

# Individual Risk Attitudes and Democratic Representation

by

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For my parents

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# CHAPTER I

## Introduction

*“... human consciousness itself would disappear in the absence of uncertainty.”*

Frank Knight, *cited in Kenneth J. Arrow (1951)*

The debate about how individuals make decisions under uncertainty started a long time ago. In 1738, Bernoulli writes :

*“Ever since mathematicians first began to study the measurement of risk there has been general agreement on the following proposition: *Expected values are computed by multiplying each possible gain by the number of ways in which it can occur, and then dividing the sum of these products by the total number of possible cases where, in this theory, the consideration of cases which are all of the same probability is insisted upon.*”<sup>1</sup>*

However, besides the fact that some probabilities tend to be overestimated and others underestimated (Menger, 1934; Allais, 1953; Savage, 1972; Kahneman and Tversky, 1979), and that there is a decreasing marginal utility of money (Ramsey, 1931; von Neumann and Morgenstern, 1947; Kahneman and Tversky, 1979), scholars discovered that not every individual behaves in a similar way when facing decisions under uncertainty (Kelling, Zirkes and Myerowitz, 1976; Zuckerman, 1991; Kam and Simas, 2010).

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<sup>1</sup>Italics in original.

In 1953 already, Allais (p.508) suggests that some persons “believe in their fortune” and others “consider themselves pursued by the adversity” when making decisions.<sup>2</sup> In the present work, I intend to focus on this variation of risk aversion across individuals, and investigate if this individual characteristic leads to some inequalities or bias in terms of democratic representation.

Most of the models in political science assume that actors try to maximize their utility by following the Bernoullian expectation rule when making decisions under uncertainty. Making this assumption is convenient as the calculation of the utility to make any decision will be abridged to the weighted mean of the utility of every possible output by its probability to happen. The rational actor will then choose the option with the highest corresponding utility. At a first glance, this Bernoullian expectation rule seems to be a very realistic and reasonable assumption. However, the extensive use of this assumption has been strongly criticized. One early example of such critiques is the paper by Allais (1953). He criticizes the American school of his time for making this assumption and strongly deplores the lack of time that scholars spend on discussing the axioms underlying decision processes compared to the time they spend on developing the consequences of these axioms once they have assumed that they hold.

The assumption according to which all individuals behave similarly when confronted to risk has been recently tackled in political science. One strand of this literature in international studies discusses the effect of risk aversion on leaders’ decisions. A more recent strand focuses on the effect of individual level of risk aversion on voting behavior. I find this to be an important question for democratic representation. What if there is an underlying and almost invisible dimension that affects the relation between citizens and representatives? What if specific institutions affect how risky some choices are for the voters? Furthermore, risk aversion is correlated with

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<sup>2</sup>personal translation

left-right ideology. Thus, because all political decisions entail some uncertainty, risk might have a non-negligible effect on democratic representation.

I define risk and risk attitudes as follows. Risk is the level of predictability of the outcome. Opting for a gamble is more risky than opting for the expected value of the gamble. Thus, if two options are available, a gamble and a sure option with an outcome equal to the expected value of the gamble, a risk averse individual prefers the sure option. A risk neutral individual is indifferent between the two. A risk acceptant individual is more inclined to prefer the gamble.<sup>3</sup> As Fox and Tannenbaum (2011) explain, “different disciplines explain risk – and therefore *risk-taking* – in different ways.” I argue that the definition given above is broad and encompasses these more specific definitions of risk. Economists define the level of risk that an outcome entails by its variance. This is consistent with my definition because the higher the variance, the lower the predictability. For clinicians, a risky behavior is a behavior having a negative impact on health, and increasing the likelihood of death. As such behaviors seem to increase the benefit of some individuals in the short term, but also increase the probability of a negative outcome in the long term, they lead to higher uncertainty. Finally, in finance, experts define a risky option as an option that may lead to a negative outcome. Here again, the outcome of an option that should produce more money but may also lead to losses is more difficult to predict. So all these definitions are consistent with the more general definition given above.

Risk aversion is an individual characteristic and there is no consensus for defining it as a trait. Several studies show that individuals have different levels of risk propensity depending on the domain. However, the type of measure generally changes from one domain to another, and individuals may value the outcomes in some domains more than in others. So it is unclear what share of the variation of measured risk

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<sup>3</sup>Of course, this example is a special case and in real life, individuals generally don't have the choice between a gamble and a sure outcome. However, the idea stays the same: some alternatives are more predictable than others, a risk averse-individual will tend to favor the less risky outcome more than a risk-acceptant individual, all else being equal.

attitudes across domains comes from differences in risk attitudes *per se*. Moreover, individuals have personality dispositions to be more or less risk averse (in particular impulsivity, sensation-seeking, and authoritarian predispositions). Thus, there is a stable component too, and despite the debate about context specificity and time specificity of risk attitudes, I treat risk attitudes as a trait in the present work.

In the present work, I study how vote choice among both voters and representatives is affected by the individual propensity to take risks. Concerning the voters, the effect of risk on their behavior may have strong implications for democratic representation. Indeed, risk aversion is positively correlated with right-leaning preferences. Some choices may entail more or less uncertainty, depending on the institutions, and affect voters differently, depending on their preferences. Concerning the representatives, we don't know much about their risk attitudes. Although the rational choice literature takes risk attitudes into account to model leaders' decisions related to war, risk propensity of the leaders is defined by the country's characteristics rather than by the leader's ones. To the best of my knowledge, no study on leaders' risk attitudes exists. I investigate here if risk aversion has an effect on legislative voting.

This project is divided into five chapters. In the second chapter, I test if risk attitudes affect the likelihood to vote for a new party. In the third chapter, I test if risk aversion has an effect on strategic voting. In the fourth chapter, I present a survey of Swiss representatives and test if risk averse legislators are more likely to vote for new alternatives. In the fifth chapter, I discuss how risk attitudes can affect ideal point estimations using Item Response Theory models. In the final chapter, I discuss the implications of the main findings, and suggestions for future work.

## CHAPTER II

### Risk Aversion and Voting for a New Party

The effect of risk attitudes on voting behavior is the subject of increasing attention. This paper investigates the effect of risk attitudes on voting behavior in multiparty systems. I argue that voting for a new party entails more uncertainty than voting for an established one; because the policy stance, the electoral success, and the efficiency of the agent-principal relationship are difficult to predict with a new party. Thus, risk-averse voters should be less likely to vote for a new party than risk-acceptant voters, *ceteris paribus*. This paper uses the Swiss case, where two new parties appeared on the political scene at the federal level between 2007 and 2011, to evaluate this proposition. The results show that the more risk averse a voter is, the less likely he is to vote for a new party.

#### 2.1 Introduction

When facing choices, people are more inclined to take risks in some situations than in others depending on the values ascribed to each of the existing alternatives and how these alternatives are framed (Kahneman and Tversky, 1979; Kahneman and Tversky, 1983; Johnson, Hershey, Meszaros and Kunreuther, 1993; Rothman and Salovey, 1997; Druckman, 2001). In addition to these variations of risk acceptance across situations, variations across individuals exist. More precisely, some individuals are more risk



averse than others, and are thus less likely to choose more uncertain outcomes (Allais, 1953; Zuckerman, 1991; Kelling, Zirkes and Myerowitz, 1976; Kam and Simas, 2010). Applied to voting behavior, this suggests that voters will not only be influenced by preferences related to political dimensions and personal features of candidates, but also by how much uncertainty characterizes each party or candidate. As risk aversion is correlated with political preferences, with leftist voters being less risk averse than rightist voters (Kam, 2012), the effect of risk attitudes on voting behavior can have important implications for democratic representation. In a sense, risk can be seen as an additional dimension in the policy space, although not orthogonal to the main political dimensions.

