closest to measuring the decision theory actually adopted. With regard to the calculus of compulsory voting, it can be expected that individuals will either conduct a deeper or more comparing information search or both at the same time. In doing so, individuals gather as much information as needed in order to make an informed decision and avoid voting mistakes.

H3: Subjects conduct a deeper information search when voting is compulsory

H4: Subjects conduct a more comparing information search when voting is compulsory

Additionally, a set of alternative hypotheses are considered which account for strong concepts having an influence on individual behavior in the context of election campaigns. Thus, it is possible to control whether the alteration of voting rules is a convincing explanation for individual information processing or not. Furthermore, this accounts for existing findings about individual behavior in the electoral context. Important aspects connected with this are political sophistication, ideological predispositions, and party identification. Almost every study about voting considers them as important predictors of individual behavior regarding elections (Campbell et al., 1960, Shanks and Miller, 1996, Nie et al., 1976). Therefore, questions about a general level of political sophistication, ideological positions, and political interest are incorporated in the study. Empirically, we face the problem that information processing is likely to be related to political predispositions and political interest. As individuals become more informed, their predispositions and awareness of political issues become stronger and vice versa (Lau and Redlawsk, 2006). Therefore, alternative hypotheses about the explanation of information processes in electoral campaigns are deducted. It can be expected that individuals showing high levels of political sophistication behave differently during the experiment. In fact, they seem more likely to adopt a compensatory decision rule and are therefore more likely to obtain specific information items. On the other hand, they might avoid noisy information about the campaign in general since they are already well informed about political processes.

H5: Preliminary levels of political sophistication influence the information acquisition and processing in the experiments.

In addition to these main effects, this study expects an interaction effect between preliminary levels of political sophistication and the alteration of voting rules. Drawing on the calculus of compulsory voting approach, this study expects a stronger effect of compulsory voting on individual information acquisition and processing for individuals who are politically not very sophisticated, since compulsory voting affects uninformed voters the most.

> **H6: The effect of compulsory voting on information acquisition will be positive and stronger in the experimental groups with compulsory voting for subjects with low levels of political sophistication**

Thus, it can be expected that subjects with low levels of political sophistication will acquire more information items in total, more non-trivial information and less trivial pieces in the experimental sessions with compulsory voting when compared to the free voting sessions. Moreover, with respect to the key measures, the interaction between political sophistication and compulsory voting should lead to higher scores on the key measures for subjects scoring low on the political sophistication scale.

6.2 Research Design

In order to disentangle the causal mechanisms that drive individuals to adopt certain decision rules, this chapter will utilize an experimental design to test the effect of compulsory voting on voters' information searches in electoral campaigns. Embedded in a real German state election, this chapter makes use of the Dynamic Process Tracing Environment (DPTE) developed by Redlawsk and Lau (2009). Particularly the individuals' depth of search and the comparability of search in the compulsory and voluntary voting group will be measured.

6.2.1 Information Board Experiments

As the key aspect of this study will be information and its acquisition by individuals during electoral campaigns, it draws on an experimental tool developed by Lau (1995) and Redlawsk and Lau (2009). They developed a computer-based dynamic information board to investigate information acquisition in the dynamic environment of political campaigns (Lau and Redlawsk, 1997, Lau and Redlawsk, 2001b, Redlawsk and Lau, 2009, Lau, 1995). It is called "Dynamic Process Tracing Environment" (DPTE). Its major advantage is that it combines the basic aspects of classic information board research with the possibility of simulating the dynamic processes of political campaigns. In doing so, the method allows the researcher

to investigate the individual decision-making process as it happens (Redlawsk and Lau, 2009). As in real electoral campaigns, political information comes and goes. Thus, the voter has to decide which information is relevant and which is not (Meffert and Gschwend, 2011). Therefore, information labels scroll down a computer screen and voters can access the detailed information behind the label by clicking on the different items. The information that is presented can range from trivial personal information about candidates to information about specific non-trivial political positions of the candidates (Redlawsk and Lau, 2009). In choosing to access a particular information label, a voter may forgo the chance to learn something else, because information is changing constantly (Redlawsk, 2004). Thereby information costs, in terms of missing other information, are implemented. Thus, a closer comparison to real-world campaigns' processes can be established.

6.2.2 Experimental Setup

Experimental sessions took place three days before the actual Lower Saxony state election. We conducted a series of computer-based information board experiments using the "Dynamic Process Tracing Environment" (Redlawsk and Lau, 2009). 120 Participants were invited, and 112 observations were saved[95]. Sessions took place in the MSW-Laboratory[96] at the University of Oldenburg in January 2013. Participants were recruited with the Online Recruitment System for Economic Experiments (ORSEE) (Greiner, 2004). Thus, most of the participants were students. In contrast to the mock campaigns Lau and Redlawsk (2006) used for their research, this study's experiments were embedded in the context of a real German state election, which took place in Lower Saxony in late January. Hence, the information presented in those experimental sessions was drawn from the actual election campaigns.

Likewise, a study conducted by Meffert and Gschwend (2011), subjects were asked to vote for different parties in the experimental election, which were taken from the real world. Therefore, the alternatives were the relevant political parties competing in the Lower Saxony state election campaign (CDU, FDP, SPD Bündnis 90/Die Grünen, Die Linke, Piraten Partei). Campaign information was taken from the actual state election campaign as well. Participants were able to learn general information about all parties, their leading candidates, and specific policy positions on various issues, including economy, labor market, environment, education and social welfare. All of this information was taken from party platforms and newspapers.

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[95] Actually 120 subjects were invited. 4 subjects did not show up. 4 subject results were not saved due to internet connection delays. Since the DPTE-Tool is located on a server at the University of Iowa (USA) there was no chance to save the data elsewhere. Besides those four results not saved, no other technical issues occurred.
[96] The name of the laboratory was changed into OLExS in 2016.

Therefore, four major Lower Saxony daily newspapers had been selected: (1) "Die Nordwest-Zeitung" (NWZ) from Oldenburg, (2) "Die Neue Osnabrücker Zeitung" (NOZ), (3) "Die Hannoversche Allgemeine Zeitung" (HAZ) and (4) "Die Braunschweiger Zeitung" (BZ). Principally those papers were chosen due to the fact that they are the biggest daily newspapers in Lower Saxony in terms of circulation and coverage. All of these newspapers have a daily circulation of over 120.000 copies[97]. Furthermore, these newspapers cover Lower Saxony geographically. The NWZ is widely spread in the very north of Lower Saxony. In contrast, the NOZ covers the south-west of the state. The HAZ is read in the east and south of the state and the BZ is read in the very south of Lower Saxony. Due to this selection, the Lower Saxony state election campaign should be followed in all its regional specifics. In addition to the nontrivial information, somewhat more trivial information was collected and presented as well. It consisted mainly of "popular press" reports about the upcoming election. It was implemented due to the fact that participants should not only have had the chance to learn important pieces of information about the different parties and candidates. Otherwise, this study would not have been able to investigate a difference between individuals.

Like the study of Meffert and Gschwend (2011), all statements appeared on the dynamic information board as headlines. Subjects were able to read the more detailed information by clicking on the headlines. Each screen consisted of a couple of headlines and represented the information that is available in an actual election campaign (Lau and Redlawsk, 1997, Meffert and Gschwend, 2011).

While an experimental method different from classic economic laboratory experiments were conducted, the typical main experimental parameters were used. Therefore, we differentiated between two different subject groups: one treatment group, in which particular parameters were to be manipulated, and one control group where the manipulation was missing. Therefore, we alternated the voting rules in a between-subject design. The manipulated parameter of theoretical interest was the institution of a legal obligation to vote. It is operationalized with regards to different courses of action subjects can choose from in the experimental voting stage. In the treatment group, the compulsory voting rule was implemented in the general instructions. Later on, subjects had the possibility to attend the voting stage where they could ballot for their preferred alternative. Furthermore, it was possible to hand in an invalid vote. In the compulsory voting treatment, non-attendance in the voting stage was not considered in the treatment group. All of these options were presented to the subjects prior to the

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[97] „Informationsgemeinschaft zur Feststellung zur Verbreitung von Werbeträgern" is a German non-profit organization that collects information about media and newspaper coverage. Further information can be accessed under http://www.ivw.eu/aw/print/qa?gattung[0]=tz

information stage of the experiment. This presentation differed among the different experimental groups. Both groups learned their voting options, but only the treatment group was exposed to the compulsory voting rules. Because of that distinction, a possible causal effect of compulsory voting on the level of individual information search can be examined convincingly. In the end, all subjects received a fixed payoff of 4 € for their participation regardless of their performance in the experiment.

At the beginning of each experimental session, subjects had to answer a short questionnaire about their political attitude and knowledge. Next, a brief instruction of the State election and a general instruction of the experiment followed. Then the election campaign started. It was organized as follows: At first, there was the main information board or the information stage. Here the general or specific electoral campaign information was presented in headlines. Six headlines at a time were visible on the main information screen[98]. The information scrolled down at a fixed interval (Meffert and Gschwend, 2011). Participants were able to access the detailed information by clicking on the headlines. Thus, an article with a length of approximately 120 words opened in a small window partially covering the main information board. Participants were allowed to read as much information as they wanted for as long as they wanted. However, as the detailed information was displayed, information headlines continued to scroll down in the timed interval. Thus, subjects had to make a selection of which information they want to access. It is one specific goal of this method to overwhelm participants with information to force a selective behavior (Lau and Redlawsk, 1997).

After the information stage, participants were asked to vote for one of the presented alternatives or to abstain. In the treatment group, abstention was not an option. In the control group, however, abstention was possible by simply skipping the voting stage. By choosing the abstention button, subjects attended the last stage of the experiment right away. In the end, participants were asked to answer a questionnaire containing mainly demographics. Table 68 provides an overview of the experimental setup.

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[98] A screenshot of the experimental screen can be seen in Appendix C.

Table 68 Experimental procedure

Compulsory Voting Treatment	Voluntary Voting Treatment	
Political Attitude/Knowledge Questionnaire	Political Attitude/Knowledge Questionnaire	
General Introduction	General Introduction	
Manipulation: Compulsory voting rules are introduced	**Manipulation** is <u>missing</u>	
Information Board	Information Board	
Voting Decision	Voting Decision	
Manipulation: Subjects must decide to hand in a valid ballot or not. Not voting is not an option due to compulsory voting rules	**Manipulation:** Subjects must decide to vote or not to vote. Not voting is possible.	
General Questionnaire Full payoff	General Questionnaire Full payoff	

Note: Subjects were automatically, randomly and equally assigned to the different treatment conditions.
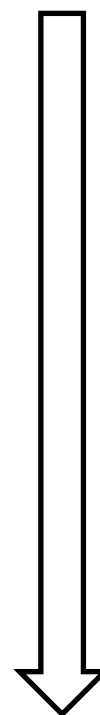
6.3 Empirical Analysis

To measure whether compulsory voting rules have an impact on the adopted decision rules in electoral campaigns, the *depth of search* score and the *comparability of search* score serve as key measures to test which decision rule is adopted by the subjects in the experiments. Lau and Redlawsk (2006) also utilized these scores.

In contrast to the work of Lau and Redlawsk (2006), however, different information types are differentiated, due to the theoretical interest of this chapter. Thus, not all information that is learned in the campaign is part of computing the key measures. Since the main interest is towards a probable enhancement of political sophistication due to compulsory voting, this study concentrates on politically relevant information, which is *non-trivial information,* in comparison to somewhat irrelevant information, which is *trivial information*. Thereby, *non-trivial information* is operationalized as specific party or candidate statements on political issues. Whereas *trivial information* can be understood as information about parties, candidates or the campaign itself, that tells individuals nothing specific about the alternative's policy positions. Those variables serve as dependent variables in the empirical analysis. Additionally, the total amount of information items accessed (*Items Accessed*) during the experimental campaign is also considered as a dependent variable as well.

6.3.1 Dependent Variables

Concentrating only on relevant information, the adoption of different decision rules shall be revealed. In total participants could learn two distinct position statements per alternative per topic. Therefore, participants could have read 12 different items per alternative on the one hand and on the other hand, they could have learned 12 different items per topic. Intuitively an easy way to measure *depth of search* is simply to count all information accessed during the campaign (Lau and Redlawsk, 2006). Lau and Redlawsk (2006) point to a potential problem with this approach: number of alternatives. It seems quite obvious that there will be more information searched in total if there are a lot of alternatives. However, there will be a more devoted search if there are only two alternatives (Lau and Redlawsk, 2006). Additionally, individuals face the problem of a dynamic information board. Hence, individuals are not in total control of how many items they can consider. There is always the tradeoff between reading an item quite carefully on the one hand and missing some information items on the other. Therefore, this approach is inaccurate to some extent. Nevertheless, this measure is used, adjusting it due to the theoretical interest of a possible variation between the experimental groups concerning the ratio of relevant information considered. Therefore, the *depth of search* score is operationalized as the percentage of all *non-trivial items* considered as compared to the total amount of information each individual learned during the campaign. The score ranges from 0-100, with a high score indicating a deep information search in the campaign and vice versa.

To compute the *comparability of search score*, again, this study draws on Lau and Redlawsk (2006). It is operationalized as *"(…) the percentage of all attributes considered about any relevant alternative compared to that considered about all relevant candidates"*(Lau and Redlawsk, 2006). Again, the score ranges from 0-100. A high percentage reflects a high level of comparability and vice versa. Table 69 shows the dependent measures.

Table 69 Dependent variables

Variable	Operationalization	Label	Coding
Items accessed	Overall number of accessed information items	ItmesAccessed	Metric
Trivial Information	Information about parties, candidates or the campaign itself, that tells individuals nothing specific about the alternatives policy positions	TrivialInformation	Metric
Non-trivial Information	Specific party/candidate statements on political issues	NonTrivialInformation	Metric
Depth of Search Score	The percentage of all *nontrivial items* considered as compared to the total amount of information each individual learned during the campaign	DepScore	Metric (0 - 100)
Comparability of Search Score	The percentage of all attributes considered about any relevant alternative compared to that considered about all relevant candidates	CompScore	Metric (0-100)

6.3.2 Independent Variables

Besides the key measures, some control variables were elevated. In different questionnaires during the experiment, we asked for the participants' position on some salient issues, for their level of political sophistication and interest, as well as for their party affiliation and socio-demographic background. Those controls are important because they reflect major political science views on voting. Overall several independent variables: *Treatment* (1 = compulsory voting; 0 = free voting) and *Female* (1= female; 0= male). These were all coded as binary variables as well as the participants' major. Here, all subjects majoring in social sciences are coded as 1, and the others as 0. Thus, this study accounts for the possibility that being a social science major leads to bias in our results. It can be assumed that students of social science have a higher interest in politics in general and are, therefore, better informed in the first place. *Political Sophistication* (0-12) was computed as a metric covariate. In the case of *Political Sophistication,* a high score points to a high level of sophistication or interest and a low score indicates the opposite. Table 70 provides an overview of the variables.

Table 70 Independent variables

Variable	Operationalization	Label	Coding
Treatment	Different voting rules be-tween treatments; Absten-tion is costly in the compul-sory voting treatments	treament	0/1 (voluntary vote/compulsory vote)
Political Sophistication	Preexisting individual levels of factual knowledge about politics derived from a pre-experimental survey	PolSoph	Metric (0 – 12)
Age	Self-reported age of the participants based on a post-experimental survey	age	Metric
Female	Self-reported gender of the participants based on post-experimental survey	female	0/1 (male/female)
Major	Self-reported field of study based on a post-experimental survey	social_science	0/1 (other/social science major)
Treatment * Political Sophistication	Interaction between self-reported levels of political sophistication and the ap-plied voting rule	sophtreat	Polsoph * Treatment

Note: Observations regarding the variables were either generate due to the individual decisions within the actual experiment or self-reported in the pre- and post-experimental survey.

6.3.3 Descriptive Statistics

The analysis starts by simply comparing the information accessed by the treatment group and the control group. Hypothesis H1 supposed that individuals participating in the compulsory voting treatments should acquire more information in order to gain more confidence in their preferred candidate. In total, 2514 items were clicked on during the experimental sessions, with a mean of 22.4 items learned per subject in the control groups and a mean of 22.5 items considered in the treatment groups. Table 71 contains descriptive findings for all dependent measures. Overall information acquisition in the experimental session. Additionally, it pro-vides numbers from a t-test conducted between the control group and treatment group. The p-value (0.9) suggests no significant difference in the mean of overall information acquisition between both experimental groups. Thus, descriptive findings provide no support for H1.

Table 71 Descriptive Statistics for the dependent Measures

Variable	Voluntary Voting			Compulsory Voting			T-score	P-value
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.		
Items Accessed	56	22.375	9.484	56	22.518	7.589	-0.0880	0.9300
Trivial Items Accessed	56	7.732	5.157	56	8.429	4.751	-0.74	0.46
Non-Trivial Items Accessed	56	14.643	6.916	56	14.2678	5.482	0.31	0.75
Depth of Search Score	56	65.59	14.66	56	64.42	15.11	0.418	0.676
Comparability of Search Score	56	65.47	24.50	56	61.63	24.75	0.83	0.41

Note: Table shows descriptive findings of all dependent measures compared by the two treatment conditions.

With regard to the theoretical interest, a closer look at a possible difference between the experimental groups concerning the consideration of trivial and non-trivial information should provide more insights about whether compulsory voting laws have an impact on individual information search. Drawing on the calculus of voting H2 claimed that subjects confronted with compulsory voting should acquire more specific information items, that is more non-trivial information. Table 71 shows that in the voluntary voting group (control-group) a mean of 7.3 trivial information items was accessed during the sessions. At the same time, a mean of 8.4 trivial information pieces was considered in the treatment group.

Numbers of the conducted t-test show that there is no significant difference in the mean of accessed trivial information items in the experimental campaign considering the two experimental conditions. Much more interesting, however, is to look at the recorded data about the amount of non-trivial pieces of information accessed during the sessions in both groups. The distribution of information items clicked is rather similar. In fact, the variance is even smaller. In the treatment group, a mean of 14.2 items of non-trivial information was learned, whereas in the control group a mean of 14.6 items was considered. Thus, slightly more trivial items were read in the control groups. Table 71 also reports the results of descriptive statistics regarding non-trivial information items acquired between experimental treatments. Numbers suggest almost no difference between the two groups with respect to the adoption of non-trivial information items. Thus, it can be assumed that compulsory voting does not affect individual information search in the expected way. But to verify if this is really the case, the analysis continues with the key measures.

The *depth of search* score is computed as the percentage of accessed non-trivial information compared to the total amount of clicked items. A high score means a high frequency of relevant information evaluated, whereas a low score points to the contrary. It is argued that a high score in the *depth of search* index reflects the adoption of a compensatory decision rule, which is supposed to be cognitively more tasking. Therefore, a higher score could point to a development in the level of informedness in one or the other group. Following the theoretical assumptions, it is expected that, on average, the *depth of search* score should be higher in the treatment group. In the dataset, the depth of search score has an overall mean of 65.05 over both groups, with a standard deviation of 14.82 and range from 20-100 in the experimental campaign.

For the voluntary voting groups, a mean of 65.6 can be observed. In the compulsory voting groups, however, a mean of 64.4 is observed. This indicates that subjects in the control groups conducted an even deeper information search compared to the subjects in the treatment group. Overall, Table 71 shows that a variance between the two experimental groups barely exists. This is also supported by the result of a conducted t-test, which shows that the difference in the mean of the depth of search score is not significantly different from each other. This contradicts the assumption of H3. Thus, descriptive statistics provide no evidence in favor of the theoretical assumption that compulsory voting leads to higher scores in the depth of search measure.