Several studies investigate how this personal characteristic influences vote choice and election outcomes (Nadeau, Martin and Blais, 1999; Morgenstern and Zechmeister, 2001; Berinsky and Lewis, 2007; Helmke, 2009; Kam, 2012; Kam and Simas, 2012). In the context of US elections, Kam and Simas (2012) show that more risk-averse voters are more likely to vote for the incumbent, *ceteris paribus*. It is indeed well-founded and consistent with the literature on incumbency advantage to argue that, in a single-member district plurality (SMDP) system, the challenger represents a more uncertain (and thus more risky) option than the incumbent (see for example Mayhew (1974) and Fiorina (1977)). In the US, party discipline is low, and scholars see parties as a tool used by representatives to reach their goals (Downs, 1957; Aldrich, 1995), so the focus is more on candidates than on parties during elections. Thus, given the importance of individual candidates in the US electoral system, scholars have focused on the uncertainty associated with the challenger. To the contrary, in Western European parliamentary democracies, as explained by Mueller (2000, p.330), “political parties are *the* central mechanism to make the constitutional chain of political delegation and accountability work in practice.” Consequently, because of the importance of parties in the delegation process translating voters’ preferences into policy outcomes,

the effect of party uncertainty, rather than candidates, is of primary importance in multiparty systems. Nevertheless, it is important to note that Kam and Simas' (2012) test concerns individual candidates, and that their results do not necessarily apply to parties. As such, I argue that voting for a new party is risky, and this is so for three main reasons. First, the electoral success of the new party is very uncertain, as voters have no (or less) information from previous elections. Second, voters have less information about the position of the new party. Third, it is not certain how efficient the role of the new parties will be in the delegation and accountability chain. Thus, this paper tests if the more risk averse a voter is, the less likely he is to vote for a new party, *ceteris paribus*.

This effect should be at work especially in systems where voters primarily use party ties. This is the case in Switzerland,<sup>1</sup> where two new parties arose on the political scene between the 2007 and 2011 national elections, allowing to test the effect of risk attitudes on the likelihood of voting for a new party. The next section discusses the link between risk attitudes and vote choice. Section three explains why a new party is a more risky option. Section four presents the data and the analysis. Section five allows for a discussion.

## 2.2 Risk Attitudes and Vote Choice

As several definitions of risk exist in the literature on decision theory, it is important to define risk first. Some definitions associate risk with negative outcomes. Other authors argue that there are some gains associated with risk. For example, Kam (2012, p.1) “combine[s] th[e] risk-return theoretical framework with the literature on individual differences in sensation seeking to understand how risk attitudes

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<sup>1</sup>Indeed, Switzerland is known as being a country with a very inclusive political system (see for example Lijphart (1999) and Powell (2000)), which is probably an important factor of the stability of the partisan composition of representatives at the national level. As the party system is quite stable, Swiss voters generally use party ties when they vote.

might affect participation.” I prefer a more neutral definition and choose to follow Kahneman and Tversky’s (1983, p.341) definition of risk. These authors make the distinction between a risk-averse behavior and a risk-seeking behavior by the following terms: “In general, a preference for a sure outcome over a gamble that has higher or equal expectation is called risk averse, and the rejection of a sure thing in favor of a gamble of lower or equal expectation is called risk seeking.” Thus, a risk-averse behavior is a choice by an individual for a more certain but more moderate gain (loss) over a less certain but higher-average gain (loss). In his critique of the use of the rationality assumption, Allais (1953, p.508) suggests that some individuals “believe in their fortune” and others “consider themselves pursued by the adversity” when making decisions.<sup>2</sup> Some persons are more risk seeking than others,<sup>3</sup> and this has an effect on their decision-making. The paper by Kam and Simas (2010) confirms that there is indeed an effect of risk attitudes at the individual level on the likelihood to avoid risky alternatives. They measure the individual level of risk aversion using a questionnaire on risk orientation and show that the more risk seeking a respondent, the more likely he is to choose the probabilistic outcome over the certain outcome, both outcomes having the same expected utility according to the expected utility hypothesis. This opens up a multitude of questions about the role of risk attitudes in vote choice.

Some of these questions have been investigated recently. For example, Nadeau, Martin and Blais (1999) find that in the context of the Quebec referendum on sovereignty, risk-averse voters give more consideration to the probability of the worst scenario, and less consideration to the anticipated costs and benefits, compared to

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<sup>2</sup>personal translation

<sup>3</sup>It is important to note, however, that several scholars aimed at nuancing this assumption. Indeed, a few studies discuss the idea that, according to different personality traits, people might be more risk seeking in the domain of gains and more risk averse in the domain of losses or, inversely, risk averse in the domain of gains and risk seeking in the domain of losses (see for example Kowert and Hermann, 1997; Lauriola, Russo, Lucidi, Violani and Levin, 2005). Moreover, it has been shown that risk attitudes vary across contexts, although there is a general underlying component specific to each individual (Dohmen, Falk, Huffman, Sunde, Schupp and Wagner, 2011).

the more risk-acceptant ones.

Morgenstern and Zechmeister (2001) show that risk-acceptant voters are more likely to vote for the opposition and are more willing to punish bad economic performance than risk-averse voters. Berinsky and Lewis (2007) find that individuals have a different utility function curvature depending on their propensity to take risks.<sup>4</sup> Tomz and Van Houweling (2009) show that although American voters tend to favor ambiguous outcomes, the more risk seeking of them are more likely to do so compared to the more risk-averse ones. Helmke (2009) finds that risk-averse voters are more likely to split their vote in the Mexico 2000 elections. Kam (2012) investigates the relationship between risk attitudes and different types of participation. Kam and Simas (2012) show that risk-averse voters are more likely to opt for the incumbent, as challengers entail more uncertainty in their impact on the status quo and in their competence. So any factor leading to higher uncertainty or higher ambiguity associated with a candidate decreases the chances of that candidate being chosen by a risk-averse voter. In general, challengers are perceived as riskier options as their policy positions and their performance are more difficult to predict (Kam, 2012; Quattrone and Tversky, 1988). Following a similar logic, I argue here that new parties entail more uncertainty and that consequently risk-acceptant voters are more inclined to vote for them than are risk-averse ones, *ceteris paribus*.

### **2.3 How Risky is a New Party?**

There are four different categories of new parties: parties that emerge from a fission of an existing party, parties resulting from a fusion between several existing parties, parties emerging with no help from existing party officials, and finally, electoral alliances (Hug, 2001). Certain aspects making new parties uncertain might be

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<sup>4</sup>Although given the number of control variables included in their regression, the explanatory power of the spatial component of the model can be questioned.

more pronounced in some types of new parties than others, however, all types should be marked by uncertainty. As it takes some time for the efficiency of a party organization to be visible once in office, I adopt a relaxed definition relative to the one adopted by Hug (2001, p.14):

A new political party is a genuinely new organization that appoints, for the first or second time, candidates in a general election to the system's representative assembly.

Now that I have defined what a new party is, I can begin to evaluate what constitutes a risky alternative in an election. According to Kahneman and Tversky (1979, p.289),

“[t]he decision weight associated with an event will depend primarily on the perceived likelihood of that event, which could be subject to major biases (Tversky and Kahneman, 1974). In addition, decision weights may be affected by other considerations, such as ambiguity or vagueness. Indeed, the work of Ellsberg (1961) and Fellner (1965) implies that vagueness reduces decision weights. Consequently, subcertainty should be more pronounced for vague than for clear probabilities.”

With this in mind, there are three reasons why a new party is more risky. First, if the party is new, voters cannot use previous election results to estimate the potential success of this party. Consequently, it is unclear how many voters will estimate the success of this party to be too unlikely and decide to vote for another party even if the new party was their first choice (wasted vote logic (Cox, 1997)).<sup>5</sup> Thus, the perceived likelihood of the success of this event (i.e. the new party obtaining seats) being uncertain, a new party does represent a risky alternative.

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<sup>5</sup>Moreover, the uncertainty of the size of the new party also has an effect on the uncertainty of its bargaining power if represented in parliament.

Second, a voter cannot base his or her estimate of the position of a new party on previous behavior. Voters have more information on well established parties, and can estimate with more certainty their positions. Also, if the party emerged after a fission, there is ambiguity stemming from the fact that candidates come from another party. However, uncertainty of policy position seems more relevant in a plurality vote system than in a proportional vote system since an elected candidate has potentially more effect on the status quo in a winner-take-all system (Tsebelis, 2002).

Third, the “performance” of a new party is more difficult to predict. By performance here I do not mean the performance of individual candidates<sup>6</sup> but the performance of the party as an organization. Indeed, in Western Europe the role of political parties is considerable. Parties solve collective action problems because parties are long term organizations, meaning that they have more incentive to be accountable than individual MPs. If the party is new, the competence with which the party will play its role is uncertain. Indeed, as discussed by Mueller (2000, p.324) after explaining that MPs generally have an incentive in following their party line to maintain credibility, “there are prominent individual exceptions (e.g. Winston Churchill) as well as new parties which establish themselves as break-away from other parties.” Also, the screening and selection mechanism that makes it difficult for any member to rise to the top of the list in an existing party in Europe is quasi non-existent in a new party. Moreover, the policy making and governing functions of a new party are undefined. Consequently, if the party is new, the competence with which the party will play its role is uncertain.

Thus, the main source of uncertainty characterizing a new party comes from the unpredictability of its electoral success, of its position on the political space, and of its performance in solving collective action problems. It follows that voting for a new party and voting for an individual challenger do not entail the same risks, hence the

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<sup>6</sup>The individual candidates of a new party are not necessarily all challengers *per se*, however their party label is.

necessity to test the following hypothesis:

*Hypothesis 1:* The less voters are risk averse, the more likely they are to vote for a new party, all else being equal.

## 2.4 Risk and Party Choice in Switzerland

### 2.4.1 The Swiss Case

In Switzerland in 2007, there were six main parties; the Social Democratic Party (SP), the Greens (GPS), the Christian Democratic Party (CVP), the Free Democratic Party (FDP), the Liberals (LP) and the Swiss People's Party (SVP). On the left-right dimension, the SP and the Greens are leftist parties, the CVP, LP and FDP are center-right parties, and the SVP is a rightist party. Martin Bäumle, who was previously a member of parliament (MP) in the lower house for the GPS, created the Green Liberals (GL) in 2004.<sup>7</sup> One of the reasons for this partition was that the GPS was perceived as being too left oriented (see for example Roulet (2011)) by some of its members. The party started to grow first at the district and cantonal level, but in the 2007 national elections, the GL obtained four seats in the parliament and 14 seats in 2011, out of a total of 246 seats. The GL leans more right than the GPS but as of 2011 several political actors still perceived the party line of the GL as very vague (see Cossy (2011)).

The creation of the BDP started with dissension that occurred among SVP members during the election of the government in 2007. The SVP comprises a right nationalist wing and a more moderate wing. An important share of the members of the parliament coordinated with some members of the moderate wing of the SVP to

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<sup>7</sup>He did so with the help of Verena Diener, an MP at the cantonal level

favor the election of a more moderate member of the SVP, Eveline Widmer-Schlumpf, instead of the incumbent. The SVP then asked the party section at the district level to exclude Widmer-Schlumpf, but this demand was rejected. It followed that the party excluded the whole section. This section created a new party: The Conservative Democratic Party of Switzerland (BDP). After that, several members of other district sections of the SVP followed and the BDP progressively developed into a national-level party. As for the GL, the party line of the BDP might seem quite vague for the voters (see Zubler (2010)).

Although voters already knew important figure members of the GL as well as the BDP, how these parties will fulfill their roles was still more uncertain than it was for established parties during the 47<sup>th</sup> legislature (2007-2011).

#### 2.4.2 Data and Analysis

The Swiss Household Panel (SHP)<sup>8</sup> covers a broad range of topics. The study randomly samples households in Switzerland, and interviews of household members are mainly conducted by phone. I use the data from 2009 because it is the first survey in this panel that includes the question of risk. The GL contested its first federal elections in 2007 only in two Cantons but was rising in other Cantons between 2007 and 2011. The BDP did not run in 2007 but already had representatives in the government after the 2007 elections and, by 2009, had several cantonal branches. Consequently, the GL and BDP were new parties at the time of the survey.

In 2009, the survey includes the following question: “Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?” The answer scale goes from 0 (avoid taking risks) to 10 (fully prepared to take risks). As this is a self placement scale, the measure of risk is likely to entail some bias, including

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<sup>8</sup>Voorpostel, M., Tillmann, R., Lebert, F., Kuhn, U., Lipps, O., Ryser, V.-A., Schmid, F., Rothenböhler, M., & Wernli, B. (2012). Swiss Household Panel Userguide (1999-2011), Wave 13, October 2012. Lausanne: FORS.



for example social desirability bias (Feldman, 1991; Fisher, 1993). However, Dohmen et al. (2011) showed that this measure correlates with a risky gambling behavior. Moreover, I find correlations between this variable and several demographic variables consistent with the literature. Females are generally more risk averse than men (Levin, Snyder and Chapman, 1988; Sung and Hanna, 1996; Byrnes, Miller and Schafer, 1999; Dohmen et al., 2011). Income and education seem to be positively correlated with risk acceptance (Rosen, Tsai and Downs, 2003; Riley and Chow, 1992). Dohmen et al. (2011) find that the relation between age and risk aversion is positive. Table 2.1 presents the correlations between our variable *risk* (i.e. risk acceptance) and its main covariates. The signs are consistent with the literature. Also included in Table 2.1 are the correlation coefficients between *risk* and two political dimensions. The first is the left-right scale and the correlation sign is consistent with existing empirical studies (Kam and Simas, 2010; Kam, 2012). The second is a political dimension that I will call “political openness”. It is the second main political dimension in Switzerland.<sup>9</sup> According to Hermann and Leuthold (2001), this dimension encompasses two main conflicts: the conflict for or against change, and the question about the relation with other countries and the condition of foreigners in Switzerland. In the SHP of 2009, the following question is included: “Are you in favour of Switzerland joining the European Union or are you in favour of Switzerland staying outside of the European Union?”. I use this variable as a proxy for political openness (no other question in the survey seems to measure this dimension). The correlation is positive and significant. To my knowledge, no such correlation has been estimated in the literature. However, this positive correlation makes sense because to be open politically to foreign countries entails some uncertainties. Moreover, this result is somewhat consistent with Ehrlich and Maestas (2010) who find that risk-averse low-skilled workers are less likely to

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<sup>9</sup>Hermann and Leuthold (2001) named this dimension liberal-conservative. I name it “political openness” to avoid any confusion with the left-right scale, as liberal-conservative and left-right are often taken as synonyms in the American literature.

support free trade, and that risk-acceptant high-skilled workers are more likely to support free trade.

Table 2.1: Risk Acceptance and its Main Covariates

	risk
gender (female)	-0.153***
age	-0.159***
education	0.150***
income	0.100***
ideology (left-right)	-0.052***
political openness	0.086***

\*\*\*:  $p < .01$

Other possible covariates of the variable *risk* are the big five personality traits. Table 2.2 presents correlation coefficients between *risk* and the big fives.<sup>10</sup> The coefficients have the same sign as in Kam’s (2012) analysis, except for agreeableness and neuroticism. This might come from the fact that the big five measures are not based on the same questions.<sup>11</sup> The fact that Kam’s (2012) measure of risk is more oriented toward the propensity to like new experiences, rule breaking, and sensation seeking may also play a role. Indeed, Slovic, Fischhoff and Lichtenstein (1986) find that there are two dimensions underlying the concept of risk: “understood risk” (uncertainty) and “dread risk” (related to fear), and although the self placement measure is broad enough to encompass both, Kam’s measure is more oriented toward the second dimension.

<sup>10</sup>the SHP survey uses two questions for each trait, the questions being based on Rammstedt (2007).

<sup>11</sup>Questions in Kam (2012) are based on Gosling, Rentfrow and Swann (2003) (TIPI).

Table 2.2: Risk Acceptance and The “Big Five” Personality Traits

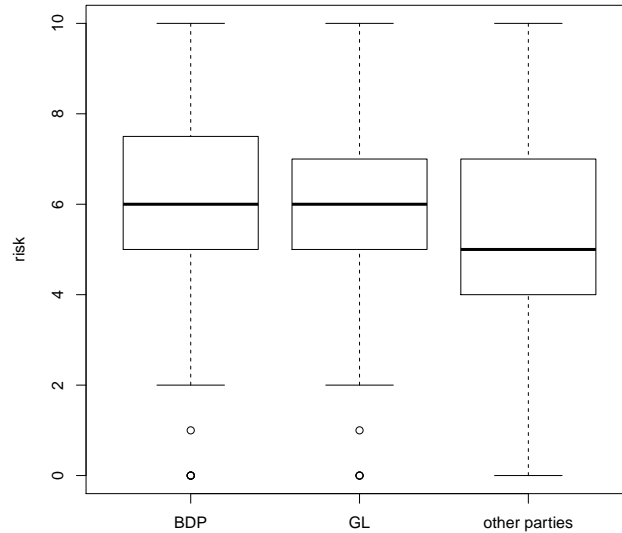
	risk
Openness	0.042***
Conscientiousness	-0.140***
Extraversion	0.136***
Agreeableness	0.043***
Neuroticism	-0.012***

\*\*\*:  $p < .01$

I argue that although there may exist better (and more costly) measures of risk attitudes, no other measure of risk attitudes exists in this survey, or in other surveys in Switzerland at this time. In the analysis below, *risk* will be the main independent variable. The dependent variable will be *vote choice*: One question in the 2009 SHP survey asks respondents which party they would vote for if there were elections of the Lower House tomorrow. I keep the eight biggest categories, the two new parties and six established parties, so the dependent variable *vote choice* has eight categories. Figure 1 displays three boxplots, showing the distribution of *risk* of the people who would vote for the BDP, the GL, or one of the established parties, respectively. The median of the measure of risk acceptance is larger in the first and second boxplots, which is consistent with *Hypothesis 1*.