With respect to the *comparability of search score*, this pattern is even stronger. Recall that the comparability of search score is computed as the percentage of all relevant items considered on any alternative compared to those items considered for multiple alternatives. Again, a high score reflects a more comparative individual information search. Considering the calculus of compulsory voting, it was expected that compulsory voting would induce more subjects to adopt a compensatory decision rule in the compulsory voting treatments. In particular, it was expected that on average the *comparability of search score* will be higher in the treatment group since a high score on this index would point to the adoption of a more taxing decision rule. In total, it ranges from 0 to up to 100, with a mean 63.5 for the experimental campaign and a standard deviation of 24.59. Table 71 also provides descriptive findings with respect to the *comparability of search score*. A closer look at the different groups reveals a mean of 61.3 in the treatment group and 65.4 in the control group. Even though the observed variance is significantly smaller, it is in conflict with the assumption of H4. Furthermore, the results of a t-test suggest no significant difference in the mean of the comparability of search score between experimental groups.

Thus, both measures suggest that there is no significant difference between the two groups regarding the individual information search in the experimental campaign. In fact, the overall consideration of relevant items is quite equally distributed between the two groups. Furthermore, serious differences between the distribution of the depth of search score and the comparability of search score also cannot be observed. Therefore, it can be concluded that the adoption of different decision rules is quite equally distributed between the experimental groups. What can be observed though is a slightly deeper and more comprehensive information search on average in the control group than in the treatment group. Drawing on these descriptive findings, it can be argued that at least for the experimental design chosen for this study, compulsory voting does not seem to enhance political sophistication.

6.3.4 Statistical Analysis

For further analysis, a series of simple OLS-regressions with robust standard deviations for the five different dependent variables were computed. On the one hand, the focus was on the frequency and quality of information: *Items Accessed, Trivial Information and Nontrivial Information.* On the other hand, the test of the key measures was crucial. All dependent variables were tested with various predictor variables:

Table 72 Determinants of Items Accessed; OLS-regression

	Items Accessed			
VARIABLES	**M1**	**M2**	**M3**	**M4**
Treatment	0.143	0.735	1.027	-4.949
	(1.623)	(1.647)	(1.559)	(3.532)
Political Sophistication		0.625**		-0.0889
		(0.248)		(0.467)
Age			-0.215**	-0.246**
			(0.0980)	(0.100)
Female			-4.597***	-3.573*
			(1.610)	(2.086)
Major			-0.987	-1.017
			(1.698)	(1.652)
Treatment*Political Sophistication				0.999**
				(0.499)
Constant	22.38***	18.14***	30.50***	31.43***
	(1.267)	(2.214)	(3.657)	(5.562)
Observations	112	112	112	112
R-squared	0.000	0.050	0.094	0.139
Wald Test	2.93**			

Note: OLS-regression with robust standard errors[99], p-values in parentheses * $p<0.10$,** $p<0.05$, *** $p<0.01$

Table 72 reports results from various OLS-specifications concerning the overall assessment of information items in the experimental sessions. Results from the different models show that the treatment variable produces a minor positive effect on the information acquired in the experiments, which decreases to a moderately negative effect in the fully specified model. This means that being in the treatment group slightly decreases the adoption of information items by the value of the specific coefficient. In the fully specified model (M4), for example, being in the treatment group decreases the information acquisition by -4.949. This contradicts the expectations that compulsory voting accelerates information acquisition. Therefore, this is in line with the findings of the previous chapter. Furthermore, coefficients of the treatment variable are statistically not significant in all specifications. Thus, findings of the regression analysis suggest that there is no significant impact of compulsory voting on the general information acquisition in this experimental setup.

[99] Robust standard errors are estimated in order to cope with effects from outlying observations

Political sophistication has a moderately positive and statistically significant influence (0.625**) on the individual information acquisition in the experiment, which can be seen in Model M2. Therefore, it can be argued that politically more sophisticated individuals also tend to gather more information in the mock election. This coincides with empirical findings of previous turnout research (Wolfinger and Rosenstone, 1980). The effect, however, fails statistical significance in the full model specification and also turns negative.

Interestingly enough, all control variables have negative effects on the information gathering in the experiments. Model (M3) shows that a one unit increase in the variable age decreases the information acquisition by -0.215**. The effect is even slightly stronger -0.246** in the fully specified model (M4). Maybe this can be explained by the experimental tool. Since the experiment was computer-based and information items flowed by rather swiftly, it could be that older participants had a harder time following the information board[100]. Another explanation could be that older participants tend to read the clicked information more carefully and therefore forgo the chance to access as much information as other participants. Riggle and Johnson (1996) for example argue that age has an impact on information search in general. Particularly older subjects learn less information but spend more time on the information accessed (Riggle and Johnson, 1996). Thus, the negative correlation could disappear with respect to the key measures.

As well as age, the participants' gender has a negative impact on the overall assessment of information items in the experiment. Furthermore, the coefficient of the female variable is significant at a five percent level in both models (M3 and M4). It follows that male participants acquired fewer information items in the experiment. Alongside age and gender, the post-experimental survey asked for the subjects' majors in order to control for a social science bias[101]. Being a social science major has a minor negative effect on the overall adoption of information items in the experiment. However, this effect is not statistically significant.

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[100] Normally age is not a good control variable in all student samples since it lacks variance. In this case, however, 6 participants were 35 years old or older. In fact, 3 participants were over 50.

[101] As aforementioned, it shall be controlled to create a possible systematic influence of social science majors in the conducted experiments, since the experimental laboratory is used for teaching in social science BA and MA program as well. Thus it could be the case that social science majors are more familiar with the experimental procedures and therefore behave distinctly different from other participants.

Figure 28 Predictive Margins for the variable Items Accessed
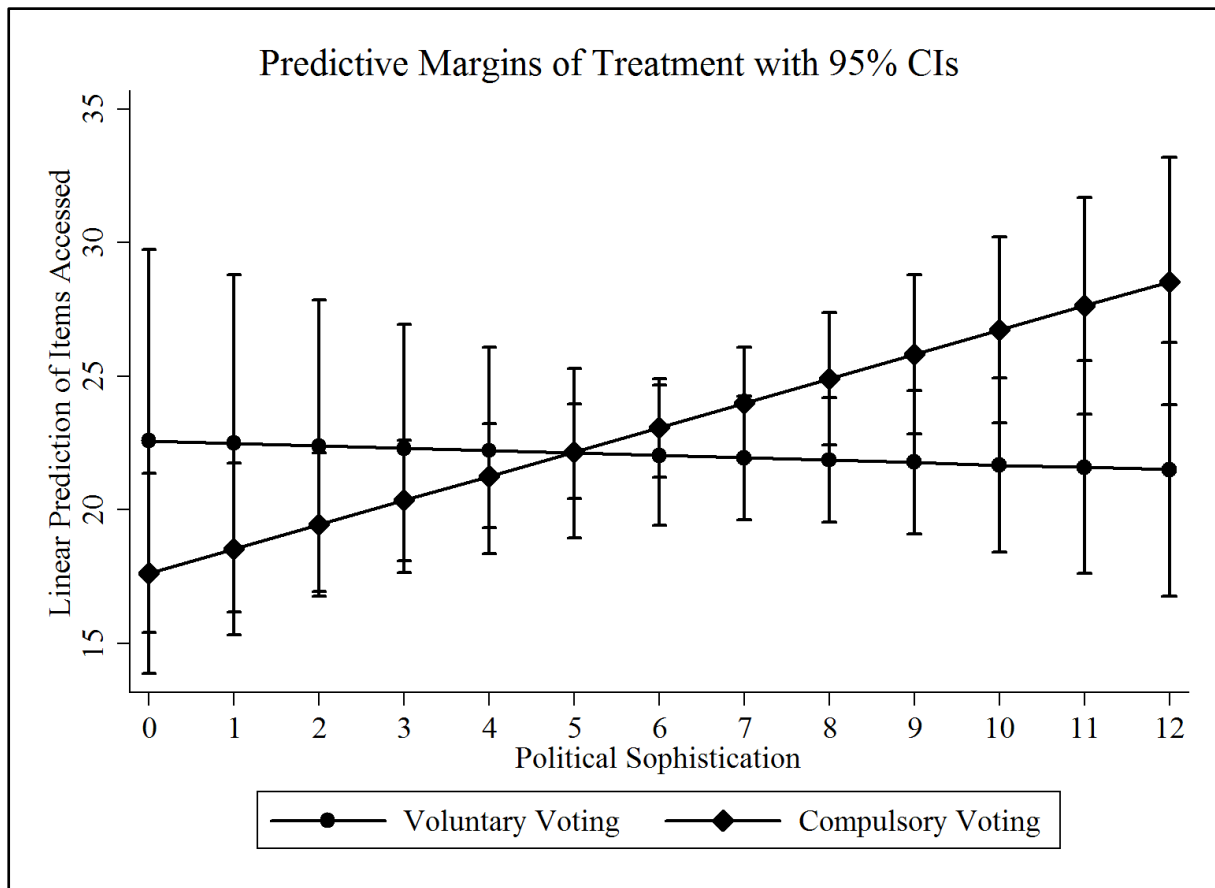
Note: Political Sophistication is measured on an ascending scale. 0 refers to the lowest level. 12 is the highest level. Individual scores were obtained from the right or wrong answers according to political trivia questions during the experiment.

According to the expectation that individual levels of political sophistication and the applied voting rules interact with each other, the fully specified model entails an interaction term computed out of the political sophistication and the treatment variable (Treatment*Political Sophistication). Essentially the interaction variable captures the basic proposition of Lijphart (1997) that levels of political sophistication are directly affected by an alteration of the voting rules. In general, the coefficient of the interaction variable is positive and statistically significant, which indicates a positive impact of the interaction term on the information acquisition. Additionally, a Wald-Test[102] was conducted to test the joint impact of the interaction term. The test is statistically significant on a five percent level. However, without further investigation, one cannot say much about the direction of the interaction. Thus, Figure 28 shows the marginal effects for the variable "Items Accessed" divided by experimental groups. The graph indicates almost no effect in the voluntary voting groups but in the compulsory voting groups. Here the predicted values suggest that politically more sophisticated individuals acquire more information in the experimental sessions with compulsory voting.

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[102] The Wald-Test was computed with the testparm command.

This is in line with the expectations of the behavioral decision theory (Lau and Redlawsk, 2006). Since information acquisition is considered to be cognitively demanding, it is not surprising that especially politically already sophisticated subjects acquire more information. This, however, contradicts the argument proposed by Lijphart (1997). Thus, findings are in conflict with the expectations formulated in hypothesis H6. Following the theoretical argument, the effect of compulsory voting on the assessment of information items should have been the strongest for individuals scoring low on the political sophistication dimension. But the marginal effects suggest that information acquisition increases in the compulsory voting setup for individuals scoring high on the sophistication scale. Thus, compulsory voting accelerates individual information acquisition but not in the expected way. Instead, initially, better-informed subjects tend to gather additional information which could increase the already existing information gap. This contradicts the claim of Lijphart (1997) in a substantial way.

With regard to the model fit, Table 72 shows that the fully specified model has the highest r-squared score ($R^2 = 0.13$). Thus, the full specification explains about 13 percent of the overall modal variance. Especially the r-squared value associated with model M1 is very low. It shows that the treatment variable alone hardly explains any of the variances in the overall information acquisition in the experiment. Thus, it can be argued that compulsory voting does not affect individual information behavior in this setup. This is in line with the empirical findings of the previous chapter. Nevertheless, overall information acquisition does not necessarily tell us anything about the quality of an information search, therefore, a closer look at the acquired information and on this chapter's key measure is necessary.

Before proceeding to the key measures, Tables73 and 74 provide evidence from various OLS-specifications regarding the influence of different predictor variables on the assessment of trivial or nontrivial information items in the experiment respectively. Starting with the adoption of trivial information, hypothesis H2 expects a negative relationship between compulsory voting and the gathering of trivial information items.

Table 73 Determinants of the variable Trivial Information; OLS-regression

| VARIABLES | Trivial Information | | | |
	M1	M2	M3	M4
Treatment	0.696	0.905	1.041	0.422
	(0.937)	(0.930)	(0.909)	(1.835)
Political Sophistication		0.220		0.0915
		(0.134)		(0.211)
Age			-0.0351	-0.0424
			(0.0545)	(0.0546)
Female			-1.429	-0.956
			(0.888)	(1.061)
Major			1.454	1.362
			(0.966)	(0.989)
Treatment*Political Sophistication				0.112
				(0.277)
Constant	7.732***	6.242***	8.422***	7.822***
	(0.689)	(1.033)	(2.061)	(2.612)
Observations	112	112	112	112
R-squared	0.005	0.023	0.041	0.048
Wald-Test	0.63			

Note: OLS-regression with robust standard errors, p-values in parentheses * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

In contradiction to this assumption derived from the calculus of compulsory voting approach, the coefficient of the treatment variable is positive in all regression models. Thus, it can be concluded that subjects in the treatment group have acquired slightly more trivial information items as compared to subjects in the control group. Even though coefficients never reach statistical significance, empirical findings raise doubts about the acceptance of hypothesis H2. That is, compulsory voting does not seem to reduce the adoption of irrelevant information items in this experimental mock election campaign. With regard to the explanation of the gathering of trivial information items, none of the other predictor variables are statistically significant. Preexisting levels of individual political sophistication have a minor positive effect on the outcome variable in model M2 and M4. The reasoning behind this seems quite tangible. Subjects that are politically more sophisticated to begin with, assessing more trivial information items since they probably do not feel the need for gathering relevant information. They probably know enough about the presented alternatives and their statements on certain

Figure 29 Predictive Margins for the variable Trivial Information
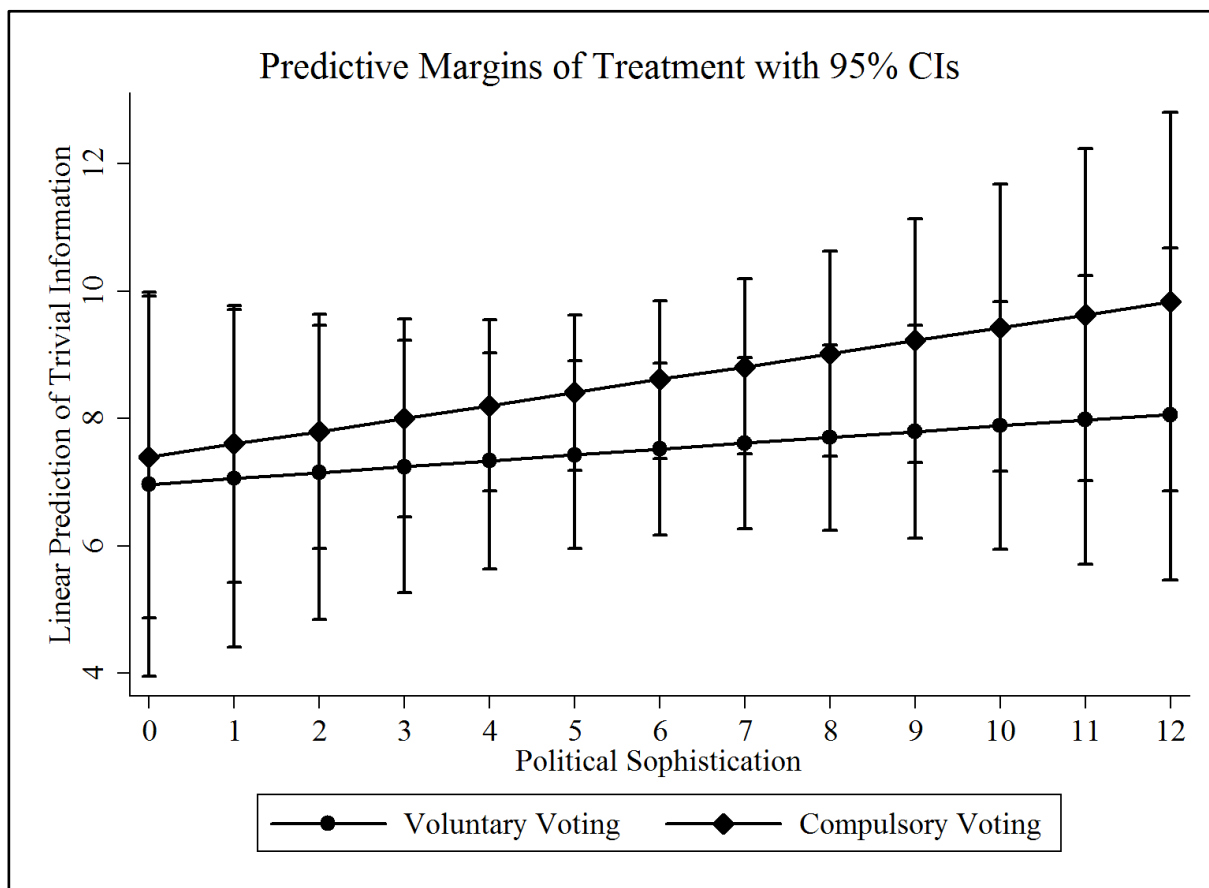
Predictive Margins of Treatment with 95% CIs

Note: Political Sophistication is measured on an ascending scale. 0 refers to the lowest level. 12 is the highest level. Individual scores were obtained from the right or wrong answers according to political trivia questions during the experiment.

policy issues. Furthermore, age and gender both have slightly or moderate negative effects on the dependent variable. This means that older or female participants tend to adopt less trivial information items. Participants majoring in social science, however, are expected to gather more irrelevant information items than students majoring in a different field of study. Probably the reasoning behind this is comparable to the political sophistication variable. Social science majors are expected to be more politically informed and interested than others and therefore have no need to assess a lot of non-trivial information items in order to make their choice.

The interaction variable has a slightly positive but insignificant effect on the adoption of trivial information, but the conducted Wald-Test of the interaction fails statistical significance. It can be concluded that there is no interaction between the two terms in this model. However, Figure 29 provides the marginal effects regarding trivial information for both experimental groups.

The graph shows that marginal change in the adoption of trivial items increases with higher scores on the political sophistication dimension. This accounts especially for the compulsory voting group, whereas the marginal change is smaller in the control groups. This could mean that voters who are forced to the polls are not necessarily less interested and waste their time on useless information. However, the acquisition of trivial items is still slightly higher in the treatment groups. Since the Wald-Test of the interaction term fails statistical significance, the marginal effects serve mainly for further illustration.

With respect to the explanatory power of the "trivial information model", it must be stated that it has almost no statistical power. For instance, the fully specified model only explains about 5 percent of the variance in the dependent variable. Therefore, this study finds no empirical evidence for the expected negative relationship between compulsory voting and the amount of considered irrelevant information in the experimental election campaign.

Based on the calculus of compulsory voting approach and the assumption that compulsory voting might shift social norms of information gathering, hypothesis H2 expects a positive relationship between the treatment variable and the assessment of non-trivial information. Table 74 reports empirical findings from various OLS-specifications.

Table 74 Determinants of the variable Nontrivial Information; OLS-Regression

VARIABLES	Nontrivial Information			
	M1	M2	M3	M4
Treatment	-0.375	-0.0360	0.162	-4.635*
	(1.179)	(1.235)	(1.145)	(2.674)
Political Sophistication		0.358*		-0.187
		(0.194)		(0.333)
Age			-0.180***	-0.201***
			(0.0637)	(0.0660)
Female			-3.050**	-2.648*
			(1.170)	(1.452)
Major			-2.291*	-2.213*
			(1.208)	(1.148)
Treatment*Political Sophistication				0.792**
				(0.358)
Constant	14.64***	12.22***	21.95***	23.49***
	(0.924)	(1.804)	(2.544)	(3.979)
N	112	112	112	112
R-squared	0.001	0.032	0.125	0.169
Wald-Test	2.70**			

Note: OLS-regression with robust standard errors, p-values in parentheses * p<0.10,** p<0.05, *** p<0.01

Results, however, show minor negative effects for the treatment variable for the models M1 and M2 but a slightly positive effect in M3. Most importantly, however, is the statistically moderate but significant negative effect of the treatment variable on the acquisition of non-trivial information items as shown in the fully specified model M4. With regard to hypothesis H2, results of M1 and M2 are in conflict with the theoretical assumption. Yet looking at the values of the r-squared measure for M1 and M2 reveals very poor model fits for both specifications. Thus, they are not considered for further interpretation. Only the findings of M3 are in line with H2 and provide solid scores in the r-squared measure. Even though the direction of the effect of the treatment variable in M3 is in line with theoretical assumptions. But H2 is not accepted since, again, the effect is negative and statistically significant in the fully specified model. It can be concluded that implementing compulsory voting does not affect the

adoption of nontrivial information items in the expected way. On the contrary, compulsory voting decreases the acquisition of non-trivial information items by -4.635*.