However, to strengthen the interpretation of the effect of risk aversion on the likelihood of voting for a new party, it is necessary to control for other variables. I use a multinomial model to estimate the effect of *risk* on *vote choice*. I expect *vote choice* to be mainly explained by the distance between the voter and the different alternatives. The distance is the distance on the left-right dimension between the policy position of the respondent as assessed by himself and each party location. The party locations

Figure 2.1: Comparing the Distribution of Risk



are estimated using the Swiss Election Studies of 2011<sup>12</sup> where respondents are asked to locate the main parties on the left-right scale. Party locations are estimated by taking the mean of the estimated positions of each party. The distance is individual specific as well as alternative specific. As distance should have the same effect for each voter and each party, there is only one coefficient estimated for the distance, for all alternatives. I expect the distance to have a negative effect on vote choice and, according to my hypothesis, risk aversion should have a negative effect on the

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<sup>12</sup>See <http://forscenter.ch/en/our-surveys/selects/>. I use the 2011 survey, as the location of the two new parties has not been asked before 2011. There are only two parties for which I use the 2007 survey: the FDP and the PLS. Indeed, these two parties merged in 2011, so we do not have distinct locations for them in the 2011 survey. One could wonder why the future merged party is not defined as a new party organization in this analysis. The reason is that these parties are still two distinct alternatives in the 2009 SHP survey, where the question on risk attitudes has been asked. One could also wonder if the location of the established parties haven't changed much between 2007 and 2011. The correlation between the locations of the main established parties in 2007 and 2011 equals 0.999.

likelihood of voting for the GL and for the BDP.<sup>13</sup> Finally, as the variable *distance* concerns the left-right dimension and as the second dimension in Switzerland seems highly correlated with *risk* (see Table 2.1), I include the variable *political openness*. To control for this variable is crucial as these new parties are known to depart from the respective parties they split from, on this specific dimension.<sup>14</sup> Thus, the Model 1 includes *distance*, *risk*, and *political openness* as explaining variables.<sup>15</sup> In a second model, I also add the variable *education*, as voters with higher levels of education might have more information on these new parties. In a third model, I control for the general demographic variables. Finally, in addition to the main dependent variables of Model 1, I include the big five traits in the last model.

I estimate a multinomial logit model<sup>16</sup> using BIOGEME (Bierlaire, 2003) and expect the likelihood of voting for the BDP or GL to increase when risk acceptance increases. Multinomial logit models are computationally less expensive than other multinomial models, but necessitate the IIA assumption. I followed Hausman and McFadden (1984), and ran Hausman and Wise's (1978) test procedure. In all models, the tests showed no significant differences in the parameters if one alternative was removed. Thus, I assume that the IIA assumption holds. In these multinomial models, I chose the CVP as the base category, because this party is big and fairly close to

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<sup>13</sup>It could be argued that the effect of *risk* is smaller if the distance is large, or inversely that the distance has less effect on the likelihood of voting for a new party if *risk* is low. However, the effect of the independent variables should exhibit diminishing returns. In other words, when distance to BPD (GL) is too large, we do not expect *risk* to have any effect on the likelihood of voting for the BDP (GL). And when *risk* is very low, we do not expect the proximity to BDP or GL to increase the chances to vote for one of these new parties. For this reason, we do not include an interaction term between *risk* and *distance*.

<sup>14</sup>This is especially true concerning the BDP (see for example Keiser (2008)).

<sup>15</sup>Given that popular votes frequently show a gap, in terms of ideology, between German-speaking voters on one side and French and Italian speaking on the other, I also ran this model with a control variable *german speaking*. The results were very similar.

<sup>16</sup>As the two new parties were not present in all Cantons, I defined them as available alternatives in the models only in Cantons where they ran federal elections in 2011.

the center.<sup>17</sup> The results for the two new parties are displayed in Table 2.3 (see the results for the seven alternatives in the Appendix):

Table 2.3: Multinomial Logit Regressions: The Effect of Risk on Vote Choice

	Model 1		Model 2		Model 3		Model 4	
	BDP	GL	BDP	GL	BDP	GL	BDP	GL
constant	-2.23 (1.63)	-1.62 (0.25)	-2.10 (0.430)	-2.56 (0.320)	-2.21 (2.70)	-2.06 (2.11)	-2.29 (1.20)	0.33 (0.862)
distance	-0.718 (0.019)	-0.718 (0.019)	-0.731 (0.020)	-0.731 (0.020)	-0.635 (0.055)	-0.635 (0.055)	-0.717 (0.019)	-0.717 (0.019)
risk	0.146 (0.059)	0.103 (0.041)	0.150 (0.059)	0.084 (0.043)	0.138 (0.061)	0.065 (0.046)	0.132 (0.060)	0.114 (0.043)
pol. open.	-0.296 (0.148)	0.154 (0.092)	-0.285 (0.148)	0.071 (0.094)	-0.350 (0.158)	0.067 (0.101)	0.273 (0.149)	0.126 (0.093)
education			-0.028 (0.046)	0.176 (0.033)	-0.062 (0.051)	0.154 (0.036)		
female					-0.684 (0.289)	-0.129 (0.194)		
age					0.019 (0.008)	-0.029 (0.064)		
log(hh income)					-0.071 (0.216)	0.264 (0.173)		
ideology (l-r)					0.081 (0.096)	-0.407 (0.074)		
Openness							0.113 (0.043)	-0.056 (0.032)
Conscientiousness							-0.012 (0.041)	-0.007 (0.029)
Extraversion							0.002 (0.037)	-0.025 (0.026)
Agreeableness							-0.091 (0.050)	-0.047 (0.363)
Neuroticism							0.008 (0.048)	-0.023 (0.034)
N	3467		3465		3354		3445	
Num. of Param.	22		29		57		57	
LogLik	-4878.2		-4082.9		-4494.5		-4811.5	

standard errors in parentheses

In all Models, as expected, distance has a negative and significant effect on vote choice. The results of Model 1 show that for the two new parties, the effect of risk is positive and significant at the five percent level. Also, the coefficient of risk is larger for these two new parties than for any other parties (see Tables 2.4 - 2.7 in Appendix), which is consistent with our hypothesis. Political openness has a negative effect on the likelihood of voting for the BDP, which is interesting because according to Lutz (2012) who presents descriptive statistics of the 2011 Swiss Electoral Survey, the difference between the CVP and the BDP on this dimension is not clear. Finally,

<sup>17</sup>Similar models were run with the FDP as base category. This party is also fairly large and close to the center. Although the effect of risk is not significant for the GL in Models 2 and 3 and only significant at the 10 percent level for the BDP in one Model 3, the main results hold. Moreover, the fact that the FDP and the LPS announced their future fusion at the beginning of 2009 can probably explain why the results are slightly less significant with the FDP as the base category.

political openness has no significant effect on the likelihood of voting for the GL. In Model 2, there is also a positive and significant effect of risk on the likelihood of voting for the BDP or the GL. It is interesting to see that voters with high levels of education are more likely to vote for the GL. In Model 3 that includes the main demographic variables, the results are weaker as risk has only a significant effect for the BDP. Men are more likely to vote for the BDP. The likelihood of voting for the BDP also increases with age, which is consistent with the results presented by Lutz (2012). Ideology has no significant effect on the BDP, but has a negative and significant effect on the GL. This means that respondents who vote for the GL tend to be more left leaning than the ones who vote for the CVP, the base category. This is again consistent with Lutz (2012). Finally, in Model 4, risk has a positive and significant effect on the likelihood of choosing one of the two new parties. However, the big five traits do not seem to explain vote choice.