Individual levels of political sophistication, however, have a positive influence on the dependent variable in model M2 (0.35*). That means that a one-unit increase in the political sophistication measure leads to an increase in the adoption of nontrivial information items. This effect is significant on a 10 percent level. In the full model specification, however, the sign of the coefficient changes again. A one-unit increase in the political sophistication variable reduces the acquisition of non-trivial information items by (-0.187). This effect is no longer significant. Nevertheless, politically more sophisticated subjects adopt slightly less relevant information in the mock election than participants who are politically less sophisticated.

The interaction between initial levels of political sophistication and compulsory voting has a strong positive effect on the assessment of non-trivial information items. The conducted Wald-Test of the interaction term is significant on a five percent level. Recall that it was expected that subjects participating in the compulsory voting groups should acquire more specific information items. For further investigation, Figure 30 provides the marginal effects of the interaction between preliminary levels of political sophistication and mandate voting.

Figure 30 Predictive Margins for the variable Nontrivial Information
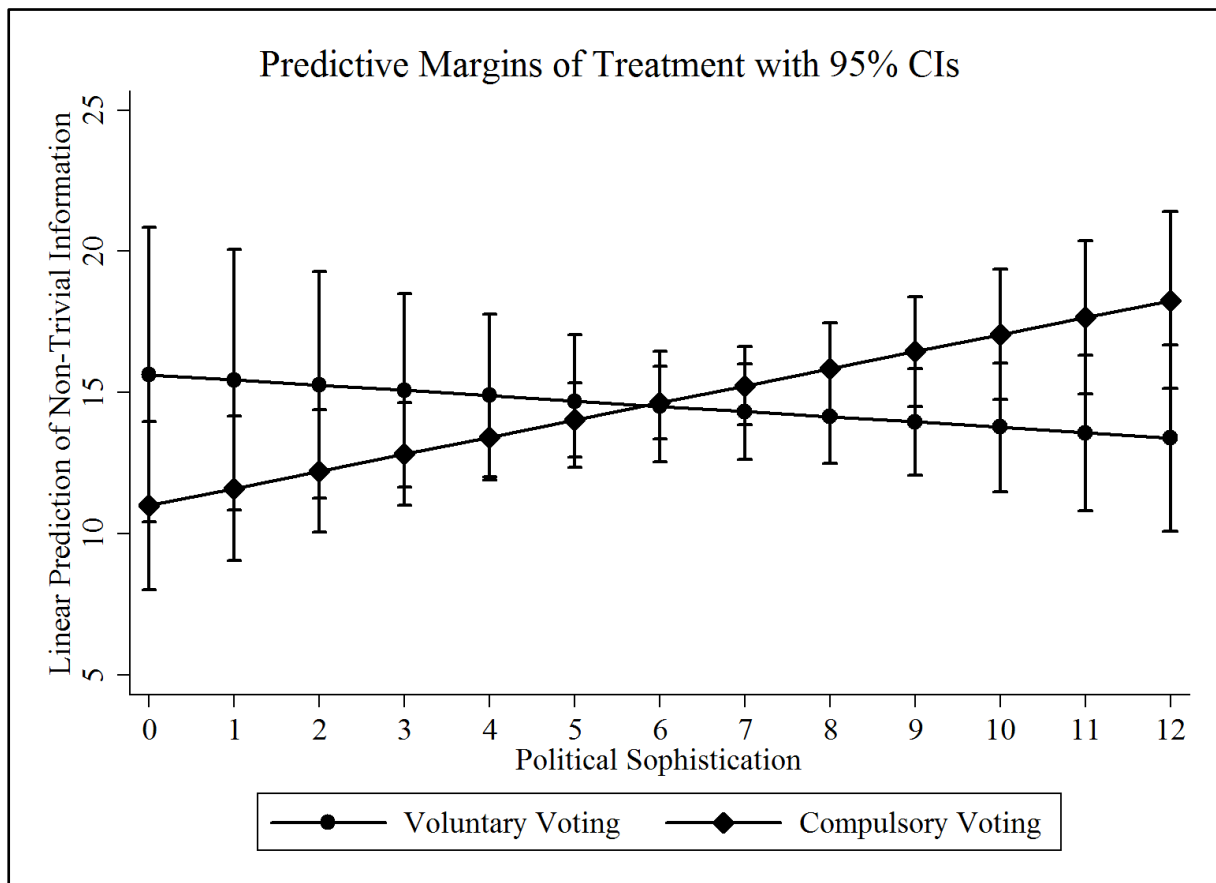
Note: Political Sophistication is measured on an ascending scale. 0 refers to the lowest level. 12 is the highest level. Individual scores were obtained from the right or wrong answers according to political trivia questions during the experiment.

Theoretically, the adoption of non-trivial information items should be increasing with decreasing values of political sophistication. But the graph indicates a different pattern. The marginal shift in the adoption of non-trivial information items increases with increasing levels of political sophistication. Hence, similar to the findings regarding the overall assessment of information items, initially better-informed subjects consider more specific information items.

With respect to the non-trivial information variable, all three socio-demographic control variables have negative effects. Firstly, older subjects acquire less relevant information items. This effect is small but highly statistically significant. Secondly, the participants' gender has a negative effect on the dependent measure as well. This means that female subjects learn less relevant items than male subjects. However, this effect is only moderately significant with respect to model M3 and only significant on a 10 percent level in the full model. Thirdly, social science majors acquire less non-trivial information items than other majors. This effect is significant on a 5 percent level in the fully specified model.

In sum, Tables 75 and 76 provide no evidence that compulsory voting is positively correlated with individual information behavior with respect to the assessment of relevant information items in the experimental setup. Nevertheless, this could be a problem of measurement. So far, all presented measures are fundamentally focused on quantities. But becoming informed cannot necessarily be explained by the amount of information that is acquired. One may have to take a closer look at how individuals gather information and at how they process this information. Thus, in the next step, analyses of different information strategies are presented. Therefore, a closer look at the key measure, the *depth of search score* and the *comparability of search score*, will be presented.

Key Measures

In order to examine whether compulsory voting laws affect individual ways of information processing, Table 75 provides evidence from various OLS-specifications using the depth of search score as the dependent measure. Drawing on the calculus of compulsory voting approach, H3 expects subjects participating in the treatment groups to have a higher score in the depth of search measure. If this will be the case, it could be argued that subjects being obliged to vote more often adopt a compensatory decision rule with regard to information acquisition and processing in election campaigns. Since the compensatory decision rule is cognitively more taxing, subjects adopting such a decision rule are expected to be politically more sophisticated or to increase their individual level of political sophistication respectively. Results presented in the regression output, however, suggest that compulsory voting rules have a

moderately strong negative effect on the individual´s depth of search. This indicates that subjects in the treatment group more often than not do not adopt a compensatory decision rule. Therefore, an increase in the individual level of political sophistication due to compulsory voting cannot be expected this way.

Table 75 Determinants of the Depth of Search Score; OLS-regression

	Depth of Search			
VARIABLES	M1	M2	M3	M4
Treatment	-1.176	-1.229	-1.379	-3.014
	(2.813)	(2.827)	(2.811)	(6.108)
Political Sophistication		-0.0563		-0.216
		(0.437)		(0.626)
Age			-0.121	-0.122
			(0.181)	(0.180)
Female			-0.578	-0.997
			(2.835)	(3.307)
Major			-6.856**	-6.694**
			(2.849)	(2.937)
Treatment*Political Sophistication				0.257
				(0.841)
Constant	65.60***	65.98***	72.96***	74.54***
	(1.959)	(3.514)	(5.644)	(7.556)
Observations	112	112	112	112
R-squared	0.002	0.002	0.055	0.056
Wald-Test	0.12			

Note: OLS-regression with robust standard errors, p-values in parentheses * $p<0.10$, ** $p<0.05$, *** $p<0.01$

With respect to individual levels of political sophistication, model M2 reports a minor negative effect on the outcome variable as well. Since the model fit, however, is tiny, M2 is not considered for further discussion. Instead, the coefficient of the political sophistication variable displayed in the fully specified model is taken into consideration. Results show that political sophistication has a slightly negative effect on the dependent measure. This means that an increase in the political sophistication variable leads to a decrease in the depth of search score by (-0.216). Thus, it can be stated that politically already more sophisticated subjects conduct a slightly more shallow information search.

Looking at the socio-demographic control variables indicates that age and gender still have negative effects on the dependent measure. Since this is the case for all computed models, these findings are robust even though they are not significant with respect to the depth of search score. Nevertheless, it can be argued that older subjects and females conduct a less deep information search. Like age and gender, major produces robust findings as well. As already displayed in the other models, being a social science major has a negative effect on the information search in the experiment. With respect to the depth of search score, this effect is rather strong and moderately significant, too. It follows that social science majors conduct a less deep information search than others. This indicates that social science majors do not adopt a compensatory decision rule in this experiment as often as others. Again, the explanation is quite similar to the one that applies to politically more sophisticated participants. Since those subjects are already well informed before the experimental campaign, they might find the presented information not as interesting as others and therefore tend to learn more trivial information, consider fewer items in general or learn information items randomly, which impedes the adoption of a compensatory decision rule.

The interaction variable has a minor positive effect on the depth of search measure but the conducted Wald-Test, again, fails statistical significance. Nevertheless, Figure 31 provides the marginal effects of political sophistication on the dependent variable in the different experimental groups for further illustration

Figure 31Predictive Margins for the variable Depth of Search
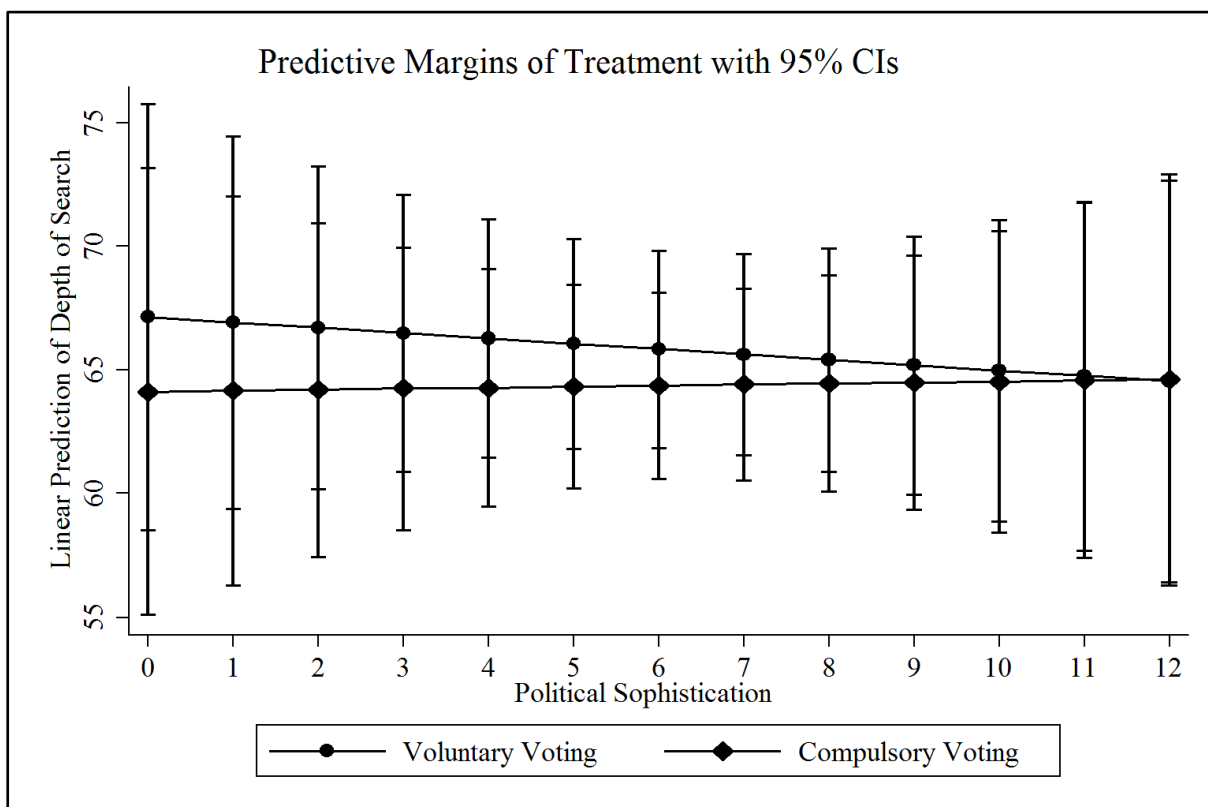
Note: Political Sophistication is measured on an ascending scale. 0 refers to the lowest level. 12 is the highest level. Individual scores were obtained from the right or wrong answers according to political trivia questions during the experiment.

The graph shows almost no difference between the marginal effects in both groups. There is only a tiny increase in the prediction for the depth of search score as the scores on the political sophistication dimension increase as well. Therefore, if there is an effect, it is one not matching the theoretical assumptions. Recall that drawing on the calculus of voting approach it was expected that subjects participating in the compulsory voting groups would be more likely to score highly on the depth of search score. Furthermore, it was expected that CV-laws especially affect politically less sophisticated subjects. The model provides no evidence for both assumptions. Moreover, these results provide no evidence for the proposal that compulsory voting could lead voters to adopt a compensatory decision rule.

Akin to the analysis of the depth of search score, Table 76 provides evidence from various OLS-specifications regarding the comparability of search score. A high score in this

measure points to the adoption of a compensatory decision rule. Behavioral decision theory argues that subjects who compare many information items between alternatives conduct a more sophisticated information search. Thus, individuals conducting a more comparative information search are expected to be politically more sophisticated or increase their levels of political sophistication. Higher overall numbers in this score in the treatment group would indicate that compulsory voting could lead to an improvement in political sophistication levels. Findings, however, suggest that compulsory voting, in fact, has a strong negative effect on the comparability of search score. Even though this effect is only significant on a 10 percent level in the fully specified model, it can be concluded that compulsory voting does not lead to an increase in the adoption of a compensatory decision rule.

Table 76 Determinants of the Comparability of Search Score, OLS-regression

| VARIABLES | Comparability of Search | | | |
	M1	M2	M3	M4
Treatment	-3.846	-2.286	-2.546	-17.55*
	(4.654)	(4.639)	(4.655)	(10.52)
Political Sophistication		1.649**		0.453
		(0.738)		(1.122)
Age			-0.610***	-0.715***
			(0.228)	(0.225)
Female			-7.681	-2.649
			(4.920)	(5.860)
Major			-10.34**	-11.01**
			(4.551)	(4.671)
Interaction				2.567*
				(1.428)
Constant	65.48***	54.32***	90.49***	88.14***
	(3.274)	(6.224)	(7.596)	(11.20)
Observations	112	112	112	112
R-squared	0.006	0.048	0.096	0.152
Wald-Test	2.21*			

Note: OLS-regression with robust standard errors, p-values in parentheses * p<0.10, ** p<0.05, *** p<0.01

Instead, results show that preliminary individual levels of political sophistication have a strong positive effect on the comparability of search score. Moreover, this effect is statistically significant in model M2 (1.649**). Thus, it can be argued that politically more sophisticated subjects conduct a more comparable information search. However, the effect is no long-

er significant in the fully specified model. This finding is consistent with former empirical results. In fact, various authors argue that political sophistication is really the only difference

Figure 32 Predictive Margins for the variable Comparability of Search
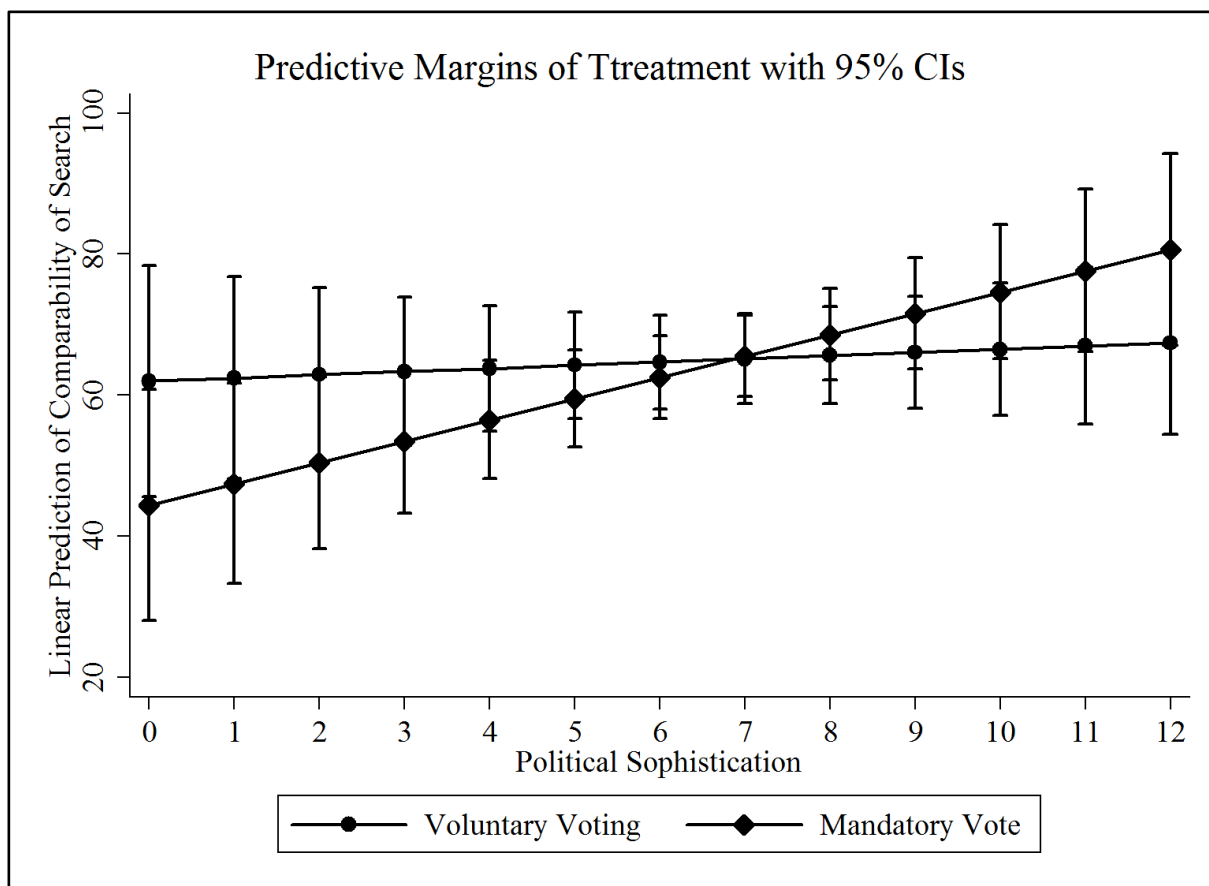
Note: Political Sophistication is measured on an ascending scale. 0 refers to the lowest level. 12 is the highest level. Individual scores were obtained from the right or wrong answers according to political trivia questions during the experiment.

to find between individuals that explains information processing (Lau and Redlawsk, 2006, Shanteau, 1992, Shanteau, 1988).

The interaction term has a positive and statistically significant (2.567*) impact on the comparability of search score. Also, the Wald-Test of the interaction term reaches statistical significance. In order to clarify the direction of the effect of the political sophistication in the different voting settings, Figure 32 provides marginal effects. With respect to the calculus of compulsory voting, it was expected that compulsory voting activates especially politically uninformed subjects to conduct a more comparable information search (H4) in order to gain confidence in their voting decision. However, the graph shows a similar pattern to the one showing the marginal effects regarding the depth of search score. Less informed subjects in the compulsory voting setting conduct less comparable information search than their voluntary counterparts. Moreover, the comparability score increases as the scores on the political

sophistication scale grow as well. Thus, H4 and H6 cannot be accepted. Instead, it can be stated that initially more politically sophisticated subjects are more likely to conduct a more comparable information search and that less informed individuals tend to compare more information in a campaign when voting is voluntary.