To summarize, the effect of risk is always positive and significant except for the GL in Model 3. Also, this effect is always larger than for any other party with the exception of the LPS that also has a high coefficient in Models 2 and 3. The fact that the LPS has low representation in the Lower House compared to other parties can explain these high coefficients, as voting for a small party might be seen as risky. Indeed, given that a small party has limited bargaining power, there is more uncertainty concerning the policy making and governing roles of this party. Thus, the general trend of these results confirms *Hypothesis 1*. Figures 2.2 to 2.5 below show the effect of risk on estimated probabilities of voting for the BDP and the GL respectively, holding all other variables constant.<sup>18</sup>

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<sup>18</sup>I estimated the confidence intervals using the delta method (see Long (2005)). I set the measure of ideology to the median (5 on a 0 to 10 scale) and defined the distances to each party accordingly. All other variables were set to their median except political openness from which I took the mean, because it is a 0 to 2 scale and its middle category is very small. Also, the gender is set to “female” in figure 2.4 (the results are very similar for the male category).

Figure 2.2: Effect of Risk on Predicted Probabilities in Model 1

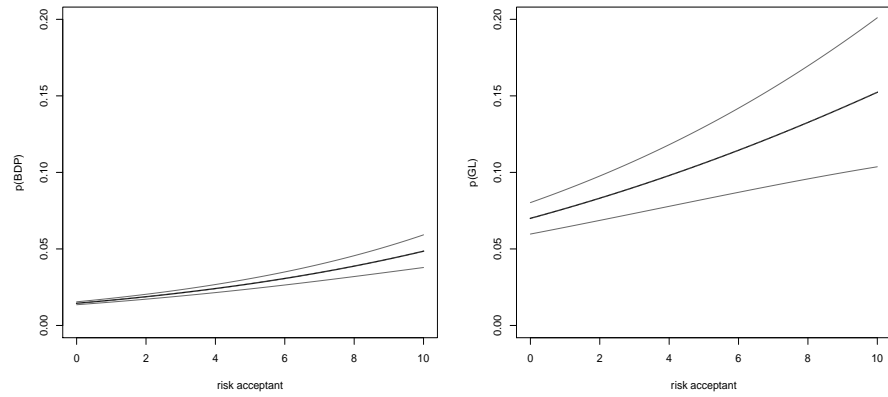


Figure 2.3: Effect of Risk on Predicted Probabilities in Model 2

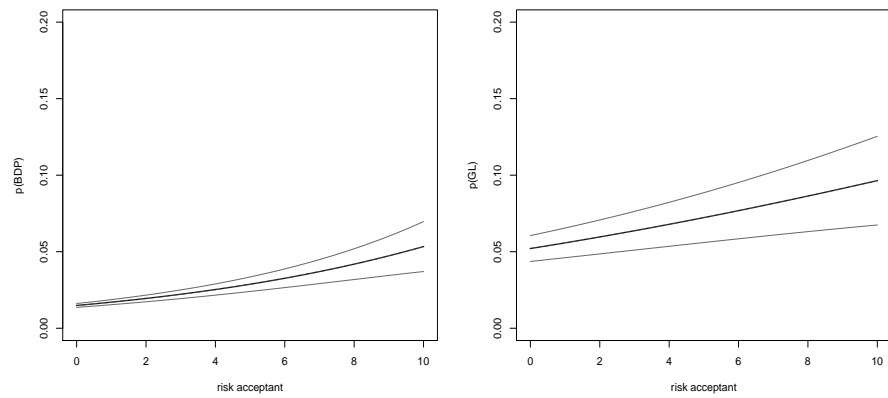




Figure 2.4: Effect of Risk on Predicted Probabilities in Model 3

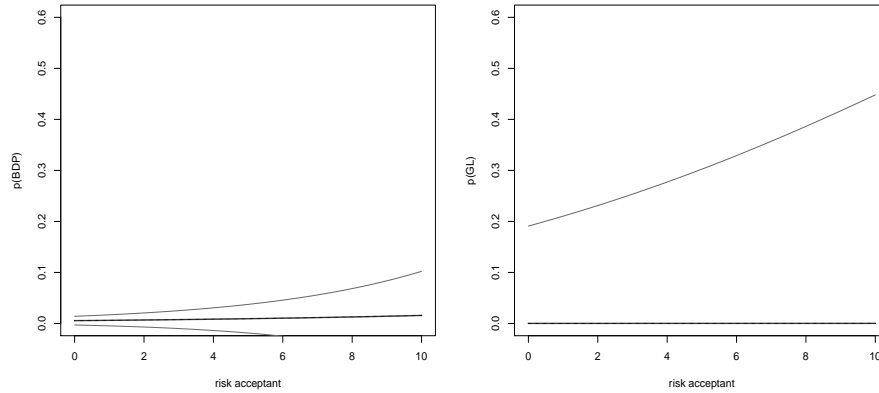
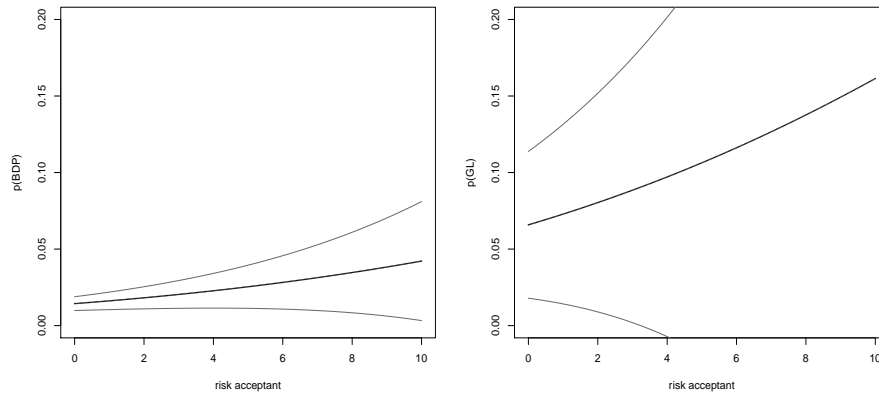


Figure 2.5: Effect of Risk on Predicted Probabilities in Model 4



The graphical representations of the effect of risk on predicted probabilities of voting for the BDP show a positive effect in models 1, 2 and 4, and a weak effect in model 3. Concerning the VL, the effect is positive and significant in the first two models, weak in model 3, and positive but not significant in model 4.

## 2.5 Discussion

This paper argues that the more risk averse a voter is, the less likely he is to vote for a new party, all else being equal. New parties are risky options for three main

reasons. First, the success of the party is difficult to predict, which can lead voters to choose another option even if they prefer the new party. Second, new parties do not reduce transaction costs as much as established ones. In other words, their policy stance is more uncertain. Third, how well a new party will solve the collective action problem is uncertain. Using survey data from Switzerland, I showed that risk aversion at the individual level tends to decrease the likelihood of voting for a new party. It is interesting to note that this result is also consistent with Mair (1990), who finds that leftist voters are more likely to reward splits and that leftist parties are more inclined to split than rightist ones, as left-leaning ideology is positively correlated with risk propensity.

Finally, the Swiss case is very specific because it is neither a parliamentary system nor a presidential one. The government cannot be voted out of office in Switzerland. Moreover, the composition of the government is very predictable. This should not prevent our results from being generalizable to other multiparty parliamentary systems. To the contrary, in a system that has less predictable election outcomes than Switzerland, it might be seen as even more risky to give its vote to a new party. Thus, the effect tested here should be generalizable to other multiparty systems.

## 2.6 Appendix

Models 1 to 4 are displayed here for all alternatives except the CVP (which is the base category).

Table 2.4: Model 1: All Alternatives

	BDP	GL	FDP	GPS	LPS	SP	SVP
constant	-2.23 (0.365)	-1.62 (0.25)	0.224 (0.159)	-0.664 (0.198)	-2.00 (0.321)	0.201 (0.173)	1.86 (0.171)
distance	-0.718 (0.019)	-0.718 (0.019)	-0.718 (0.019)	-0.718 (0.019)	-0.718 (0.019)	-0.718 (0.019)	-0.718 (0.019)
risk	0.146 (0.059)	0.103 (0.041)	0.028 (0.027)	0.043 (0.032)	0.087 (0.051)	0.022 (0.029)	-0.088 (0.030)
pol. open.	-0.296 (0.148)	0.154 (0.092)	0.009 (0.065)	0.351 (0.075)	0.299 (0.113)	0.421 (0.067)	-1.04 (0.104)
N				3467			
Num. of Param.				22			
LogLik				-4878.2			

standard errors in parentheses

Table 2.5: Model 2: All Alternatives

	BDP	GL	FDP	GPS	LPS	SP	SVP
constant	-2.10 (0.430)	-2.56 (0.320)	0.242 (0.192)	-0.831 (0.237)	-1.89 (0.375)	0.448 (0.204)	2.80 (0.213)
distance	-0.731 (0.020)	-0.731 (0.020)	-0.731 (0.020)	-0.731 (0.020)	-0.731 (0.020)	-0.731 (0.020)	-0.731 (0.020)
risk	0.150 (0.059)	0.084 (0.043)	0.028 (0.027)	-0.040 (0.033)	0.091 (0.051)	0.028 (0.029)	-0.062 (0.030)
pol. open.	-0.285 (0.148)	0.071 (0.094)	0.014 (0.066)	0.332 (0.076)	0.312 (0.113)	0.443 (0.068)	-0.995 (0.106)
education	-0.028 (0.046)	0.176 (0.033)	-0.005 (0.023)	0.033 (0.026)	-0.025 (0.040)	-0.051 (0.023)	-0.217 (0.028)
N				3465			
Num. of Param.				29			
LogLik				-4082.9			

standard errors in parentheses

Table 2.6: Model 3: All Alternatives

	BDP	GL	FDP	GPS	LPS	SP	SVP
constant	-2.21 (2.70)	-2.06 (2.11)	-3.82 (1.40)	0.187 (0.160)	-6.37 (2.50)	4.49 (1.47)	6.85 (1.52)
distance	-0.635 (0.055)	-0.635 (0.055)	-0.635 (0.055)	-0.635 (0.055)	-0.635 (0.055)	-0.635 (0.055)	-0.635 (0.055)
risk	0.138 (0.061)	0.065 (0.046)	0.035 (0.029)	0.036 (0.036)	0.135 (0.053)	0.032 (0.031)	-0.042 (0.030)
pol. open.	-0.350 (0.158)	0.067 (0.101)	0.015 (0.290)	0.290 (0.083)	0.307 (0.120)	0.460 (0.074)	-0.953 (0.104)
education	-0.062 (0.051)	0.154 (0.036)	-0.037 (0.025)	0.033 (0.029)	-0.005 (0.045)	-0.005 (0.045)	-0.197 (0.029)
female	-0.684 (0.289)	-0.129 (0.194)	-0.025 (0.135)	0.187 (0.160)	0.543 (0.246)	0.543 (0.246)	-0.166 (0.147)
age	0.019 (0.008)	-0.029 (0.064)	0.010 (0.004)	-0.012 (0.005)	0.025 (0.008)	0.025 (0.008)	-0.005 (0.004)
log(hh income)	-0.071 (0.216)	0.264 (0.173)	0.256 (0.112)	-0.170 (0.132)	0.126 (0.198)	0.126 (0.198)	-0.302 (0.115)
ideology (l-r)	0.081 (0.096)	-0.407 (0.074)	0.114 (0.052)	-0.477 (0.078)	0.155 (0.086)	0.155 (0.086)	-0.080 (0.083)
N				3354			
Num. of Param.				57			
LogLik				-4494.5			

standard errors in parentheses

Table 2.7: Model 4: All Alternatives

	BDP	GL	FDP	GPS	LPS	SP	SVP
constant	-2.29 (1.20)	0.33 (0.862)	1.05 (0.59)	0.403 (0.699)	-0.604 (1.07)	1.12 (0.625)	1.28 (0.664)
distance	-0.717 (0.019)	-0.717 (0.019)	-0.717 (0.019)	-0.717 (0.019)	-0.717 (0.019)	-0.717 (0.019)	-0.717 (0.019)
risk	0.132 (0.060)	0.114 (0.043)	0.017 (0.028)	0.054 (0.034)	0.102 (0.053)	0.023 (0.030)	-0.107 (0.031)
pol. open.	0.273 (0.149)	0.126 (0.093)	0.005 (0.066)	0.329 (0.076)	0.268 (0.114)	0.411 (0.068)	-1.01 (0.105)
Openness	0.113 (0.043)	-0.056 (0.032)	0.007 (0.021)	-0.031 (0.026)	-0.059 (0.038)	0.016 (0.023)	0.072 (0.024)
Conscientiousness	-0.012 (0.041)	-0.007 (0.029)	-0.035 (0.020)	0.024 (0.023)	-0.020 (0.036)	-0.013 (0.020)	-0.013 (0.022)
Extraversion	0.002 (0.037)	-0.025 (0.026)	-0.004 (0.017)	-0.020 (0.021)	-0.055 (0.031)	-0.035 (0.018)	0.044 (0.020)
Agreeableness	-0.091 (0.050)	-0.047 (0.363)	-0.039 (0.025)	-0.036 (0.029)	0.007 (0.045)	-0.009 (0.026)	-0.077 (0.028)
Neuroticism	0.008 (0.048)	-0.023 (0.034)	-0.001 (0.023)	-0.012 (0.027)	-0.004 (0.042)	-0.029 (0.024)	0.026 (0.027)
N				3445			
Num. of Param.				57			
LogLik				-4811.5			

standard errors in parentheses

## CHAPTER III

### Risk Aversion and Strategic Voting

A significant number of studies in the literature on electoral systems test the effect of the electoral rule on the number of parties. However, these tests generally do not directly address one of the mechanisms at the base of Duverger's law, the so called "wasted vote logic", that leads to strategic voting. Studies using survey data, or comparing vote share under various electoral rules show evidence of strategic voting motivated by the wasted vote logic. Nevertheless, it may be that voters opt for a strategic choice because they follow the elite advice, not because they decide to behave strategically. In this paper, I test if the propensity to take risks affects strategic voting. I argue that this test can bring additional evidence of the wasted vote logic, as risk aversion is a personal characteristic. I analyse survey data from the United Kingdom (UK), Canada, and Germany, and find that in each of these cases, risk-averse voters are less likely to vote strategically than risk-acceptant ones. These results suggest that there is strategic voting. In addition, these results also indicate that the utility of expressing a preference is important in the utility of vote choice.

#### 3.1 Introduction

Duverger (1951/1954) states that single member district plurality (SMDP) rule generally leads to two party systems (Duverger's law) and that proportional repre-

sentation (PR) favors multiparty systems (Duverger's hypothesis). The underlying process behind the effect of the electoral rule on the number of parties is twofold. First, the mechanical effect of the electoral rule is at work: the lower the district magnitude, the less chances small parties have to obtain seats, as a small party needs approximately as many votes as the total number of votes divided by two times the number of seats to be represented. Second, the psychological effect, a consequence of the mechanical effect, operates. The psychological effect has two possible sources: the candidates and the voters. For candidates, if the chances to obtain a seat are too low, they might decide not to run. Concerning the voters, to avoid wasting their vote, they might vote for a less preferred candidate with higher chances of winning (in the present paper, unless stated otherwise, I call strategic voting the behavior that consists of voting for a less preferred party but with a higher probability of success, to avoid a wasted vote). Consequently, strategic behavior can come from both types of actors, the voters and the candidates.

Although the theory on the wasted vote logic is substantial, empirical evidence of the voters' role in the psychological effect is scarce. Knowing the sources of strategic voting is important. Strategic voting can be due to candidates and leaders who ask voters to redirect their vote, or it can come from voters' own reflection. If strategic voting is mainly due to the behavior of candidates and leaders, then strategic voting will favor candidates who have easy access to the media (incumbents for example). This is important because it would mean that electoral systems with low proportionality will favor candidates who have easy access to the media.

One strand of the literature uses ecological inference to estimate the effect of the electoral rule on the number of parties (Ordeshook and Shvetsova, 1994; Cox, 1997; Amorim Neto and Cox, 1997; Chhibber and Kollman, 1998; Clark and Golder, 2006; Mylonas and Roussias, 2008). However, as argued above, papers testing Duverger's law using aggregate data do not test the presence of strategic voting *per se*. A sec-

ond strand of the literature focuses on individual voting behavior. More specifically, scholars study the individual factors affecting the likelihood of voting strategically (Galbraith and Rae, 1989; Johnston and Pattie, 1991; Lanoue and Bowler, 1992; Niemi, Written and Franklin, 1992; Blais and Nadeau, 1996; Blais, Nadeau, Gidengil and Nevitte, 2001; Gschwend, 2007; Blais, Lachat, Hino and Doray-Demers, 2011; Blais, Héroux-Legault, Stephenson, Cross and Gidentil, 2012). Most of these studies show that the decision to vote strategically mainly depends on the information voters have access to. Do the voters really behave strategically or do they simply follow elite advice? I argue that if risk aversion has an effect on strategic voting, this will bring additional evidence on the existence of the wasted vote logic, because risk aversion is a personal characteristic.