Like in the other models, the socio-demographic control variables have negative effects on the dependent variable. The effects of age and the participants' major are highly or moderately significant, respectively. Thus, it can be argued that older and female subjects conducted a less comparable information search. Regarding age, these results correspond with findings of Riggle and Johnson (1996). Furthermore, social science majors conduct a less comparable information search than others. This effect is also significant on a 5 percent level.

Considering all dependent variables, this study does not find evidence for the claim that compulsory voting could lead to a shift in what information is acquired and how information is being processed in election campaigns. Furthermore, the examination of the two key measures provides no evidence that individuals adopt the more taxing compensatory decision rule due to compulsory voting. Instead, findings are in line with previous studies that identify the importance of preexisting individual levels of political sophistication to predict information behavior in electoral campaigns.

6.4 Discussion

This chapter has examined whether compulsory voting affects individual information acquisition and processing in election campaigns. In order to test whether compulsory voting has an effect on individual information behavior, the depth and the comparability of the individual's information search served as key measures. This way it was possible to disentangle the individual adoption of different decision rules regarding which information was accessed and how this information was processed. To answer this question, the chapter proceeded in three distinct steps: First, a narrower theoretical framework was derived from the behavioral decision theory in order to establish a link between compulsory voting and political sophistication in general and individual information processing in electoral campaigns in particular. Secondly, drawing on this framework, the main measurement instruments and hypotheses were presented. Thirdly, the experimental tool and setup were presented. And finally, empirical results gained from the experiment were presented.

Empirical evidence suggests that compulsory voting does not lead to a shift in individual information acquisition and processing in electoral campaigns. Instead, this study shows

that preexisting levels of political sophistication explain the adoption of certain decision rules in the information board experiment. This is consistent with former studies on information processing (Shanteau, 1988, Shanteau, 1992). Furthermore, findings correspond with those of (Lau and Redlawsk (2006)) who state that information processing is influenced by individual voter characteristics in general and levels of *Political Sophistication* in particular.

One possible explanation can be seen in the experimental design itself. Compulsory voting was implemented without a specific penalty implemented for disobedience. Thus, incentives to behave like rational utility maximizers were low. However, the question of this chapter focused more on individual information processes and not on penalty averse behavior. Moreover, Shineman (2012b) argues that compulsory voting regimes that do not charge any penalties are equally effective at influencing individual voting behavior. Chapter 4, however, shows that the severity of costs changes the individual calculus of voting and thus it can be argued that a stronger penalty would have changed the experimental outcome of this chapter. But then this chapter would have examined the effect of different amounts of penalties and not the assumed impact of compulsory voting in general on information acquisition and processing.

Part III: Synopses and Concluding Remarks

7. Conclusion

Voting is crucial to democracies. Up to this point, it is the most fundamental and widespread form of political participation in modern mass democracies. However, declining turnout can be observed almost everywhere. More importantly, declining turnout seems to reinforce the general socio-economic bias of elections (Lijphart, 1997). Therefore, different authors claim that compulsory voting could be a solution to those problems by activating those who would normally abstain when voting remains voluntary (Hill, 2006, Jaitman, 2013, Shineman, 2012b, Shineman, 2010, Lijphart, 1997, Engelen, 2007). In addition, to strengthen democratic representation Lijphart (1997), for example, suggests that since individuals have to vote, they might be more likely to reason more about politics and be therefore politically more sophisticated.

In general, empirical evidence supports the notion that compulsory voting increases turnout (see for example Jackman, 2001, Jaitman, 2013). But there is only mixed and insufficient evidence in the literature about the secondary effects of compulsory voting on the composition of the electorate in terms of individual information levels (Shineman, 2012b). For example, studies comparing the impact of CV-laws on individual information levels over countries find positive (Gordon and Segura, 1997) and negative effects (Birch, 2009), but strongly suffer from country-specific heterogeneity and can therefore hardly establish causality (Shineman, 2012b). Counterfactual survey designs also report mixed results (Mariën, 2007, Czesnik, 2013) and are additionally struggling with problems of validity since they rely on reported behavior (Morton and Williams, 2010). Already existing evidence from laboratory experimental research designs indicate a positive relationship between compulsory voting and individual information levels, but only focus on elections in small committees (Großer and Seebauer (2013)), or neglect the interdependent nature of elections by drawing on a decision-theoretic model (Shineman, 2010). Thus, this study was generally motivated to improve the knowledge about the impact of compulsory voting laws on individual voting behavior by systematically testing the explanatory power of the calculus of compulsory voting approach on turnout in general and of the impact of compulsory voting rules on informed voting in particular. Therefore, this study utilized three different analytical frameworks. First, in a decision-theoretic model (Ch.4), this study tried to test the two main predictors of turnout in compulsory voting systems identified by the calculus of compulsory voting approach – costs of not participating and levels of law enforcement. Thereby, with respect to the impact of costs of not participating, this study directly draws on a reference model provided by Shineman (2010) and tries to replicate its main findings regarding turnout and informed turnout. Furthermore, this study expands this reference model by systematically including levels of law enforcement as an additional explanatory factor in the model. Therefore, the model and the corresponding experimental procedure presented in Chapter Four examine whether increasing levels of penalties and law enforcement also affect individual willingness to get informed before participating in elections.

Secondly, in order to account for the interdependent nature of voting, the main predictions of the calculus of compulsory voting regarding turnout and the expanded assumptions with respect to informed voting were tested in a game-theoretical model. Therefore, in Chapter Five, this study also made use of various controlled laboratory research designs in order to disentangle the causal link between compulsory voting and individual voting behavior. In the last step, this study left the narrow formal framework and examined the possible psychologi-

cal aspect of compulsory voting on the way individuals' process information. Thereby, this study relaxes the predictions based on the calculus of voting approach and focuses more on the general psychological impact of compulsory voting laws.

In particular, this study raised three distinct research questions. First, this study addressed the question of how and to what extent compulsory voting increases turnout. Even though previous research provides consistent and robust evidence that compulsory voting, in fact, increases turnout (Jackman, 2001, Jaitman, 2013), it lacks the systematic examination of the causal link of which aspects of mandatory voting rule actually is responsible for mobilizing voters on a large scale. Therefore, this study focused on the relationship between two main predictors, costs of not participating and levels of law enforcement, and the individual decision to turn out. Also, this has not been examined within a game-theoretical framework up to this point.

Second, this study raised the question of how and to what extent compulsory voting increases informed turnout. Previous research has come up with mixed evidence. Shineman (2010) for instance finds that compulsory voting could, in fact, lead to higher levels of informed voting. Other scholars, instead, point to problems of ill-informed and random voting due to mandatory voting laws (Jakee and Sun, 2006). Thus, in order to deal with the different perspectives, this study provides a systematic test of the impact of costs of not participating and levels of law enforcement on informed participation.

Third, since focusing only on the quantity of acquired information might not explain individual information search adequately, this study also raises the question of whether compulsory voting affects individual information processing. Therefore, the third empirical chapter compares the quality of acquired information between the experimental groups applying voluntary or compulsory voting rules, respectively.

Overall this study argues that compulsory voting significantly increases turnout when the costs for not participating and levels of law enforcement are not trivial, but only substantially increases individual information levels in the decision-theoretic framework. Instead, this study finds substantial levels of random participation or invalid voting in both formal models. Furthermore, this study finds no evidence for a positive effect of compulsory voting on the way individuals acquire and process information in election campaigns.

7.1 Summary of the experimental evidence

Previous research, such as (Panagopoulos, 2008) for example, has supported the notion that compulsory voting increases turnout significantly when not participating is costly. In fact, it is supposed that rational individuals should vote if costs of not participating outweigh initial participation costs. That is the basic assumption of the calculus of compulsory voting (Panagopoulos, 2008). This approach argues that turnout in compulsory voting systems is best explained by the severity of penalties and the levels of law enforcement, which both can differ greatly when it comes to empirically comparing countries employing a legal requirement to participate in the elections. Previous studies also drawing on this approach claim that, if costly non-participation, in fact, drives rational individuals to the polls it also might increase levels of informed participation.

Regarding informed participation, it can be generally argued that voting is potentially costly especially for uninformed voters since they are the most likely to make voting mistakes (Degan, 2006, León, 2011, Degan and Merlo, 2011) 3). That is, helping the less preferred candidate into office. Normally uninformed voters can avoid this situation by abstaining without any direct ramifications. Thus, the uninformed and politically less interested individuals are more likely to abstain when voting is voluntary (Degan and Merlo, 2011). However, when voting is compulsory and not attending the polls is costly, voluntary non-voters are activated to vote. Following the logic of the calculus of compulsory voting approach, Shineman (2010) argues that since not participating is costly, uninformed voters might participate on a higher rate, because abstention does no longer create a higher utility.

Drawing on this analytical framework, Chapter Four examines the impact of compulsory voting on the individual decision to turn out and on whether CV-laws could also lead to an increase in informed turnout. In order to answer these questions, this study replicates a decision-theoretical model of (compulsory-) voting provided by Shineman (2010) and expands it by also systematically testing for the impact of different levels of law enforcement on turnout and levels of information acquisition.

Basically, the model predicts that levels of turnout and information gathering should be increasing, when both predictors - costs of not participating and levels of law enforcement, are individually and simultaneously increased. More specifically, the model expected that compulsory voting is most effective in mobilizing turnout and information acquisition when both factors are increased at the same time. Other than that, the general voting calculus is not really affected if both factors remain low. Moreover, the model also suggests that levels of

random voting should be also substantially higher in the experimental runs utilizing compulsory voting rules because individuals can avoid penalties and information costs by remaining uninformed and voting randomly and thus, maximize their potential reward. These expectations were tested in a series of controlled laboratory experiments varying severity of penalties and levels of law enforcement in a with-subject design.

Empirical findings of this chapter suggest that compulsory voting affects the individual motivation to turn out in the expected way. Experimental results show that turnout is significantly higher in the experimental conditions employing compulsory voting. Thus, overall findings are in line with the existing research on the primary effect of compulsory voting (Jackman, 2001, Jackman, 1987, Jaitman, 2013). Particularly the empirical analysis of Chapter Four reveals that compulsory voting is most effective in mobilizing individuals to participate in the experimental elections when both factors, costs of not participating and levels of law enforcement, are increased at the same time. Alternating only one of the two factors individually reveals that costs of not participating have a stronger effect on turnout than levels law enforcement.

Additionally, Chapter Four also shows that compulsory voting can also lead to an increase in informed turnout. Again, compulsory voting increases information acquisition more if both factors are increased simultaneously. Considering only one factor reveals, again, that costs of not participating have a stronger effect on levels of information gathering than levels of law enforcement.

In general, Chapter Four was able to replicate the main findings provided by Shineman (2010) regarding the impact of CV-laws on turnout and informed turnout. Moreover, it added further knowledge to the understanding of the impact of compulsory voting on individual behavior by systematically accounting for levels of law enforcement on turnout and informed turnout. Empirical results thereby suggest that costs of not participating have a stronger impact on individual behavior than changing levels of law enforcement. However, since the decision-theoretic approach has the problem of not accounting for the strategic and interdependent nature of elections it can only serve as a starting point. In Chapter Five, this study tried to examine whether the assumptions of the calculus of voting approach also hold in a game theoretic-model. If so, this would provide a strong test of the calculus of compulsory voting approach.

The model of Chapter Five starts with the assumption that elections can be seen as the provision of a collective good, in which individuals have a strong incentive not to cooperate

because they could still benefit from the collectively achieved good[103], without having to bear the costs of the collective action. Thus, voting can be modeled as a strategic dilemma in which individuals have to decide whether to contribute to the collective good (turning out) or to defect (abstain) and hope that the other individuals provide the collective good instead. Previous game theoretic models find that the strategic nature of voting often leads to low levels of turnout (Geys, 2006b). Chapter Five tested whether this general claim is affected by the introduction of compulsory voting laws focusing on the impact of costs of not participating and varying levels of law enforcement in particular.

Like in Chapter Four, Chapter Five predicted low levels of turnout and information acquisition for cases in which voting was voluntary, and that levels of turnout and information gathering would increase if penalties and levels of law enforcement are increased as well. However, unlike the decision-theoretic model of Chapter Four, the game-theoretical approach of Chapter Five predicted substantial levels of invalid voting as penalties and law enforcement got more severe, instead of random voting as predicted in Chapter Four.

Overall, Chapter Five also finds support for the notion that compulsory voting rules and turnout are positively correlated. Contrary to the decision-theoretical model of the previous chapter, however, this chapter finds only little evidence for the claim that CV-laws could also lead to higher levels of informed participation. In fact, informed participation is slightly higher in the experimental runs employing compulsory voting but only on a very low level in general. Instead, this chapter finds that numbers of invalid voting increase as non-trivial compulsory voting gets introduced. This can be explained by the fact that, by entering the voting stage, subjects avoid penalties for not participating and also avoid voting mistakes by not casting valid votes. Furthermore, for actors planning on rolling off at the voting stage, it makes absolutely no sense to get informed beforehand. It follows that individuals face multiple strategic dilemmas in the experimental election presented in Chapter Five. First, subjects must decide whether they want to participate or not. Second, if they participate, they have to decide whether to get informed and cast an informed vote or to remain uninformed to cast a random or invalid vote. It also follows that the introduction of compulsory voting rules with non-trivial penalties and levels of law enforcement diminishes the first dilemma by adding penalties for non-participation. Individuals can avoid these penalties by entering the voting stage. However, empirical results indicate that the second dilemma - getting informed or remaining uninformed - does not seem to be affected by the non-trivial compulsory voting

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[103] In the case of elections the collectively provided good could be the election of a new government and the peaceful transition of political power. Every citizen benefits from that even though a new government does not necessarily reflect every voters first preference.

rules in the experiment. Subjects still have a strong incentive to avoid additional information costs and thus enter the voting stage without picking up information. Here, in order to avoid voting mistakes, they cast invalid votes. Therefore, compulsory voting does not seem to eliminate the free rider problem in this setup. These findings are in line with the general predictions of the model presented in Chapter Five.

With respect to turnout, findings obtained in Chapter Five reinforce the assumptions of the calculus of compulsory voting approach. Thus, this chapter strengthens the notion that the two factors of the calculus of compulsory voting approach, costs of not participating and levels of law enforcement, are good predictors for the functioning of compulsory voting laws, at least with respect to explaining turnout.

Nonetheless, Chapter Five also suggests that compulsory voting does not increase informed participation in a substantial way. Instead, since elections can create strategic dilemmas, a legal requirement to participate in the elections could instead lead to invalid voting. Therefore, this chapter finds empirical evidence that compulsory voting is, indeed, effective in mobilizing voters but can also be a harm to the quality of the voting decision and thus to election results. Results show that expectations drawn from the calculus of voting approach do not fully explain the individual information behavior in a strategic voting situation in the experimental setup presented in Chapter Five.

In the examination of the relationship between compulsory voting and individual information behavior, Chapters Four and Five both focused on the quantity of acquired information. This is a not fully suitable approach to deal with the question if compulsory voting could, in fact, incentivize individuals to reason more about politics.

To answer the question whether compulsory voting affects individual information search not only on a quantitative level but also on a qualitative level, Chapter Six left the narrow framework of experimental economics. Instead, it linked the general theoretical assumption that compulsory voting forces individuals to participate in the elections with insights derived from political psychology. For instance, it employed a series of information board experiments to examine whether CV-laws alter not only the way individuals acquire but more importantly process information items in an electoral campaign. Building on behavioral decision theory and linking this approach to the general assumptions regarding the impact of compulsory voting on individual voting and information behavior, Chapter Six came up with various hypotheses. In general, it argues that compulsory voting activates individuals to participate in the elections even without actual penalties, by imposing a psychological pressure through the intrinsic value of obeying a law ((Shineman, 2012b). Recall, that Matsusaka

(1995) claims that individuals are more likely to vote when they are informed. Due to compulsory voting, they are more likely to vote to begin with. Reversing the argument of Matsusaka, rational actors should, therefore, be more likely to pick up information when they are very likely to vote since they want to be confident in their vote in order to vote for their preferred candidate.

Therefore, Chapter Six expected that individuals in the compulsory voting treatment groups would, on average, acquire more information items than individuals in the voluntary voting groups. Furthermore, the chapter differentiates different information items with respect to their salience, because not every piece of information that is provided during an election campaign enhances political sophistication. This was operationalized as trivial and non-trivial information items. Drawing on this distinction, Chapter Six also assumes that subjects in the CV-treatments would gather more non-trivial information items than the voluntary voting groups because compelled voters should gain confidence in their vote. In order to make information processing measurable, the study made use of two key measures established by Lau and Redlawsk (2006), the *depth of search score* and the *comparability of search score*. Both scores are scaled from 0 to100. In both cases, a high score indicates a more sophisticated information search and vice versa. A difference in the scores between both experimental treatments would indicate an effect of compulsory voting laws on the way individuals process information. Thus, Chapter Six expected individuals to score higher in the *depth of search* score when voting was compulsory, and higher scores in *the comparability of search score* for the CV-treatment-groups, respectively.

Additionally, drawing on stylized facts about voting, Chapter Six controlled, for example, for preexisting individual levels of political sophistication and their influence on individual information behavior. Following the Lijphart (1997) argument regarding the relationship between compulsory voting and individual levels of political sophistication, Chapter Six particularly expected an interaction effect between CV-laws and individual levels of political sophistication. In fact, compulsory voting should have a stronger effect on individuals having a low level of political sophistication as individuals who are already politically well informed.

Empirical evidence suggests that compulsory voting does not lead to an alteration in individual information acquisition and processing in electoral campaigns. Instead, this study shows that preexisting levels of political sophistication explain the adoption of certain decision rules in the information board experiment more accurately. This is consistent with former studies regarding information processing (Shanteau, 1988, Shanteau, 1992). Thus, in addition to the findings of the fourth chapter, which claimed that the introduction of compulsory vot-

ing did not lead to an increase in the individual information acquisition, Chapter Five finds no support for a change in the individual information processing as well.

Table 77 Summary of empirical results

Mode of explaining	Part I Decision-theoretic	Part II Game-theoretic	Part III Behavioral Decision Theory
CV + Turnout	(++)	(++)	(X)
CV + Random Voting	(+)	(X)	(X)
CV + Invalid Voting	(X)	(++)	(X)
CV + Information	(++)	(+)	(X)
CV + Information Processing	(X)	(X)	(~)

Note: (++) refers to a strong positive effect of compulsory voting laws on the dependent variable; (+) refers to positive effects of CV-laws on the dependent variable. (~) refers to a negative influence of CV-laws on the dependent variable; (~) refers to no effect of CV-laws on the dependent variable; and (X) states that this particular relationship has not been investigated in that particular section of the study.

Table 77 summarizes the findings of the empirical chapters. Overall, it can be argued that the laboratory experiments were able to replicate major findings of the empirical literature regarding the impact of compulsory voting laws on turnout. Furthermore, this study also was able to make use of the theoretical framework of the calculus of voting approach and explain the influence of compulsory voting on the individual decision on turn out. Thereby it also finds evidence supporting the notion that compulsory voting and information acquisition are, quantitatively, correlated in a positive way. However, this specifically applies to the decision-theoretic model. Looking at the game-theoretic model also suggests a positive relationship between compulsory voting and information acquisition. But this only takes place at a very low level. Furthermore, the relationship between compulsory voting and invalid voting is much stronger in this setup. Moreover, the table indicates that compulsory voting does not necessarily affect the way individuals' reasoning on politics. Thus, this study only partly finds evidence for the educational effect of CV-laws proposed by Lijphart (1997).

7.2 Implications

Theoretical Implications

With respect to the influence of compulsory voting on the individual decision to turnout, the experiments conducted in the first empirical chapter (Ch.3) suggest a positive effect of compulsory voting laws on the individual decision to participate in elections. This is in line with previous research regarding the primary effect of compulsory voting. However, the study raised the question of how and to what extent compulsory voting affects individual voting behavior. Previous studies propose that compulsory voting introduces costs of non-voting which disable the usual individual voting calculus and therefore increase turnout (Panagopoulos, 2008). This study underpins this notion by providing systematic evidence from two different formal models of (compulsory-) voting and corresponding experimental implementations. Particularly, this study tested the impact of the two main predictors for turnout in compulsory voting systems presented by the calculus of compulsory voting approach - costs for not participating and levels of law enforcement. Thereby, it provides a strong test of this theoretical approach by systematically testing the impact of both factors on their own and together. Results show that turnout is most affected, as proposed by the calculus of compulsory voting if both factors are high. Considering only one factor, costs of not participating seem to have a stronger effect on turnout than different levels of law enforcement in both models. Even though experimental research lacks contextual factors that might also explain the way compulsory voting works in a certain country, isolating the two factors provides a strong test of the theoretical approach. Moreover, all other controlling variables that were included in the experiment lacked explanatory power. Thus, it can be argued, that utilizing the calculus of compulsory voting in a systematic way serves as a strong baseline model for understanding the micro-funding factors explaining turnout when voting is compulsory.

With regard to the question of whether compulsory voting could lead to an increase in individual information levels, this study found empirical evidence in favor of this claim. However, there are differences between the two formal models presented in Chapters Four and Five. The theoretical argument, also drawing on the basic assumptions of the calculus of compulsory voting approach, claims that uninformed individuals that are getting mobilized to turn out by the legal requirement to participate in the election, face a dilemma of remaining uninformed and risking voting mistakes or investing in costly information and participating afterward. Usually, if voting is voluntary, instrumentally motivated individuals are generally

235

expected to remain uninformed (see for example Downs, 1957) and abstain from voting. Penalties introduced by compulsory voting, however, change the basic voting calculus at least if costs of not participating are not less than equal to initial participation costs. In that case, not participating produces a lower potential reward. Thus, rational actors are expected to turn out more often in that situation. However, now they face the dilemma of making voting mistakes if they participate in the elections without getting informed beforehand. If the potential reward of a random vote is lower than the potential reward of an informed vote, rational actors are expected to pick up information and participate in the elections afterward. Other experimental studies, e.g. Shineman (2010) provide empirical support in that direction, drawing on a decision-theoretical model. In Chapter Four, this study was able to be replicated in that regard. Furthermore, it shows that the expectation not only accounts for the impact of the costs of not participating but also for different levels of law enforcement. This shows that the assumptions deduced from the calculus of compulsory voting with respect to informed voting are able to explain informed turnout when voting is compulsory, at least in a decision-theoretic setup.

However, this setup does not accurately model the strategic and interdependent nature of elections (see also Feddersen and Pesendorfer, 1999a). Other than the study conducted by Shineman (2010), the model and corresponding experiment employed in the fifth chapter of this study consider a strategic situation in which decisions of others can affect the individual outcome. Therefore, it captures the interdependent nature of elections more adequately. In that chapter, elections are seen as the provision of a collective good, in which rational actors have a strong incentive not to participate in the provisioning process for but still benefit from the collective good (Olson, 1965). Results suggest that uninformed voters are more likely to cast invalid votes than to invest in additional information items when voting is compulsory, and the election outcome dependent on the decision on more than one voter. They do so, because they want to avoid the costs accompanied by abstention, but shy away from investing in further information. By entering the voting stage without casting a valid vote, rational actors also hope that the other voter casts a valid and informed vote. Thereby, the voter casting an invalid vote is the potential "free rider" maximizing their potential payoff by not investing in additional information, not paying penalties for non-participation and not paying the potential opportunity costs of an uninformed random vote resulting in a voting mistake.

By drawing on some general assumptions of the collective action theory (Olson, 1965) and linking it to the assumptions of the calculus of compulsory voting approach and its empirical findings gained from the decision-theoretic model, Chapter Five tries to provide a test of the decision-theoretic model, which serves as a baseline model in the literature (Shineman,

2010)in a strategic environment. In doing so, it shows that in a game-theoretic model, predictions regarding individual behavior partly change. For instance, turnout and informed turnout are still more likely when voting is compulsory, however, invalid voting also appears among the dominant strategies. By testing the predictions of the calculus of compulsory voting approach in a game theoretic model, this study broadens the test of the theory and is able to show that the decision-theoretic model offers a good first impression of the micro-funding of compulsory voting but is not fully accurate with respect to its explanation of individual behavior in compulsory voting systems. Instead, the game-theoretic model offers an additional approach, which helps to disentangle the impact of compulsory voting rules on individual behavior by accounting for the strategic element of elections.

The sixth chapter of this study raised the question of whether compulsory voting is able to alter individual information processing. Results show, that there is no significant difference between the experimental groups. Thus, it can be concluded that differences in information processing are better explained in a different way. For example, pre-experimental individual levels of political sophistication are a good predictor of the way individuals' process information in an election campaign.

Overall it shows that the calculus of compulsory voting approach, utilizing the two main explanatory factors - costs of not participating and levels of law enforcement - offers a strong and robust explanation of individual voting behavior in compulsory voting systems, especially with respect to turnout. Nonetheless, this study shows that conclusions regarding the impact of compulsory voting on levels of informed participation cannot fully be explained by the theoretical approach.

Building on the experimental results, different theoretical and empirical implications can be drawn with respect to the relationship between compulsory voting and information acquisition and processing. First, from a theoretical perspective, it is justified to analyze voting and information behavior accounting for a strategic environment. It challenges the inferences of studies using a decision-theoretic background. In those studies, subjects were able to directly affect their preferred outcome. At the same time, abstention incurs a cost and furthermore, like random voting, only an arbitrary chance of getting the preferred outcome. Thus, rational actors have a strong incentive to invest in additional information in order to maximize their individual utility. By isolating the individual decision, Shineman (2010) is able to draw a convincing picture of the mechanism underlying informed voting in compulsory voting states. In order to broaden this approach, this study, however, argues that individuals in elections rather face a strategic dilemma in which the electoral outcome is also decided by

others. It seems reasonable to expect voters to be affected by that. Particularly, voters face the dilemma of paying the costs of abstention or a false vote. Since being the decisive voter is very unlikely, rational actors seem to have a strong incentive to remain uninformed but enter the voting stage in order to avoid penalties. In order to avoid voting mistakes, uninformed voters have a strong incentive to cast invalid votes. Therefore, rational actors try to gain a higher pay off by possibly exploiting other voters bearing the costs of an informed vote. By conceptualizing voting in strategic an environment, this study is able to add further knowledge to the understanding of how compulsory voting affects turnout in general and informed turnout in particular.

Secondly, from empirical perspective implications are twofold. On the hand, this study finds support for the claim of Lijphart (1997) that compulsory voting could enhance individual levels of political sophistication and therefore could lead to more informed engagement in terms of informed turnout. But only in terms of the quantity of acquired information. With respect to changes in the quality of an information search due to the introduction of compulsory voting laws, this study finds no empirical evidence. Thus, compulsory voting alone seems not to be a good vehicle to overcome a lack of interest and engagement in politics. Instead, this study finds empirical evidence for the claim that mandating individuals to vote could lead to a decrease in the quality of election outcomes. Since random and invalid voting is observed frequently. Thus, it can be argued that compulsory voting is able to increase participation and representation without also generally increasing informed participation in terms of the quality of the acquired information.

Methodical implications

The major advantage of controlled laboratory research designs is the internal validity (McDermott 2002b). Making use of such methods makes it possible to convincingly establish and investigate causality between two variables. One major downside of experimental research, however, is the lack of external validity (Faas and Huber, 2010). Especially laboratory experiments suffer from artificial scenarios which make it hard to generalize inferences gained from experiments on the general population. Thus, the contribution of this study is mainly providing a systematic test of the theoretical assumptions of the calculus of compulsory voting approach in different analytical frameworks. Furthermore, in order to increase external validity, this study adds a game-theoretical perspective to the examination of the impact of CV-laws on individual behavior as it is supposedly more accurate in reflecting the interdependent nature of elections and the strategic dilemma that uninformed voters face in real-

world elections. Thereby, this study tries to strengthen experimental inferences gained from decision-theoretic models in terms of improving external validity by employing experiments utilizing strategic decision environments.

Even though considering a game-theoretic model might increase external validity, it is, at the same time, still a limitation of this study. Similarly to many other experimental studies (Kam et al., 2007), this study has recruited only students as participants. Thus, generalizing findings can be criticized. Opponents of so-called convenience samples argue that students often do not reflect average citizens in various characteristics, e.g. education. In sum, the main concern against all-student samples is one of external validity (see for example Sears, 1986). Nevertheless, Kam et al. (2007) state that convenience samples might be appropriate if there are, for example, theoretical reasons for assuming that the effect of the treatment will not be significantly different between students and the rest of the general population. Although Druckman and Kam (2011) are able to show, by comparing experimental and observational studies, that students are in fact distinguishable from non-students with respect to levels of political informedness, using student samples is still suitable for this study. The main focus of this study is to explain how changes on the institutional level affect the individual decision to turnout. All voters, students or non-students, are affected by the institutional change in the same way. Thus, they should not differ significantly with respect to their general voting behavior.

However, this study also examines the effect of compulsory voting on information behavior. Here, findings could be influenced by the general pattern that students are more informed about politics than the general population. But in Chapters Three and Four, information items are abstract and do not depend on preexisting information levels. Furthermore, both chapters focus on the effect of compulsory voting on the willingness to invest in costly information items. Hence, it examines the sole quantity of acquired information. There is no resilient reason to believe that students would behave significantly different from non-students with respect to the acquisition of abstract information items. Regarding Chapter Six, however, the argument might stick. It tries to investigate whether compulsory voting changes the way individuals process information items. Additionally, the experimental design draws on real-world information. Thus, preexisting levels of information could explain individual behavior. However, this study does not try to generalize inference on the general population. In a worst-case scenario, drawing on an all-student population with political information is a crucial issue, this chapter could create non-findings (Huber, 2012). But in the information board experiment, preexisting information levels did not lead to a better performance in terms

of individual utility. All subjects received a flat payoff regardless of their performance. Furthermore, the key measures of this chapter did not measure correct answers or how many times subjects identified their most preferred candidate, but differences in the acquisition of distinct types of information items. Thus, information is a good predictor of behavior in the experiment, but this should account for student and non-students in the same way. Moreover, in the analysis of the experiment conducted in Chapter Six, this study statistically controlled for the effect of political information.

In sum, with respect to the main aim of this study, a significant difference between students and non-students should not be expected. Nevertheless, empirical findings are interpreted within the used population and not directly generalized to the general population. In the sense of Roth (, the experiments employed in this study are used in order to search for facts and to arbitrate between conflicting results in the existing literature and to speak to theorists in order to test theoretical predictions derived from the expansion of existing theoretical explanations.

Normative Implications

Section 2.1.1 this study highlights the normative debate regarding compulsory voting. Thereby, three different aspects of the discussion were identified. First, voting as a right vs. voting as a duty; second, the legitimacy of electoral outcomes and third, the effect on citizen engagement.

Universal franchise is without a doubt a fundamental part of modern democratic states. However, low or declining turnout is not uncommon. Thus, in modern democracies, everyone has the right to vote but not all citizens make use of their fundamental democratic right. At the core of this discussion stands the dispute of seeing voting as a right or as a duty. Scholars supporting the notion that voting is a right argue that this automatically entails a right not to vote (Katz, 1997, Lever, 2010), as otherwise rights of personal freedom would be restricted. On the contrary, scholars in the tradition of John Stuart Mill (1991) claim that since elections in general and electoral outcomes, in particular, constitute a common good, every citizen has the duty to contribute to the collective good (Hill, 2002, Lijphart, 1997, Engelen, 2007) and thus would help to overcome the free rider problem. In other words, since all citizens benefit from collective decisions such as voting, compulsory voting could be justified in terms of equality (Birch, 2009). Additionally, Shineman (2012b) proposes that compulsory voting could reinforce the already existing feeling of having a moral obligation to vote (civic duty) and could, therefore, have positive effects on voting in general.

Another aspect of the normative debate regarding compulsory voting is how the voting rule affects the legitimacy of electoral outcomes. Low or decreasing turnout is criticized in this regard. In general, some scholars and political observers are being skeptical about the democratic legitimacy of electoral outcomes, if barely 50 percent (or less) of the electorate bother to turn out[104]. It raises the question whether a candidate or a parliament elected by the entire electorate has a higher legitimacy than one being elected only by a minor part of eligible voters. Emphasizing equality and the rule of "one man - one vote" one could lead to a government elected by the entire electorate being perceived as more legitimate than one being elected by only 50 percent or less. It follows that compulsory voting could strengthen the legitimacy of elected governments in the sense that the electoral outcome truly would represent the will of the entire electorate.

At the same time, this has an impact on the free rider problem typically existing in the context of voting. Compelling all citizens to vote, could give rational individuals the security that all citizens vote and therefore also contribute to the public good (Katz, 1997, Hill, 2006). Therefore, compulsory voting could produce higher collective outcomes.

This might be more important with respect to the socio-economic bias of elections (see for example Lijphart, 1997). That is, less wealthy and less educated citizens are most likely to abstain from voting. Therefore, only a certain group of citizens influences the electoral outcome. As a result, they are not represented by mainstream politics anymore. Compulsory voting, however, might overcome this pattern since the entire electorate is supposed to be activated to vote. Therefore, parties or candidates must provide policies in the interest of the former unrepresented groups (Chong and Olivera, 2008). This could shift public policy in the direction of more redistribution. Bechtel et al. (2016), for example, find that compulsory voting increases the support for left-policies, which are more likely to be supported by citizens that are in the need of those policies – less wealthy and less educated citizens.

In sum, compulsory voting distributes the costs of voting equally among the voters, since turnout is supposed to be universal, and ensures that the elected government is aware of the preferences of all citizens (Birch, 2009). Therefore, compulsory voting can enhance democratic legitimacy.

Opponents of compulsory voting, however, argue that requiring citizens to participate in elections affects the electoral outcome in a negative way. The main concern is that compulsory voting increases uninformed and/or random voting (Jakee and Sun, 2006, Lever, 2010).

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[104] In the last regional elections in Bremen for example only 50.2 percent of the eligible voters turned out to vote. See the numbers for example here: http://de.statista.com/statistik/daten/studie/3172/umfrage/wahlbeteiligung-bei-den-buergerschaftswahlen-in-bremen-seit-1947/

In fact, the data provided in Chapters Four and Five points in that direction. Instead of acquiring additional information, i.e. in Chapter 5, uninformed subjects cast invalid votes much more often in order to avoid penalties for not entering the voting stage. Thus, these findings support one of the main objections brought against compulsory voting.

This study does not account for a possible public-policy effect of compulsory voting. However, the experimental evidence of this study suggests that compulsory voting, in fact, significantly increases representation. In the experiment discussed in the fourth chapter, for example, turnout was nearly universal[105]. This suggests that almost the entire electorate was activated by the compulsory voting rules. Following the argument developed above, a candidate or government elected by the majority of nearly the whole electorate should be, at first glance, considered legitimate. Nevertheless, it could be the case that most of the formerly alienated voluntary-nonvoters cast random or invalid votes in order to avoid being penalized for their non-participation, as supposed by the empirical evidence provided in this study.

The third main aspect of the normative debate is the possible impact of compulsory voting on political engagement in general and on informed voting in particular. Starting with the argument that voting is positively correlated with other forms of political participation (Pateman, 1970), Lijphart (1997) and others proposed that compulsory voting could increase political participation. Furthermore, since voters are in touch with politics more often, they should also increase their individual levels of political sophistication. In other words, compulsory voting could raise levels of awareness and interest in politics due to the prior mobilization effect and have a secondary educational effect.

The examination of this educational effect was at the center of this study. As already mentioned before, this study does find experimental evidence for such a secondary effect of compulsory voting, especially within the decision-theoretical framework. In the game-theoretic framework, the study shows that the legal requirement to participate in elections also increases informed participation but only on a very low level. Instead, more invalid voting was observed. Therefore, these findings support the arguments of opponents of compulsory voting who, for example, argue that changing the voting law will not solve the problem of disaffection with respect to politics (Birch, 2009). On the contrary, compulsory voting only artificially increases turnout. Full participation might be desirable as a short-term strategy but it would also mask that abstention can be seen as a critical measure of disagreement with the current political system. Since random and uninformed voting is increased by compulsory voting, full participation does not lead to a higher quality of political engagement.

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[105] For further information see chapter 4. For the actual turnout numbers see table 20.

In sum, this study finds empirical evidence for and against various positions of the normative debate. For instance, on the one hand, compulsory voting, in fact, mobilizes nearly the entire electorate and is therefore likely to increase representation of relevant societal groups. On the other hand, this study finds rather mixed evidence for the proposed educational effect of compulsory voting. Even though the quantity of acquired information goes up in the decision-theoretic and game theoretic model, this study finds no evidence for a positive effect of CV-laws on the quality of acquired information. This becomes most obvious in the experiment discussed in Chapter Six. Changing the voting rules does not affect the way individuals acquire and process information. Thus, drawing on the experimental evidence provided in this study, compulsory voting can in fact increase turnout in a substantial way and can thus be effective for increasing representation but does not seem to be suitable to solve the underlying problems of low and declining turnout in western style-democracies – political disinterest and disengagement of large parts of the society.

Further Research

Since some of the experimental results gained from this study are in conflict with already existing findings, further research should be conducted to combine the different approaches in order to get an extensive picture of how compulsory voting affects individual voting behavior in general, and individual information behavior in particular. Thus, further experiments should adopt the two-step way of operationalizing compulsory voting, suggested by Shineman (2009), and test this in the game-theoretic strategic environment proposed by this study. This would combine the main advantages of both studies and would reduce the limits of both studies at the same time. So far, results of both studies suggest that the adopted procedure could explain some of the differences in the empirical results.

Furthermore, future experiments should focus on the causal examination of the impact of the costs of non-voting. For example, Panagopoulos (2008) shows in a cross-country comparison that the severity of penalties and the level of law enforcement explains much of the variance in turnout in different compulsory voting states. However, the causal link remains unclear. It could be the case that turnout instead is driven by unobserved country-specific heterogeneity. Thus, further experiments should isolate different levels of penalties and different levels of law enforcement in order to underpin the findings of observational studies.

Additionally, scholars should try to take a closer look at the importance of civic duty. Studies argue that compulsory voting reinforces the individual perception of voting as an act of civic duty (Shineman, 2012b). This could explain why some compulsory voting countries

have rather high turnout levels without enforcing the legal requirement or imposing only marginal fines.

In general, further research should focus on the explanation of the secondary effects of compulsory voting since the primary effect, enhancement of turnout is established and robust. Scholars should concentrate on the question whether compulsory voting is able to overcome socio-economic election bias and therefore increase representation. First results point in that direction (Bechtel et al., 2016). However, causal mechanisms remain unrevealed. Laboratory experiments could help to underpin those findings.

7.3 Concluding Remarks

This study raised the general question of whether compulsory voting affects individual behavior in the context of voting. In particular, it was 1) the aim to disentangle how and to what extent compulsory voting enhances turnout, 2) to examine whether compulsory voting increases information acquisition and 3) affects the way individuals process information in election campaigns.

The experimental evidence shows that, regarding the first question, compulsory voting substantially increases turnout in elections and that is very well explained by the introduction of costs of not voting and more severe levels of law enforcement, as proposed by the calculus of compulsory voting.

With respect to the second and third research questions, this study indicates that compulsory voting increases informed participation in both formal models, but only in a quantitative way. With respect to the quality of the information search, this study finds that compulsory voting does not change individual information behavior. Also, compulsory voting leads to higher levels of random and invalid voting, which can cause problems regarding the quality of election results.

These findings contribute to the existing literature and ongoing debate in various ways. The findings regarding the effect of CV on turnout underpin the notion of the established empirical literature on the primary effect of compulsory voting. This study also enlarges this body of literature because it systematically examines the impact of the two main predictors of turnout in compulsory voting systems introduced by the calculus of compulsory voting approach - costs of not participating and levels of law enforcement (Panagopoulos, 2008). Furthermore, this study is, to my knowledge, the first offering systematic examinations

of these two factors in a decision-theoretical way and transferring them to a game-theoretic model afterward. Previous research neglected to specifically focus the importance of different levels of law enforcement or to treat elections as a strategic situation, in which the decisions of others affect the outcome of a single individual. Thus, this study provides further knowledge of how compulsory voting affects individual motivation to turn out to vote.