In the present paper I explore two contradicting hypotheses. According to the first, risk aversion should increase strategic voting. According to the second hypothesis, risk aversion should decrease strategic voting. The reason for these two hypotheses is the following. If the gain of having voted for a winner is important, then voting strategically will be safer, which is consistent with the first hypothesis. If the gain of having chosen its preferred party is important, then voting sincerely is safer, which is consistent with the second hypothesis. I find that more risk-averse voters are less likely to vote strategically, which corroborates the second hypothesis. In the next section, I will discuss the link between risk aversion and strategic voting. In section three, I will present the three analyses of British, Canadian, and German elections successively. Section four will allow for a discussion.

## 3.2 Risk Aversion and the Psychological Effect

### 3.2.1 Strategic Voting in the Literature

The effect of electoral systems on representation started to attract the attention of political scientists long ago (Tingsten, 1937; Ross, 1948; Duverger, 1950; Duverger, 1951/1954). In 1954, Duverger reports that systems with proportional representation are generally multipartite, while systems with SMDP representation are likely to be bipartite (see also Duverger (1950)). He explains this by two distinct mechanisms: the mechanical effect and the psychological effect of the electoral rule. Following Duverger’s work, several authors discuss this law and its main assumptions. There are two main points discussed by these authors that allowed to clarify the effect of electoral rules. First, proportionality has an effect on the number of parties, and this conditional on the heterogeneity of preferences in the district (Leys, 1959; Wildavsky, 1959; Clark and Golder, 2006). Second, Duverger’s law is at work at the district level and can only be generalized if the parties are centralized at the national level (Leys, 1959; Chhibber and Kollman, 1998).

In addition, scholars generalized Duverger’s law from a dichotomous dependent variable (SMDP vs. PR) to a continuous dependent variable “proportionality of electoral systems” (Leys, 1959; Sartori, 1968), leading to the so called “ $m + 1$  rule” (Cox, 1997). This rule states that there is always an upper bound for the number of parties. More specifically, if the number of seats equals  $m$  in a given district, there will be  $m + 1$  viable competitors, or less, depending on the heterogeneity of preferences. Two processes underlie the relation between the electoral rule and the number of parties: the so called mechanical effect of the electoral rule, and the psychological effect. The psychological effect can exist for voters (strategic voting) and candidates (decision of entry).

As stated above, it is important to determine if the psychological effect is generated



exclusively by candidates or not. Several studies test Duverger's statements. However, as explained by Cox (1997), analyses testing the effect of the electoral rule using aggregate data do not attest the existence of strategic voting *per se*. Indeed, the work testing the effect of the electoral rule on the number of legislative parties (Clark and Golder, 2006; Brambor, Clark and Golder, 2007) generally does not allow to distinguish between the mechanical and the psychological effects. Moreover, the work testing the effect of the electoral rule on the effective number of electoral parties given ethnic heterogeneity (Clark and Golder, 2006) shows that there is some psychological effect, but does not allow to distinguish between the two types of psychological effects. All strategic behavior can come from candidates, and as argued by Cox (1997), the elite-level hypotheses are even more realistic given the infinitesimal chance that one vote will change the outcome (p.89).

There are two types of analyses that bring some evidence of strategic voting. First, analyses of survey data find that there are several individual level variables affecting the decision of voting strategically (Galbraith and Rae, 1989; Johnston and Pattie, 1991; Lanoue and Bowler, 1992; Niemi, Written and Franklin, 1992; Blais, 2002). These factors comprise the level of education, political knowledge, partisan attachment, media exposure, and the certitude that the favorite party will win at the national level. However, voters can vote strategically because they follow advice given by parties, groups (see Lanoue and Bowler (1992)), or candidates. Indeed, individual level factors that affect strategic voting are all associated with the amount and type of information each voter accesses.

Second, studies comparing aggregate data of vote choice under two different electoral rules in one system allow to test the presence of strategic voting (Helland and Saglie, 2003; Blais et al., 2011; Blais et al., 2012). However, in these cases too, strategic voting can be generated by the elite (an example is the voting advice given by candidates between the first and second rounds in France). One exception is a study

by Blais et al. (2012) that uses a survey where respondents in Ontario give their “real” vote choice (under the current electoral rule, first past the post (FPTP)), and their vote choice under two hypothetical electoral rules (PR, and alternative vote (AV)). However, in reality, the party system and candidates behavior would vary under different electoral rules. Thus, although this paper brings valuable empirical evidence of the existence of the wasted vote logic, testing the effect of risk attitudes on strategic voting will provide evidence free of the drawbacks inherent to these types of experiments.

Below, I define risk aversion and present two contradicting hypotheses based on different assumptions. For the first hypothesis, the *efficaciousness hypothesis*, if voters mainly care about voting for a winner, risk-averse voters are more likely to vote strategically. For the second, the *expression hypothesis*, I assume that voters mainly see elections as a mean to express preferences, so voting strategically is more risky. It is important to note that these hypotheses only concern voters whose preferred party is not among the top two in the constituency, as only these voters are likely to worry about wasting their vote.

### **3.2.2 The Efficaciousness and Expression Hypotheses**

I define risk attitudes as follows. Let us imagine that an individual has the choice between a gamble, and the expected value of this gamble. A risk-averse individual will opt for the sure outcome, while a risk-acceptant individual will be more inclined to opt for the gamble. A risk-neutral individual will be indifferent between the two. Given this definition, I will discuss if strategic voting is preferred by risk-averse or risk-acceptant voters.

In the literature, the underlying reason for strategic voting is that some voters want to avoid wasting their vote. They give their vote to a less preferred party to increase the chances that their vote counts. I argue that voters know that they have

an infinitesimal chance of affecting the election outcome, so they don't expect their vote to matter. However, voters might still want to vote strategically because they prefer to vote for a winner, otherwise they might have the feeling to have wasted their vote. So, once voters have decided their party preferences, they care about two things: the utility of expressing a preference, and the utility of efficaciousness (the satisfaction of having voted for a winner, or in other words the utility of not having wasted its vote).

The utility of expression is high if the voter opted for its preferred party and low otherwise. For any choice, this gain is sure and immediate. To the contrary, the utility of efficaciousness is uncertain and depends on the election results. The utility of efficaciousness is null if the voter did not opt for an elected party, and positive otherwise. The utility of efficaciousness is more certain for a party with high probability of success. As voting strategically implies voting for a less preferred party with higher probability of success, the utility of efficaciousness is less uncertain if the vote is strategic.

Thus, depending on the importance of the utility of expression *versus* the utility of efficaciousness, risk-averse voters are either more inclined to vote strategically (*efficaciousness hypothesis*) or less inclined to vote strategically (*expression hypothesis*). I will test the following hypotheses in the next section:

*efficaciousness hypothesis*: The more risk averse a voter (whose preferred party is not among the top two) is, the more likely he is to vote strategically.

*expression hypothesis*: The more risk averse a voter (whose preferred party is not among the top two) is, the less likely he is to vote strategically.

### 3.3 Risk Aversion and Strategic Voting in the UK, Canada, and Germany

I selected these three countries for two reasons. First, although measures of risk attitudes are still rare, for each of these countries, I found an election survey including a question on risk attitudes around the same time in each (the surveys are the British Election Study (BES) of 2010<sup>1</sup>, the Canadian Election Study (CES) of 2011,<sup>2</sup> and the 2009 short-term campaign panel of the German Longitudinal Election Study (GLES)).<sup>3</sup> Second, in each of these countries, earlier studies on strategic voting exist. All three countries are multiparty systems. In all three cases, I focus on plurality votes, where strategic voting incentives via wasted-vote concerns should be greatest: the election of the House of Commons in the UK in 2010, the election of the House of Commons of Canada in 2011, and the election of the Bundestag in Germany in 2009. The German case differs from the others because it is a mixed-member proportional (MMP) representation system, but I analyse the first vote only, an SMDP vote. For each of these three analyses, the design is as follows. For each respondent, I define if his vote was strategic or not (see the description below). Then, I regress the dichotomous measure of strategic voting on the measure of risk aversion and other control variables. I describe the variables below.