With respect to generalizing the findings on turnout to the general population, results suggest that compulsory voting could have a positive effect on enhancing representation due to nearly universal turnout. Emphasizing the importance of equality for the functioning of democratic states suggests that the introduction of compulsory voting could help to overcome the problems associated with low or declining turnout.

Regarding the proposed educational effect of compulsory voting, the findings are in conflict with previous experimental evidence, provided by Großer and Seebauer (2013) among others. The differences in experimental evidence are most likely caused by distinctions in the theoretical background and experimental design. In order to isolate the causal mechanism between compulsory voting and informed voting, the approach presented in this dissertation should also be tested in the environment proposed by the former study. The discrepancy of the experimental results could also indicate that compulsory voting alone does not lead to politically more informed citizens. Instead, putting more time and effort into political education seems a lot more promising, with respect to increasing individual levels of political sophistication in general and informed voting in particular, than simply changing the voting rules.

The empirical findings presented in this study are not resilient enough to advise politics to adopt compulsory voting in order to overcome disinterest in politics. Only the robust primary effect of compulsory voting suggests that if turnout drops dramatically, compulsory voting will be a very reliable tool to restore turnout. It also seems possible to reduce the socio-economic bias associated with elections. However, these two positive aspects should not hide that compulsory voting alone does not seem to have a causal impact on informed political participation. Thus, drawing on the experimental evidence, implementing compulsory voting laws, for example in Germany, in order to foster political participation in general and informed voting in particular, is not advisable. The experimental results gained from this study show that changing the voting rules to compulsory voting mainly affect the quantity of turnout but does not seem to affect the quality of the electoral participation.

8. Appendix

Appendix A

Chapter 4 Reassessing the Calculus of Compulsory Voting

Experiment conducted in Chapter Four

Instruktionen

Ziel dieses Experiments ist die Untersuchung von Entscheidungsverhalten. Sie und die anderen Teilnehmer[106] werden während des Experiments Entscheidungen treffen. Dabei werden Sie Geld verdienen. Die Höhe Ihrer Auszahlung wird nur durch Ihre eigenen Entscheidungen und nicht durch die Entscheidungen der anderen Teilnehmer, entsprechend den Regeln auf den folgenden Seiten, bestimmt. Die Instruktionen dienen dazu, Sie vollständig über die Struktur des Experiments und die Konsequenzen Ihrer Entscheidungen zu informieren. Vom Experimentator werden keine Informationen zurückgehalten oder in irgendeiner Weise manipuliert.

Vergütung

Im Verlauf des Experiments verdienen Sie Punkte. Am Ende des Experiments werden Ihre Punkte in Euro umgerechnet. Dabei gilt folgender Wechselkurs: **1 Punkt = 0.004 Euro** (d.h. 1000 Punkte = **4 Euro**). Sie erhalten den Geldbetrag, den Sie im Verlauf des Experiments verdient haben, plus **5 Euro** Aufwandsentschädigung, für die anderen Teilnehmer nicht sichtbar und in bar ausgezahlt.

Dauer

Das gesamte Experiment dauert ca. 45 Minuten. Im Anschluss an das Experiment wird ein Fragebogen auf Ihrem Bildschirm erscheinen. Nachdem Sie den Fragebogen ausgefüllt haben, warten Sie bis Ihre Platznummer aufgerufen wird. Dann erhalten Sie Ihre Auszahlung in Euro.

Anonymität

Alle Teilnehmer erfahren weder während des Experiments noch danach die Identität der anderen Teilnehmer. Die anderen Teilnehmer erfahren weder während des Experiments noch danach, wie viel Sie verdient haben.

Kommunikationsverbot

Während des gesamten Experiments besteht striktes Kommunikationsverbot. Bitte schalten Sie auch Ihr Handy aus. Zudem weisen wir Sie darauf hin, dass Sie am Computer nur diejenigen Funktionen

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[106] Aus Gründen sprachlicher Einfachheit werden im Folgenden nur männliche Bezeichnungen verwendet. Diese sind geschlechtsneutral zu verstehen.

bedienen dürfen, die für den Ablauf des Experiments bestimmt sind. Verstöße gegen diese Regeln führen zum Ausschluss vom Experiment.

Inhalt

Im Laufe des Experiments werden Sie mit 2 verschiedenen Entscheidungssituationen konfrontiert; Spiel A und Spiel B.

In **Spiel A** können Sie sich entscheiden, ob Sie an einer Wahl teilnehmen wollen oder nicht. Wenn Sie an der Wahl teilnehmen, können Sie sich zwischen zwei Kandidaten, A und B, oder einer ungültigen Stimmabgabe entscheiden. Welchen Kandidaten Sie bevorzugen wird zu Beginn jeder Runde zufällig (mit gleicher Wahrscheinlichkeit) festgelegt. Sie erhalten zu Beginn einer neuen Runde nicht immer eine Information darüber, welcher Kandidat als Ihre Präferenz bestimmt wurde. Sie können sich die Informationen darüber aber kaufen. Wenn Sie auf den Informationsknopf drücken werden Kosten in Höhe von 30 experimentellen Punkten fällig. Diese werden Ihnen am Ende der Runde von Ihrem Gewinn abgezogen, in der Sie die Informationen gekauft haben. Wenn Sie sich an der Wahl beteiligen, entstehen für Sie Kosten in Höhe von 30 experimentellen Punkten. Auch diese werden Ihnen am Ende der Runde, in der Sie sich an der Wahl beteiligt haben von Ihrem Gewinn abgezogen. In einigen Runden wird eine Nichtbeteiligung mit dem Abzug von Punkten am Ende der Runde betraft. Die Höhe der Strafkosten variiert zwischen den Runden (0,10, 30, 60 oder 90 Punkte). Ob Sie bestraft werden, wenn Sie sich nicht an der Wahlbeteiligen hängt davon ab, ob Ihre Wahlbeteiligung kontrolliert wird. Die Wahrscheinlichkeit hierfür variiert ebenfalls über die Runden (0%, 25%, 50% 75%, 100%). Sie erhalten zu Beginn jeder Runde Informationen über die Höhe der Strafkosten und die Wahrscheinlichkeit mit denen Ihre Wahlbeteiligung tatsächlich kontrolliert wird.

Ihr Rundengewinn hängt davon ab, welcher Kandidat die Wahl gewinnt und welche Kosten Sie zahlen müssen. Der Kandidat den Sie wählen, gewinnt auch die Wahl. Wenn Sie sich nicht beteiligen wird der Wahlgewinner zufällig bestimmt. Beide Kandidaten haben die gleiche Wahrscheinlichkeit bei der Zufallsauswahl zum Wahlgewinner bestimmt zu werden. Die Wahrscheinlichkeit beträgt jeweils 50 Prozent. Stimmt der Wahlgewinner mit Ihrer vorab festgelegten Präferenz überein, können Sie 100 Punkte verdienen. Von diesen Punkten werden die verschiedenen Kosten abgezogen, die Sie in einer Runde zahlen müssen.

Die folgende Tabelle gibt Ihnen eine **beispielhafte** Übersicht über Ihre möglichen Gewinne.

Präferenz	Information	Beteiligung	Kontrolle	Ent-scheidung	Ge-winner	Punkte	Abzug Info Kosten	Abzug Beteiligung Kosten	Abzug Straf-kosten	**Gewinn**
A	gekauft	JA	/	A	A	100	-30	-30	0	**40**
B	gekauft	NEIN	NEIN	/	B	100	-30	0	0	**70**
A	nicht gekauft	JA	/	B	B	0	0	-30	0	**-30**
B	nicht gekauft	JA	/	B	B	100	0	-30	0	**70**
A	nicht gekauft	NEIN	NEIN	/	A	100	0	0	0	**100**
B	nicht gekauft	NEIN	NEIN	/	A	100	0	0	0	**0**
A	nicht gekauft	NEIN	JA	/	A	100	0	0	z.B. -30	**70**
B	nicht gekauft	NEIN	JA	/	A	0	0	0	z.B. -90	**-90**

Bitte beachten Sie: Das Experiment ist so programmiert, dass Sie in jedem Fall eine Auszahlung erhalten, auch wenn Sie in einer oder mehrerer Runden einen negativen Rundengewinn erzielen. Dieses Spiel wird mit unterschiedlichen Kostenparametern 18 Mal wiederholt. Sie sind über alle Kosten und Wahrscheinlichkeiten in jeder Runde voll informiert.

In **Spiel B** treffen Sie eine Auswahl zwischen alternativen Lotterien. Weitere Informationen zu diesem Spiel erhalten Sie in einem extra Erklärungsbildschirm bevor Spiel B gestartet wird.

Ablauf

Die Spielstruktur wird Ihnen vor Beginn der auf dem Computerbildschirm erklärt. Bitte lesen Sie die Spielanleitungen sehr aufmerksam und nehmen Sie sich bitte Zeit diese zu verstehen. Zu jeder Spielsituation erhalten Sie ebenfalls Lesebeispiele, aus denen Sie entnehmen können wie sich Ihre Entscheidungen in den jeweiligen Situationen auf Ihre Auszahlung auswirken.

Bitte beachten Sie: In jeder Spielsituation spielen Sie für sich alleine. D.h., das sich nur Ihre Entscheidungen und nicht die der anderen Mitspieler im Labor auf Ihre Auszahlung auswirken.

Bitte beachten Sie ebenfalls: Die Auszahlung der beiden Spielsituationen ist nicht unabhängig voneinander. Am Ende des Experiments werden die Punkte, die Sie in Spiel A und Spiel B erhalten zusammengezählt. Die von Ihnen in beiden Spielsituationen erspielten Punkte werden aufgerundet, in Euro umgerechnet und an Sie ausgezahlt.

Fragebogen

Im Anschluss an die Spiele erscheint auf Ihrem Bildschirm ein Fragebogen, den Sie bitten ausfüllen. Zuletzt wird Ihnen Ihre Vergütung plus Aufwandsentschädigung in Euro angezeigt.

Klicken Sie auf den Weiter-Button und warten Sie, bis Ihre Platznummer für die Auszahlung aufgerufen wird. Schreiben Sie Ihren Namen auf die Quittung, die Sie zu Beginn des Experiments erhalten haben. Nehmen Sie Ihre Platzkarte, die Instruktionen, den Kugelschreiber und die ausgefüllte Quittung zur Auszahlung mit.

Vielen Dank

Screenshots: Experiment conducted in Chapter 4.

Experiment Chapter 4 - Information Stage

Strafpunkte für Nichtbeteiligung an der Wahl in dieser Runde	0
Strafwahrscheinlichkeit in dieser Runde	0 Prozent
Per Zufallsentscheidung wurde fesgelegt welchen Kandidaten Sie bevorzugen.	Keine Information
Durch das Klicken auf den Informationsknopf können Sie sich aber über Ihre Präferenz informierern. Höhe der Informationskosten (in experimentellen Punkten).	30

Möchten Sie sich informieren? **Informieren** **Nicht informieren**

Note: At the information stage initially uniformed subjects had to decide whether to get informed by clicking on the information button or remaining uniformed by clicking the "Nicht Informieren" button. The screenshot shows the information stage in the experimental run employing voluntary voting.

Experiment Chapter 4 - Ballot Stage

Strafpunkte für Nichtbeteiligung an der Wahl in dieser Runde	0
Strafwahrscheinlichkeit in dieser Runde	0 Prozent
Per Zufallsentscheidung wurde fesgelegt welchen Kandidaten Sie bevorzugen.	Kandidat A
Wenn Sie an der Wahl teilnehmen möchten, werden Kosten fällig (experimentelle Punkte). Diese werden am Ende der Runde von Ihrem Gewinn abgezogen. Höhe der Wahlkosten	30

Möchten Sie an der Wahl teilnehmen?
Wenn Sie sich nicht beteiligen, dann wird der Wahlgewinner per Zufallsauswahl bestimmt. Die Wahrscheinlichkeit zum Gewinner bestimmt zu werden ist für beide Kandidaten dann gleich (50%). **Teilnehmen** **Nicht teilnehmen**

Note: At the Ballot stage subjects had to decide whether to enter the following voting stage or abstain from voting in that period. The screenshot shows the information stage in the experimental run employing voluntary voting.

Experiment Chapter 4 - Voting Stage

Strafpunkte für Nichtbeteiligung an der Wahl in dieser Runde	0
Strafwahrscheinlichkeit in dieser Runde in	0 Prozent
Sie bevorzugen	Kandidat A

Möchten Sie ihre Stimme abgeben?
Für die Stimmabgabe werden keine weiteren Kosten fällig.
Auch wenn Sie eine ungültige Stimme abgeben werden keine Kosten fällig.

| Kandidat A |
| Kandidat B |
| Ungültig |

Note: At the voting stage subjects had to decide whether to vote for alternative A or alternative B or to cast an invalid vote in that period. The screenshot shows the information stage in the experimental run employing voluntary voting.

Experiment Chapter 4 - Summary Stage

Ihr bevorzugter Kandidat wurde gewählt

Strafpunkte für Nichtbeteiligung an der Wahl in dieser Runde	0
Strafwahrscheinlichkeit in dieser Runde	0 Prozent
Bevorzugter Kandidat	Kandidat A
Teilnahme an der Wahl	Teilnahme
Ihre Wahlentscheidung	Kandidat A
Der Gewinner der Wahl	Kandidat A
Möglicher Gewinn	100
Abzug von Informationskosten in dieser Runde	30
Abzug von Wahlkosten in dieser Runde	30
Kontrolle der Wahlenbeteiligung	keine Kontrolle
Abzug von Strafkosten	0
Ihr Gewinn in dieser Runde	40

Weiter

Note: At the summary stage subjects received information about their performance and the corresponding reward in that period. The screenshot shows the information stage in the experimental run employing voluntary voting.

251

Experiment Chapter 4 – Screenshot of the post-experimental survey (socio-demographic items)

Fragebogen

Bitte nehmen Sie sich genügend Zeit, die folgenden Fragen zu lesen und zu beantworten. Der Fragebogen wird maximal 10 Minuten in Anspruch nehmen.

Anschließend werden Sie über Ihre endgültige Vergütung informiert und Ihre Platznummer wird zur Auszahlung aufgerufen.

Demographische Angaben

Ihr Alter in Jahren

Geschlecht
- ○ Weiblich
- ○ Männlich

Studiengang
- ○ Wirtschaftswissenschaften
- ○ Natur- und Ingenieurswissenschaften
- ○ Sozialwissenschaften
- ○ Sprachwissenschaften
- ○ Sonstige

Studieren Sie auf Lehramt?
- ○ Ja
- ○ Nein

Fachsemester

[Weiter]

Experiment Chapter 4 – Screenshot post-experimental survey (political Items)

Wie zufrieden oder unzufrieden sind Sie - alles in allem - mit der Demokratie, so wie sie in Deutschland besteht?
- ○ Sehr zufrieden
- ○ Ziemlich zufrieden
- ○ Etwas zufrieden
- ○ Etwas unzufrieden
- ○ Ziemlich unzufrieden
- ○ Sehr unzufrieden

Alles in allem gesehen, was denken Sie, wie gut oder wie schlecht funktioniert unser politisches System heute? Welche der Aussagen auf dieser Liste kommt Ihrer Meinung am nächsten?
- ○ Es funktioniert gut und muß nicht verändert werden
- ○ Es funktioniert eigentlich ganz gut, muß aber in einigen Punkten verändert werden
- ○ Es funktioniert nicht gut und muß in vielen Punkten verändert werden
- ○ Es funktioniert überhaupt nicht gut und muß völlig verändert werden

Viele Leute in der Bundesrepublik neigen längere Zeit einer bestimmten politischen Partei zu, obwohl sie auch ab und zu mal eine andere Partei wählen. Wie ist das bei Ihnen: Neigen Sie - ganz allgemein gesprochen - einer bestimmten Partei zu?
- ○ Nein, ich neige keiner Partei zu
- ○ CDU/CSU
- ○ SPD
- ○ FDP
- ○ Bündnis 90 / Die Grünen
- ○ Die Linke
- ○ Sonstige

[Weiter]

Screenshot post-experimental survey (self-placement items)

Viele Leute verwenden die Begriffe 'links' und 'rechts', wenn es darum geht, unterschiedliche politische Einstellungen zu kennzeichnen. Wir haben hier einen Maßstab, der von links nach rechts verläuft. Wenn Sie an Ihre eigenen politischen Ansichten denken, wo würden Sie diese Ansichten auf dieser Skala einstufen?

0 (links)	1	2	3	4	5	6	7	8	9	10 (rechts)
○	○	○	○	○	○	○	○	○	○	○

Bitte teilen Sie uns außerdem mit, wo Sie die folgenden Parteien auf der gleichen Skala einordnen würden:

	0 (links)	1	2	3	4	5	6	7	8	9	10 (rechts)
CDU/CSU	○	○	○	○	○	○	○	○	○	○	○
SPD	○	○	○	○	○	○	○	○	○	○	○
FDP	○	○	○	○	○	○	○	○	○	○	○
Bündnis 90 / Die Grünen	○	○	○	○	○	○	○	○	○	○	○
Die Linke	○	○	○	○	○	○	○	○	○	○	○

[Weiter]

Experiment Chapter 4 – Screenshot post-experimental survey (political interest items)

Wie stark interessieren Sie sich für Politik? Sehr stark, stark, mittel, wenig oder überhaupt nicht?

- ○ Sehr stark
- ○ Stark
- ○ Mittel
- ○ Wenig
- ○ Überhaupt nicht

Wie häufig informieren Sie sich über Politik? Sehr häufig, häufig, mittel, wenig oder überhaupt nicht?

- ○ Sehr häufig
- ○ Häufig
- ○ Mittel
- ○ Wenig
- ○ Überhaupt nicht

Auf dieser Liste stehen einige Meinungen, die man gelegentlich hört. Sagen Sie mir bitte zu jeder Meinung, ob Sie ihr voll und ganz zustimmen, eher zustimmen, eher nicht zustimmen oder überhaupt nicht zustimmen?

	1 (stimme voll und ganz zu)	2	3	4 (stimme überhaupt nicht zu)
Die ganze Politik ist so kompliziert, daß jemand wie ich gar nicht versteht, was vorgeht.	○	○	○	○
Im Allgemeinen weiß ich eher wenig über Politik.	○	○	○	○
In der Demokratie ist es die Pflicht jedes Bürgers, sich regelmäßig an Wahlen zu beteiligen.	○	○	○	○

[Weiter]

Experiment Chapter 4 – Screenshot post-experimental survey (political sophistication items)

Für welche Partei ist Katrin Göring-Eckardt aktiv?	○ CDU ○ CSU ○ SPD ○ FDP ○ Bündnis 90/Die Grünen ○ Linke ○ Piraten
Für welche Partei ist Heiko Maas aktiv?	○ CDU ○ CSU ○ SPD ○ FDP ○ Bündnis 90/Die Grünen ○ Linke ○ Piraten
Für welches Ressort ist Wolfgang Schäuble als Minister verantwortlich?	○ Verteidigung ○ Inneres ○ Wirtschaft ○ Finanzen ○ Verkehr ○ Umwelt ○ Landwirtschaft
Welche Staatsgewalt ist die gesetzgebende Gewalt?	○ Judikative ○ Legislative ○ Exekutive
Wer wählt in der BRD den Bundeskanzler/ die Bundeskanzlerin?	○ Die Bevölkerung ○ Die Bundesversammlung ○ Der Bundestag

Weiter

Experiment Chapter 4 – Screenshot post-experimental survey (participation items)

Die letzte Bundestagswahl war im September 2013. Haben Sie da gewählt?	○ Nicht wahlberechtigt ○ Ja ○ Nein
Haben Sie in der Vergangenheit schon einmal an Wahlen NICHT teilgenommen, für die Sie eigentlich wahlberechtigt waren?	○ Ja ○ Nein

Weiter

Experiment Chapter 4 – Screenshot post-experimental survey (risk items)

Additional table for the empirical results Section

Correlations between dependent measures and controls

	Risk Aversion	Holt & Laury	Civic Duty	Political Position	Gender	Age	Major
Turnout	0.0000	0.0142	-0.0000	-0.0295	0.0000	0.0055	0.0000
Informed Turnout	-0.0000	0.0114	-0.0000	0.0000	0.0000	-0.0000	-0.0000
Random Vote	-0.0000	0.0114	0.0000	0.0000	0.0000	0.0000	-0.0000

Appendix B

Chapter 5 Reassessing the Calculus of Compulsory Voting in a game theoretical model

Experiment conducted in Chapter 5

Instruktionen

Ziel dieses Experiments ist die Untersuchung von Entscheidungsverhalten. Sie und die anderen Teilnehmer[107] werden während des Experiments Entscheidungen treffen. Dabei werden Sie Geld verdienen. Die Höhe Ihrer Auszahlung wird sowohl durch Ihre eigenen Entscheidungen als auch durch jene anderer Teilnehmer entsprechend den Regeln auf den folgenden Seiten bestimmt. Die Instruktionen dienen dazu, Sie vollständig über die Struktur des Experiments und die Konsequenzen Ihrer Entscheidungen zu informieren. Vom Experimentator werden keine Informationen zurückgehalten oder in irgendeiner Weise manipuliert.

Vergütung

Im Verlauf des Experiments verdienen Sie Punkte. Am Ende des Experiments werden Ihre Punkte in Euro umgerechnet. Dabei gilt folgender Wechselkurs: **1 Punkt = 0.0035 Euro** (d.h. 1000 Punkte = **3.50 Euro**). Sie erhalten den Geldbetrag, den Sie im Verlauf des Experiments verdient haben, plus **5 Euro** Aufwandsentschädigung, für die anderen Teilnehmer nicht sichtbar und in bar ausgezahlt.

Dauer

Das gesamte Experiment dauert ca. 45 Minuten. Im Anschluss an das Experiment wird ein Fragebogen auf Ihrem Bildschirm erscheinen. Nachdem Sie den Fragebogen ausgefüllt haben, warten Sie bis Ihre Platznummer aufgerufen wird. Dann erhalten Sie Ihre Auszahlung in Euro.

Anonymität

Alle Teilnehmer erfahren weder während des Experiments noch danach die Identität der anderen Teilnehmer. Die anderen Teilnehmer erfahren weder während des Experiments noch danach, wie viel Sie verdient haben.

Kommunikationsverbot

Während des gesamten Experiments besteht striktes Kommunikationsverbot. Bitte schalten Sie auch Ihr Handy aus. Zudem weisen wir Sie darauf hin, dass Sie am Computer nur diejenigen Funktionen bedienen dürfen, die für den Ablauf des Experiments bestimmt sind. Verstöße gegen diese Regeln führen zum Ausschluss vom Experiment.

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[107] Aus Gründen sprachlicher Einfachheit werden im Folgenden nur männliche Bezeichnungen verwendet. Diese sind geschlechtsneutral zu verstehen.

Inhalt

Im folgenden Spiel werden Sie alle 6 Runden zufällig mit einem neuen Mitspieler in einer Gruppe zusammengebracht. Sie können Sie sich entscheiden, ob Sie an einer Wahl teilnehmen wollen oder nicht. Wenn Sie an der Wahl teilnehmen, können Sie sich zwischen zwei Kandidaten, A und B, oder einer ungültigen Stimmabgabe entscheiden. Welchen Kandidaten Sie bevorzugen wird zu Beginn jeder Runde für die Gruppe zufällig (mit gleicher Wahrscheinlichkeit) festgelegt. D.h., dass Sie und Ihr Mitspieler in der Gruppe die gleiche zufällige Präferenz haben. Sie erhalten zu Beginn einer neuen Runde keine Information darüber, welcher Kandidat als Ihre Präferenz bestimmt wurde. Sie können sich die Informationen darüber aber kaufen. Wenn Sie auf den Informationsknopf drücken werden Kosten in Höhe von 30 experimentellen Punkten fällig. Diese werden Ihnen am Ende der Runde von Ihrem Gewinn abgezogen, in der Sie die Informationen gekauft haben. Wenn Sie sich an der Wahl beteiligen, entstehen für Sie Kosten in Höhe von 30 experimentellen Punkten. Auch diese werden Ihnen am Ende der Runde, in der Sie sich an der Wahl beteiligt haben, von Ihrem Gewinn abgezogen. In einigen Runden wird eine Nichtbeteiligung mit dem Abzug von Punkten am Ende der Runde betraft. Die Höhe der Strafkosten beträgt 30 Punkte[108]. Ob Sie bestraft werden, wenn Sie sich nicht an der Wahlbeteiligen, hängt davon ab, ob Ihre Wahlbeteiligung kontrolliert wird. Die Wahrscheinlichkeit hierfür variiert über die Runden (0%, 50% 75%, 100%). Sie erhalten zu Beginn jeder Runde eine Information über Wahrscheinlichkeit mit der Ihre Wahlbeteiligung tatsächlich kontrolliert wird.

Ihr Rundengewinn hängt davon ab, welcher Kandidat die Wahl gewinnt und welche Kosten Sie zahlen müssen. Der Wahlgewinner wird mit einfacher Mehrheit bestimmt. Gewinnt der Kandidat, der Ihrer Präferenz entspricht, können Sie 100 Punkte verdienen. Von diesen 100 Punkten werden die Kosten für die Entscheidungen, die Sie in dieser Runde getroffen haben abgezogen. Gewinnt der Kandidat, der nicht Ihrer Präferenz entspricht erhalten Sie 0 Punkte. Auch von diesen 0 Punkte werden Entscheidungskosten abgezogen. Sie können also auch einen negativen Rundengewinn erzielen. Bei einem Unentschieden gibt es keinen Wahlgewinner. In diesem Fall erhalten Sie 50 Punkte, von denen die Entscheidungskosten abgezogen werden. Die folgende Tabelle gibt Ihnen eine **beispielhafte** Übersicht über Ihre möglichen Gewinne.

---

[108] Note, the value of the penalty changed between different sessions. For instance, penalties was also 60 or 90 experimental points.

	Präferenz	Information	Ihre Beteiligung	Beteiligung Mitspieler	Kontrolle	Ihre Entscheidung	Entscheidung Mitspieler	Gewinner	Punkte	Abzug Info Kosten	Abzug Beteiligung Kosten	Abzug Strafkosten	**Gewinn**
1.	A	gekauft	JA	JA	/	A	A	A	100	-30	-30	0	**40**
2.	B	gekauft	NEIN	JA	NEIN	/	B	B	100	-30	0	0	**70**
3.	A	nicht gekauft	JA	NEIN	/	B	/	B	0	0	-30	0	**-30**
4.	B	nicht gekauft	JA	NEIN	/	B	/	B	100	0	-30	0	**70**
5.	A	nicht gekauft	NEIN	JA	NEIN	/	A	A	100	0	0	0	**100**
6.	B	nicht gekauft	NEIN	NEIN	NEIN	/	/	/	50	0	0	0	**50**
7.	A	nicht gekauft	NEIN	JA	JA	/	A	A	100	0	0	-30	**70**
8.	A	nicht gekauft	JA	JA	NEIN	A	B	/	50	0	-30	0	**20**
9.	B	nicht gekauft	NEIN	NEIN	JA	/	/	/	50	0	0	-30	**20**

Bitte beachten Sie: Das Experiment ist so programmiert, dass Sie in jedem Fall eine Auszahlung erhalten, auch wenn Sie in einer oder mehreren Runden einen negativen Rundengewinn erzielen. Das Spiel wird mit unterschiedlichen Strafwahrscheinlichkeiten 24 Mal wiederholt. Sie sind über alle Kosten und Wahrscheinlichkeiten in jeder Runde voll informiert.

Ablauf

Die Spielstruktur wird Ihnen zu Beginn auf dem Computerbildschirm erklärt. Bitte lesen Sie die Spielanleitung sehr aufmerksam und nehmen Sie sich bitte Zeit diese zu verstehen. Sie erhalten ebenfalls Lesebeispiele, aus denen Sie entnehmen können wie sich Ihre Entscheidungen in den jeweiligen Situationen auf Ihre Auszahlung auswirken.

Bitte beachten Sie: Die jeweiligen Rundengewinne ergeben sich aus Ihrer Entscheidung und der Entscheidung Ihres Mitspielers. Am Ende des Experiments werden Ihre Punkte aus den jeweiligen Runden zusammengezählt. Die von Ihnen erspielten Punkte werden aufgerundet, in Euro umgerechnet und an Sie ausgezahlt.

Fragebogen

Im Anschluss an die letzte Runde erscheint auf Ihrem Bildschirm ein Fragebogen, den Sie bitten ausfüllen. Zuletzt wird Ihnen Ihre Vergütung inkl. Aufwandsentschädigung in Euro angezeigt.

Klicken Sie auf den Weiter-Button und warten Sie, bis Ihre Platznummer für die Auszahlung aufgerufen wird. Schreiben Sie Ihren Namen auf die Quittung, die Sie zu Beginn des Experiments erhalten haben. Nehmen Sie Ihre Platzkarte, die Instruktionen, den Kugelschreiber und die ausgefüllte Quittung zur Auszahlung mit.

Vielen Dank

Screenshots: Experiment conducted in Chapter 5

Experiment Chapter 5 – Information Stage

<table>
<tr><td colspan="2" align="center">Die Spielernummer Ihres Mitspielers in dieser Runde   0</td></tr>
<tr><td>Strafpunkte für Nichtbeteiligung an der Wahl in dieser Runde</td><td align="center">0</td></tr>
<tr><td>Strafwahrscheinlichkeit in dieser Runde</td><td align="center">0 Prozent</td></tr>
<tr><td>Per Zufallsentscheidung wurde fesgelegt welchen Kandidaten Sie bevorzugen. Durch das Klicken auf den Informationsknopf können Sie sich aber über Ihre Präferenz informierern. Höhe der Informationskosten (in experimentellen Punkten).</td><td align="center">30</td></tr>
</table>

Möchten Sie sich informieren? [Informieren] [Nicht informieren]

Note: At the information stage initially uniformed subjects had to decide whether to get informed by clicking on the information button or remaining uniformed by clicking the "Nicht Informieren" button. The screenshot shows the information stage in the experimental run employing voluntary voting.

Experiment Chapter 5 – Ballot Stage

<table>
<tr><td>Strafpunkte für Nichtbeteiligung an der Wahl in dieser Runde</td><td align="center">0</td></tr>
<tr><td>Strafwahrscheinlichkeit in dieser Runde in</td><td align="center">0 Prozent</td></tr>
<tr><td>Per Zufallsentscheidung wurde fesgelegt welchen Kandidaten Sie bevorzugen.</td><td align="center">Kandidat A</td></tr>
<tr><td>Wenn Sie an der Wahl teilnehmen möchten, werden Kosten fällig (experimentelle Punkte). Diese werden am Ende der Runde von Ihrem Gewinn abgezogen. Höhe der Wahlkosten</td><td align="center">30</td></tr>
</table>

Möchten Sie an der Wahl teilnehmen? [Teilnehmen] [Nicht teilnehmen]

Note: At the Ballot stage subjects had to decide whether to enter the following voting stage or abstain from voting in that period. The screenshot shows the information stage in the experimental run employing voluntary voting.

Experiment Chapter 5 – Voting Stage

Strafpunkte für Nichtbeteiligung an der Wahl in dieser Runde	0
Strafwahrscheinlichkeit in dieser Runde in	0 Prozent
Sie bevorzugen	Kandidat A

Möchten Sie ihre Stimme abgeben?
Für die Stimmabgabe werden keine weiteren Kosten fällig.
Auch wenn Sie eine ungültige Stimme abgeben werden keine Kosten fällig.

[Kandidat A] [Kandidat B] [Ungültig]

Note: At the voting stage subjects had to decide whether to vote for alternative A or alternative B or to cast an invalid vote in that period. The screenshot shows the information stage in the experimental run employing voluntary voting.

Experiment Ch. 5 - Summary Stage

Ihr bevorzugter Kandidat wurde gewählt

Strafpunkte für Nichtbeteiligung an der Wahl in dieser Runde	0
Strafwahrscheinlichkeit in dieser Runde	0 Prozent
Bevorzugter Kandidat	Kandidat A
Ihre Entscheidung zur Teilnahme an der Wahl	Teilnahme
Ihre Wahlentscheidung	Kandidat A
Die Entscheidung Ihres Mitspielers zur Teilnahme an der Wahl	Keine Teilnahme
Die Wahletnscheidung Ihres Mitspielers	Keine Teilnahme
Der Gewinner der Wahl	Kandidat A
Möglicher Gewinn	100
Abzug von Informationskosten in dieser Runde	30
Abzug von Wahlkosten in dieser Runde	30
Kontrolle der Wahlenbeteiligung	Wahlteilnahme
Abzug von Strafkosten	0
Ihr Gewinn in dieser Runde	40
Gewinn Ihres Mitspielers in dieser Runde	0

[Weiter]

Note: At the summary stage subjects received information about their performance, the decision of the other player and the corresponding reward in that period. The screenshot shows the information stage in the experimental run employing voluntary voting.

Experiment Chapter 5 – Screenshot of the post-experimental survey (socio-demographic items)

Fragebogen

Bitte nehmen Sie sich genügend Zeit, die folgenden Fragen zu lesen und zu beantworten. Der Fragebogen wird maximal 10 Minuten in Anspruch nehmen.

Anschließend werden Sie über Ihre endgültige Vergütung informiert und Ihre Platznummer wird zur Auszahlung aufgerufen.

Demographische Angaben

Ihr Alter in Jahren

Geschlecht
- ○ Weiblich
- ○ Männlich

Studiengang
- ○ Wirtschaftswissenschaften
- ○ Natur- und Ingenieurswissenschaften
- ○ Sozialwissenschaften
- ○ Sprachwissenschaften
- ○ Sonstige

Studieren Sie auf Lehramt?
- ○ Ja
- ○ Nein

Fachsemester

[Weiter]

Experiment Chapter 5 – Screenshot post-experimental survey (political Items)

Wie zufrieden oder unzufrieden sind Sie - alles in allem - mit der Demokratie, so wie sie in Deutschland besteht?
- ○ Sehr zufrieden
- ○ Ziemlich zufrieden
- ○ Etwas zufrieden
- ○ Etwas unzufrieden
- ○ Ziemlich unzufrieden
- ○ Sehr unzufrieden

Alles in allem gesehen, was denken Sie, wie gut oder wie schlecht funktioniert unser politisches System heute? Welche der Aussagen auf dieser Liste kommt Ihrer Meinung am nächsten?
- ○ Es funktioniert gut und muß nicht verändert werden
- ○ Es funktioniert eigentlich ganz gut, muß aber in einigen Punkten verändert werden
- ○ Es funktioniert nicht gut und muß in vielen Punkten verändert werden
- ○ Es funktioniert überhaupt nicht gut und muß völlig verändert werden

Viele Leute in der Bundesrepublik neigen längere Zeit einer bestimmten politischen Partei zu, obwohl sie auch ab und zu mal eine andere Partei wählen. Wie ist das bei Ihnen: Neigen Sie - ganz allgemein gesprochen - einer bestimmten Partei zu?
- ○ Nein, ich neige keiner Partei zu
- ○ CDU/CSU
- ○ SPD
- ○ FDP
- ○ Bündnis 90 / Die Grünen
- ○ Die Linke
- ○ Sonstige

[Weiter]

Experiment Chapter 5 – Screenshot post-experimental survey (self-placement items)

Viele Leute verwenden die Begriffe 'links' und 'rechts', wenn es darum geht, unterschiedliche politische Einstellungen zu kennzeichnen. Wir haben hier einen Maßstab, der von links nach rechts verläuft. Wenn Sie an Ihre eigenen politischen Ansichten denken, wo würden Sie diese Ansichten auf dieser Skala einstufen?

0 (links)	1	2	3	4	5	6	7	8	9	10 (rechts)
○	○	○	○	○	○	○	○	○	○	○

Bitte teilen Sie uns außerdem mit, wo Sie die folgenden Parteien auf der gleichen Skala einordnen würden:

	0 (links)	1	2	3	4	5	6	7	8	9	10 (rechts)
CDU/CSU	○	○	○	○	○	○	○	○	○	○	○
SPD	○	○	○	○	○	○	○	○	○	○	○
FDP	○	○	○	○	○	○	○	○	○	○	○
Bündnis 90 / Die Grünen	○	○	○	○	○	○	○	○	○	○	○
Die Linke	○	○	○	○	○	○	○	○	○	○	○

[Weiter]

Experiment Chapter 5 – Screenshot post-experimental survey (political interest items)

Wie stark interessieren Sie sich für Politik? Sehr stark, stark, mittel, wenig oder überhaupt nicht?
- ○ Sehr stark
- ○ Stark
- ○ Mittel
- ○ Wenig
- ○ Überhaupt nicht

Wie häufig informieren Sie sich über Politik? Sehr häufig, häufig, mittel, wenig oder überhaupt nicht?
- ○ Sehr häufig
- ○ Häufig
- ○ Mittel
- ○ Wenig
- ○ Überhaupt nicht

Auf dieser Liste stehen einige Meinungen, die man gelegentlich hört. Sagen Sie mir bitte zu jeder Meinung, ob Sie ihr voll und ganz zustimmen, eher zustimmen, eher nicht zustimmen oder überhaupt nicht zustimmen?

	1 (stimme voll und ganz zu)	2	3	4 (stimme überhaupt nicht zu)
Die ganze Politik ist so kompliziert, daß jemand wie ich gar nicht versteht, was vorgeht.	○	○	○	○
Im Allgemeinen weiß ich eher wenig über Politik.	○	○	○	○
In der Demokratie ist es die Pflicht jedes Bürgers, sich regelmäßig an Wahlen zu beteiligen.	○	○	○	○

[Weiter]

Experiment Chapter 5 – Screenshot post-experimental survey (political sophistication items)

Für welche Partei ist Katrin Göring-Eckardt aktiv?

- CDU
- CSU
- SPD
- FDP
- Bündnis 90/Die Grünen
- Linke
- Piraten

Für welche Partei ist Heiko Maas aktiv?

- CDU
- CSU
- SPD
- FDP
- Bündnis 90/Die Grünen
- Linke
- Piraten

Für welches Ressort ist Wolfgang Schäuble als Minister verantwortlich?

- Verteidigung
- Inneres
- Wirtschaft
- Finanzen
- Verkehr
- Umwelt
- Landwirtschaft

Welche Staatsgewalt ist die gesetzgebende Gewalt?

- Judikative
- Legislative
- Exekutive

Wer wählt in der BRD den Bundeskanzler/ die Bundeskanzlerin?

- Die Bevölkerung
- Die Bundesversammlung
- Der Bundestag

Weiter

Experiment Chapter 5 – Screenshot post-experimental survey (participation items)

Die letzte Bundestagswahl war im September 2013. Haben Sie da gewählt?

- Nicht wahlberechtigt
- Ja
- Nein

Haben Sie in der Vergangenheit schon einmal an Wahlen NICHT teilgenommen, für die Sie eigentlich wahlberechtigt waren?

- Ja
- Nein

Weiter

Additional table for the empirical results Section

Correlations between Dependent measures and controls

	Risk Aversion	Civic Duty	Political Position	Gender	Age	Major
Turnout	0.0208	-0.0046	-0.0115	-0.0337	0.0135	0.0035
Informed Turnout	0.0929	-0.0043	0.0349	-0.0933	0.0097	-0.0437
Roll Off	-0.0036	-0.0016	-0.0107	-0.0026	0.0051	0.0081

Appendix C

Chapter 6 Compulsory Voting and Individual Information Processing

Experiment conducted in Chapter 6

Instruktionen

Ziel dieses Experiments ist die Untersuchung von Wahlkämpfen. Ihnen und den anderen Teilnehmern[109] werden während des Experiments Informationen aus dem niedersächsischen Landtagswahlkampf präsentiert. Sie können dann entscheiden, welche Informationen Sie sich genauer ansehen möchten. Die Höhe Ihrer Auszahlung ist fix und nicht von Ihren Entscheidungen während des Experiments abhängig.