The main independent variable, *risk averse*, is based on a question that asks the respondent how inclined they are to take risks (see Appendix A). I argue that this measure is consistent with my definition. Indeed, individuals generally associate risk-taking with activities that may lead to a very negative outcome. For example, driving fast may bring to the driver an additional small gain every day, but is also more likely

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<sup>1</sup><http://bes2009-10.org>

<sup>2</sup>Fournier, Patrick, Fred Cutler, Stuart Soroka and Dietlind Stolle. 2011. The 2011 Canadian Election Study [*CES2011\_F1.dta*]

<sup>3</sup>Rattinger, Hans; Rossteutscher, Sigrid; Schmitt-Beck, Rüdiger; Wessels, Bernhard; Wolf, Christof (2014): Repeatedly questioned respondents of the Short-term Campaign Panel 2009 and 2013 (GLES). GESIS Data Archive, Cologne. ZA5757 Data file Version 1.0.0, doi:10.4232/1.12029

to lead to an accident. Thus, in the long run, the total utility of a fast driver is less predictable than someone who drives safely. Consequently, I assume that the self-reported measures of risk attitudes do measure my concept of risk aversion. Most of the correlations between the measures of risk aversion and the main covariates of risk aversion are consistent with the literature (see Appendix B).

The dependent variable is a dichotomous variable, equal to 1 if the respondent voted strategically, and 0 otherwise. As explained by Blais and Nadeau (1996), there are different ways of defining strategic voting for respondents. One is to ask the respondent directly if he voted strategically (“self measure”) (Heath, Jewell, Curtice, Evans, Field and Witherspoon, 1991; Lanoue and Bowler, 1992; Niemi, Written and Franklin, 1992; Evans and Heath, 1993). Another way is to deduce it from respondent’s party preferences and measures of predicted probabilities of parties’ success at the constituency level: if the respondent did not vote for its preferred party<sup>4</sup> and the party he voted for has higher chances of being elected, several authors deduce that the respondent voted strategically (“deduced measure”) (Abramson, Aldrich, Paolino and Rohde, 1992).<sup>5</sup> In the analyses below, I use a self measure as well as a deduced measure in the UK analysis (because the data allow for this), and only deduced measures in the analyses of Canada and Germany.

For the deduced measure of strategic voting, I need an estimation of predicted

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<sup>4</sup>Most of the measures of party preferences are based on barometer questions. Deducing strategic vote from these implicitly assumes that in a system where there is an absence of (or weak) wasted vote logic, voters would vote for their preferred party. This contradicts the directional voting hypotheses (Iversen, 1994; Kedar, 2005). However, one of my measure of party preference is based on party choice under a hypothetical AV rule (in the UK) and one is based on party choice under PR rule (second vote in Germany). In these two cases, the preferred party is assumed to be the first choice under a PR or AV rule, which does not contradict the directional hypothesis. In any case, the various measures lead to similar results.

<sup>5</sup>Blais and Nadeau (1996) use a third technique based on a two step procedure. They first regress individual vote choice on party, leader, as well as local candidates preferences. They then deduce sincere party preferences from the coefficients. Given these preferences, they define the sample of respondents who have an incentive to vote strategically and see which ones did indeed vote strategically. I decide not to use this technique because the coefficients are estimated based on a sample that includes strategic and sincere voters and thus should not be used to predict sincere preferences.

probabilities of election results at the constituency level. In the BES, only estimated predicted probabilities only exist for the five biggest parties, while other data concern the eight biggest parties in the UK. In the CES and GLES, no question on the prediction of election results at the district level are included. Consequently, although it is not optimal, I follow Black (1978) and Cain (1978) and make the assumption that predicted probabilities can be approximated by vote results.

Other control variables are mainly based on Lanoue and Bowler (1992), and Niemi, Written and Franklin (1992). I include *education* because voters with a higher level of education should be more likely to vote strategically. I also include a variable named *political knowledge*. People with higher political knowledge are more likely to be aware of the wasted vote logic and vote strategically. Another control variable is *supporter*, a dichotomous variable indicating if the respondent sees himself as a strong partisan or not. Supporters are more likely to vote for their preferred party. Because several authors also find that when voters predict that their preferred party will win at the national level they are less likely to vote strategically, I include a variable *predict.is.pref*, equal to 1 if the respondent thinks that his party will win at the national level and 0 otherwise. The closeness of the race between the top two parties also affects strategic voting. If the race is close, individuals are more likely to vote strategically because their vote has a greater chance of mattering. Thus, I include a variable measuring the difference of vote share between the top two candidates at the district level, *diff.pcv.top2*. Finally, if the preferred party is likely to be close to the second party in the district race, the respondent is less likely to vote strategically. I thus add the variable *diff.pcv.pref.2nd*, measuring the difference of vote share between the preferred party and the second party. For each country, survey questions used to define the variables are given in Appendix A.

Because my hypotheses only concern respondents who have a risk of wasting their vote, I remove from the analysis voters whose preferred party is among the top two at

the constituency level.<sup>6</sup> I also remove respondents who said that they did not vote.

### 3.3.1 The UK

The UK is a multiparty parliamentary system with SMDP rule. The Liberal, Labour, and Conservative parties are the three main parties, and the Plaid Cymru is fairly strong in Ireland. Several studies show evidence of the effect of individual level variables on strategic voting in the UK (Cain, 1978; Heath et al., 1991; Lanoue and Bowler, 1992; Niemi, Written and Franklin, 1992). The present analysis uses the British Election Study of 2010. Because the data allow for the two types of measures, I define two measures of strategic voting: *sv.self*, based on self affirmation of strategic vote and *sv.deduced*, based on a deduction from party preferences and vote choice.

My first measure, *sv.self*, is based on the following questions:

- i. Which party did you vote for in the general election?

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<sup>6</sup>One potential problem with this sample selection is that there might be some misclassification due to the variable used to select the sample. The question here is: Will this exclusion bias the results? I use election results to define the top two parties, so there are two possible mistakes. First, if the respondent thought that his party was second in the polls while it ended up being third, he might have seen no incentive to vote strategically. Given my data, this respondent is still in the sample because his preferred party finished third. Second, a respondent might have thought that his party was third in the polls and voted strategically. If the party finished second in the elections, this respondent will not be in the sample because it is classified as an individual with no risk to waste its vote. These two problems come from the fact that I don't have a measure of perceived predicted probabilities of winning for each party by each individual.

Here I argue that concerning the first group of individuals, the fact that some voters may not vote strategically because it is uncertain which party is second and which one is third should be captured by the dependent variable "closeness between second and third parties" (the closer the race between these two, the less likely their partisans will vote strategically). However, concerning the second group, the problem is that they are not included in the sample. Although there is no reason to think that the effect of risk attitudes on strategic voting differs for these actors, there might be a correlation between risk attitudes and accuracy of individual predicted probabilities, which can in turn affect the relation between risk attitudes and strategic voting. In other words, risk-averse actors may be more (or less) likely to misperceive parties' strength and thus more (or less) likely to vote strategically. To verify that no such bias exists, I use the GLES survey (because this survey asks the prediction of vote shares of all parties at the national level) and test if risk aversion has an effect on election predictions. The analysis is presented in Appendix B. I find an effect of education and political knowledge on the accuracy of predictions, but there is no significant effect of risk attitudes on accuracy of predictions. Consequently, I assume that the non-inclusion of partisans of the second party who may have thought that their party will rank third, should not bias the results of the main analysis.

- ii. People give different reasons for why they vote for one party rather than another. Which of the following best describes your reasons? (1 - The party had the best policies, 2 - The party had the best leader, 3 - I really preferred another party but it stood no chance of winning in my constituency, 4 - I voted tactically, 5 - Other.)

If respondents answered option 3 or 4, the following question was then asked:

- iii. Which party did you really prefer?

I set *sv.self* to 1 if the respondent answered question ii above by 3 or 4 AND the party he really preferred, according to question iii above, obtained less votes than the party he voted for, and 0 otherwise. This measure gives a share of 3.6% of the respondents voted strategically.

My second measure is based on a comparison between vote choice and party preferences. Its coding is based on question i above and the following question:

- iv. In 2010 the House of Commons voted for a new style of ballot paper to be introduced soon if voters approve, which is