Die Instruktionen dienen dazu, Sie vollständig über die Struktur des Experiments zu informieren. Vom Experimentator werden keine Informationen zurückgehalten oder in irgendeiner Weise manipuliert.

Verdienst

Im Verlauf des Experiments verdienen Sie eine fixe Auszahlung von 4 €. Nur wenn Sie das Experiment beenden kann Ihnen dieser Betrag am Ende des Experiments ausgezahlt werden. Dieser Betrag wird am Ende für die anderen Teilnehmer nicht sichtbar und in bar ausgezahlt.

Dauer

Das gesamte Experiment dauert ca. 20-30 Minuten. Im Anschluss an das Experiment wird ein Fragebogen auf Ihrem Bildschirm erscheinen. Nachdem Sie den Fragebogen ausgefüllt haben, warten Sie bis Ihre Platznummer aufgerufen wird. Dann erhalten Sie Ihre Auszahlung in Euro.

Anonymität

Alle Teilnehmer erfahren weder während des Experiments noch danach die Identität der anderen Teilnehmer. Ihre Entscheidungen Sind auch für den Experimentator nicht mit Ihrem Namen in Verbindung zu bringen.

Kommunikationsverbot

Während des gesamten Experiments besteht striktes Kommunikationsverbot! Bitte schalten Sie auch Ihr Handy aus. Zudem weisen wir Sie darauf hin, dass Sie am Computer nur diejenigen Funktionen

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[109] Aus Gründen sprachlicher Einfachheit werden im Folgenden nur männliche Bezeichnungen verwendet. Diese sind geschlechtsneutral zu verstehen. (107P8)

bedienen dürfen, die für den Ablauf des Experiments bestimmt sind. Verstöße gegen diese Regeln führen zum Ausschluss vom Experiment.

Ablauf

Das Experiment ist in verschiedene Stufen unterteilt. Sie erhalten vor jeder Stufe detaillierte Anleitungen. Lesen Sie diese bitte Aufmerksam.

In der 1. Stufe des Experiments werden Ihnen zunächst verschiedene Fragen zu Ihrer politischen Einstellung und zu Ihrem politischen Interesse gestellt.

Anschließend erfolgt auf der 2. Stufe der Wahlkampf. Hier können Sie auf einem Information Board Informationen der Parteien, Spitzenkandidaten und Berichterstattung aus dem niedersächsischen Landtagswahlkampf lesen. Die Informationen werden in Überschriften präsentiert. Durch das Anklicken dieser Überschriften erhalten Sie detaillierte Informationen zu dem ausgewiesenen Thema. Während Sie die Informationen einsehen laufen die Überschriften auf dem Information Board weiter. Sie müssen also auswählen, welche Informationen für Sie wichtig sind. Durch das drücken auf den „Schließen" Knopf können Sie die detaillierte Information wieder verlassen. Das Information Board läuft nur eine begrenzte Zeit. Nach rund 6 Minuten schließt sich das Information Board von alleine.
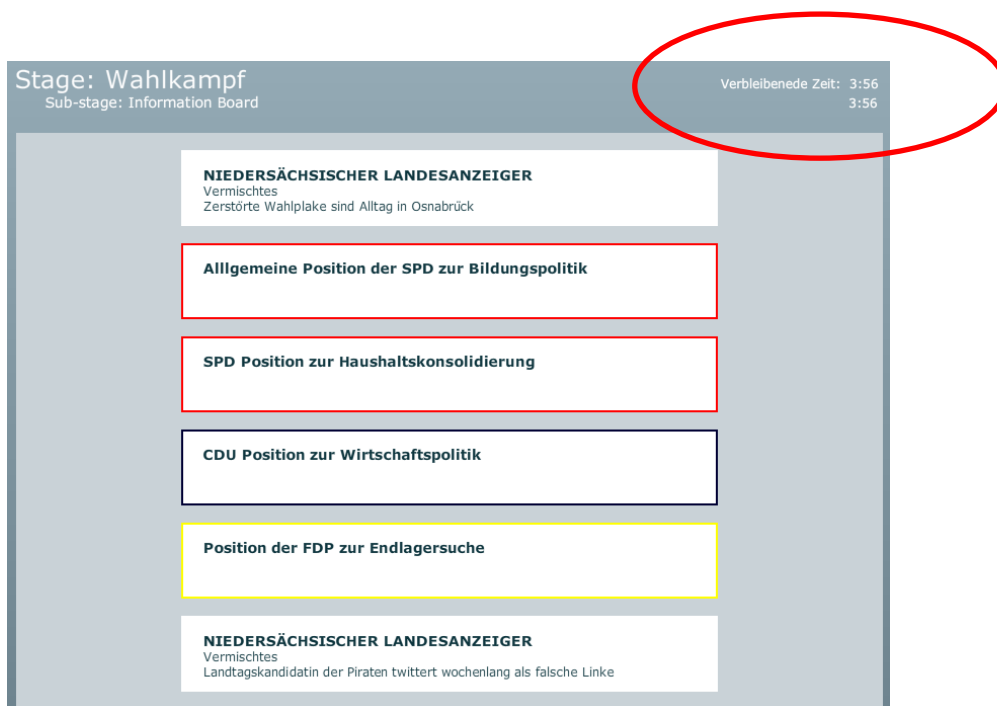
Auf der 3. Stufe erfolgt die Abstimmung. Sie können hier eine Stimme für die in der Niedersachsenwahl relevanten Parteien abgeben. Bereits zu Beginn des Experiments werden Sie per Zufallsauswahl auf zwei verschiedene Gruppen verteilt. Die Gruppen unterscheiden sich durch unterschiedliche Wahlregeln. In der einen Gruppe müssen Sie an der Wahl teilnehmen und dürfen sich nicht durch Überspringen der Abstimmung der Wahl enthalten. In der anderen Gruppe ist eine Wahlenthaltung erlaubt und durch Überspringen der Abstimmung möglich.

In der vierten Stufe interessieren wir uns erneut für Ihre Meinung. Sie erhalten einige Fragen zu den Parteien und anschließend den Abschlussfragebogen mit Fragen zu Ihrer Person.

FRAGEBOGEN

Im Anschluss an die Wahl erscheint auf Ihrem Bildschirm ein Fragebogen, den wir Sie bitten auszufüllen.

Klicken Sie auf den Weiter-Button und warten Sie, bis Ihre Platznummer für die Auszahlung aufgerufen wird. Schreiben Sie Ihren Namen auf die Quittung, die Sie zu Beginn des Experiments erhalten haben. Nehmen Sie Ihre Platzkarte, die Instruktionen, den Kugelschreiber und die ausgefüllte Quittung zur Auszahlung mit.

Screenshots: Experiment conducted in Chapter 6

Experiment Ch. 6 Welcome Stage

Experiment Ch. 6Instruction Stage
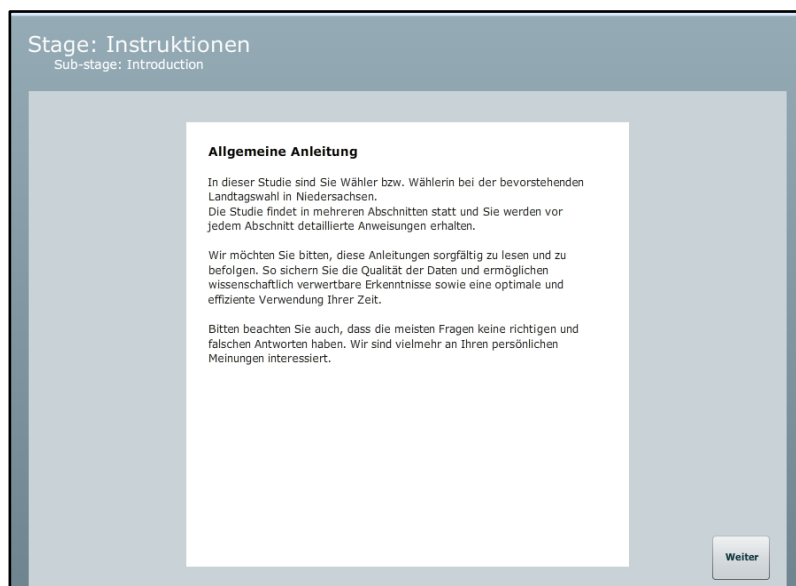
Experiment Ch. 6 Instruction Stage - Voting Rules

Stage: Instruktionen
Sub-stage: Introduction

Wahlregel

In dieser Wahlstudie haben Sie verschiedene Handlungsmöglichkeiten. Sie können **eine** Stimme für die von Ihnen bevorzugte Partei abgeben. Sie habe auch die Möglichkeit eine ungültige Stimme abzugeben. Dies hat keine Auswirkung auf Ihre Auszahlung.

Eine Nichtbeteiligung an der Abstimmung ist **nicht** möglich.

Weiter

Experiment Ch. 6 Pre-experimental Survey - Introduction

Stage: Einstellungen
Sub-stage: Fragebogen zur politischen Einstellung

Fragen zur politischen Einstellung

Diese Studie beschäftigt sich mit der Untersuchung von Wahlkämpfen. Wir möchten deshalb zunächst wissen, wie Sie über verschiedene politische Themen denken: Was ist Ihre Einstellung zu den Themen und wie wichtig sind Ihnen diese Themen?

Nach der Beantwortung einer Frage erscheint automatisch die nächste Frage. Wenn Sie bereit sind, klicken Sie bitte auf "Start".

Um fortzufahren, drücken Sie bitte den Knopf unten auf dem Bildschirm

Start

Experiment Ch. 6 Pre-experimental Survey- Political questionnaire I

Stage: Einstellungen
Sub-stage: Fragebogen zur politischen Einstellung

Frage1von13

Die Politik sollte sich aus der Wirtschaft heraushalten

○ Sehr dagegen

○ Dagegen

○ Etwas dagegen

○ Neutral

○ Etwas dafür

○ Dafür

○ Sehr dafür

○ Weiss nicht

Wählen Sie eine Option aus. Drücken Sie bitte dann den "Weiter" Knopf

Weiter

Experiment Ch. 6 Pre-experimental Survey - Party affiliation

Stage: Einstellungen
Sub-stage: Fragebogen zur politischen Einstellung

Frage2von8

Wenn heute Landtagswahl wäre, welcher Partei würden Sie Ihre Stimme geben?

○ CDU

○ SPD

○ Bündnis 90/ Die GRÜNEN

○ FDP

○ Die LINKE

○ Die Piraten Partei

○ Andere

○ Weiß nicht

○ Keiner

Wählen Sie eine Option aus. Drücken Sie bitte dann den "Weiter" Knopf

Weiter

Experiment Ch. 6 Information Board Stage - Instruction

Stage: Wahlkampf
Sub-stage: Information Board
Verbleibenede Zeit: 6:15
6:15

Ihre Aufgabe ist es, sich in die Rolle eines Wählers bzw. einer Wählerin in Niedersachsen zu versetzen und sich auf die Landtagswahl vorzubereiten.

Während eines Wahlkampfes sind Wähler einem ständigen Informationsfluss ausgesetzt. Ereignisse und Themen tauchen in der Regel schnell auf und sind schnell wieder verschwunden. Sie werden einer Serie von schnell wechselnden Überschriften begegnen. Die Überschriften bieten Ihnen die Möglichkeit, mehr über Themen, Parteien und Wahlkampf zu erfahren. Wenn Sie aufgrund einer Überschrift mehr zu dem Thema erfahren wollen, können Sie auf die Überschrift klicken und die entsprechenden Informationen lesen. Es ist der Benutzung des Internets sehr ähnlich.

Auf dem "Information Board" werden verschiedene Arten von Informationen präsentiert. Allgemeine Positionen der Parteien sind farbig hinterlegt und aus den entsprechenden Landtagswahlkampfprogrammen der Parteien entnommen. Unter der Überschrift "NIEDERSÄCHSISCHER LANDESANZEIGER" wird eine fiktive Zeitung bereitgestellt, in der weitere Informationen zu den Parteien und Inhalten angeboten werden. Diese Informationen sind verschiedenen großen niedersächsischen Tageszeitungen entnommen (Nord West Zeitung, Hannoverische Allgemeine Zeitung, Neue Osnabrücker Zeitung und Braunschweiger Zeitung).

Alle Informationen entsprechen tatsächlichen Informationen aus dem niedersächsischen

Weiter

Experiment Ch. 6 Information Board Stage - Main Page

Stage: Wahlkampf
Sub-stage: Information Board
Verbleibenede Zeit: 4:45
4:45

Position der FDP zur Energiewende

Allgemeine Position der CDU zur Schulpolitik

Allgemeine Position der SPD zur Sozialpolitik

NIEDERSÄCHSISCHER LANDESANZEIGER
Vermischtes
83.000 Wahlhelfer gesucht

Position der Piraten zu Studiengebühren

Position der LINKE zur Automobilindustrie

DPTE: Dynamic Process Tracing Environment 2.6.8, Copyright (c) 2007 - 2013 The University of Iowa, all rights reserved.

271

Experiment Ch. 6 Information Board - Specific Information

Experiment Ch. 6 Election Stage - Voting Rule (Compulsory or Voluntary)

Experiment Ch. 6 Voting Stage - Casting a Vote

Sie haben hier die Möglichkeit ihre Stimme für die von Ihnen bevorzugte Partei abzugeben. Da es sich hier nur um die Wahl von Parteien geht haben Sie nur _eine_ Stimme.

○ Christlich Demokratische Union Deutschlands (CDU)

○ Sozialdemokratische Partei Deutschlands (SPD)

○ Bündnis 90 /Die Grünen

○ Freie Demokratische Partei Deutschlands (FDP)

○ Die Linke

○ Piraten Partei

○ Ungültig

Wählen Sie eine Option aus. Drücken Sie bitte dann den "Ende" Knopf

Ende

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9. German Summary

Die vorliegende Dissertation untersucht den Einfluss einer gesetzlichen Wahlpflicht auf das individuelle Wahlverhalten im Allgemeinen und auf das individuelle Informationsverhalten bei Wahlen im Besonderen. Gestützt auf die theoretischen Erwartungen des „calculus of compulsory voting" greift die Studie auf drei verschiedene laborexperimentelle Forschungs-designs zurück, um so mögliche Effekte einer Wahlpflicht isolieren zu können.

Basierend auf einem entscheidungstheoretischen Modell untersucht das erste empirische Kapitel wie und in welchem Umfang eine gesetzliche Wahlpflicht die individuelle Wahlbeteiligung beeinflusst hat. Bisherige Studien haben gezeigt, dass eine Wahlpflicht die Wahlbeteiligung signifikant erhöht, ohne die Begründung für diesen Effekt auf der individual Ebene vollumfänglich zu begründen. Die Ergebnisse der Experimente im ersten Teil der Arbeit unterstützen die Vermutung früherer Arbeiten, dass eine Wahlpflicht deshalb in der Lage ist die Wahlbeteiligung zu erhöhen, weil die Kosten einer Nichtwahl nun die Kosten der Wahlbeteiligung ausgleichen oder übersteigen. Zudem wird der Einfluss der tatsächlichen effektiven Durchsetzung einer Wahlpflicht als weitere Erklärung hinzugefügt. Somit haben auch habituelle Nichtwähler einen starken Anreiz sich an der Wahl zu beteiligen. Zusätzlich haben diese Wähler auch einen höheren Anreiz sich vor der Wahlentscheidung zu informieren. Somit kann eine Wahlpflicht auch das individuelle Informationsverhalten beeinflussen, allerdings ergeben sich aus der entscheidungstheoretischen Modellierung der Wahlentscheidung heraus Zweifel mit Blick auf die Erklärungskraft des Modells im Besondern, wenn man die eigentlich strategische Natur von Wahlentscheidungen bedenkt.

Deshalb wird, basierende auf einem spieltheoretischen Modell, im zweiten Teil der Studie der Frage nachgegangen, wie und in welchem Umfang eine gesetzliche Wahlpflicht die individuelle Wahlbeteiligung und das individuelle Informationsverhalten beeinflusst. Wahlen bzw. die Wahlentscheidung werden in diesem Zusammenhang als ein Problem des kollektiven Handelns verstanden. In vorausgegangenen Studien wird vermutet, dass, wenn keine Wahlpflicht vorherrscht, strikt rational motivierte Individuen einen starken Anreiz haben sich an Wahlen nicht zu beteiligen, weil sie von dem durch die Wahlen bereitgestellten öffentlichen Gut auch ohne eigenen Beitrag profitieren können. Im Umkehrschluss wird hier unterstellt, dass die, mit einer Wahlpflicht verbundenen, Strafkosten für eine Nichtbeteiligung diesen Anreiz überlagern können und somit eine individuelle Wahlbeteiligung wahrscheinlicher wird. Zudem gilt die Vermutung, dass durch eine Wahlpflicht besonders die Individuen zu

einer Wahlbeteiligung motivierte werden, die sich ansonsten uninformiert der Wahl enthalten würden. Daraus folgt, dass durch die Einführung einer Wahlpflicht auch der Anreiz zur zusätzlichen Informationsaufnahme steigen sollte. Die Ergebnisse der Experimente legen nahe, dass die Einführung einer Wahlpflicht auch im spieltheoretischen Modell zu einer signifikanten Erhöhung der Wahlbeteiligung führt, allerdings verschwindet der im entscheidungstheoretischen Modell gefunden Informationseffekt einer Wahlpflicht. Stattdessen führt im spieltheoretischen Modell die Einführung einer Wahlpflicht zu einem Anstiegt der ungültig abgegebenen Stimmen allerdings nahe, dass es keinen nennenswerten Unterschied zwischen der Informationsaufnahme bei Wahlen mit und ohne Wahlpflicht gibt.

Da die ökonomisch motivierten Experimente dieser Studie keine eindeutigen Erkenntnisse mit Blick auf die Frage nach dem Einfluss einer Wahlpflicht auf die Qualität der individuellen Wahlbeteiligung liefern können verlässt diese Dissertation im dritten empirischen Kapitel den Rahmen der ökonomischen Experimente und versucht über die alleinige Untersuchung des quantitativen Elements der Informationsaufnahme hinaus eine Aussage treffen zu können. Dazu bedient sich dieser explorative Teil der Studie bei Konzepten aus der politischen Psychologie, und geht dabei der Frage nach, wie und in welchem Umfang eine Wahlpflicht einen positiven Effekt auf die inhaltliche Verarbeitung von Informationen im Rahmen eines Wahlkampfes hat. Auch hier lässt sich der in anderen Studien vermutete positive Zusammenhang nicht in den Experimenten nachweisen.

Daraus folgt, dass die Studie insgesamt zu dem Schluss kommt, dass eine gesetzliche Wahlpflicht ein geeignetes Instrument zur Überwindung niedriger und sinkender Wahlbeteiligung ist, es jedoch keine belastbaren Hinweise dafür gibt, dass eine Wahlpflicht darüber hinaus zu einer Verbesserung der politischen Informiertheit in der Gesellschaft ohne Weiteres beitragen kann.

10. Eidesstattliche Erklärung

Hiermit erkläre ich Steffen Bandlow-Raffalski (geb. Bandlow), dass die Dissertation von mir selbstständig angefertigt wurde und alle von mir genutzten Hilfsmittel ordnungsgemäß angegeben wurden. Außerdem erkläre ich, dass die Stellen, die wörtlich oder dem Sinne nach aus anderen Veröffentlichungen entnommenen wurden von mir kenntlich gemacht wurden. Darüber hinaus versichere ich hiermit, dass ich mich bisher keiner weiteren Prüfung zur Erlangung eines Doktorgrades unterzogen habe. Diese Dissertation wurde weder in der gegenwärtigen noch in einer anderen Fassung an einer anderen Fakultät zur Begutachtung oder als andere Abschlussarbeit eingereicht. Zudem erkläre ich hiermit, dass ich die Leitlinien guter wissenschaftlicher Praxis der Carl von Ossietzky Universität Oldenburg bei der Erstellung der Arbeit befolgt habe.

Datum: 30.11.2017

Unterschrift: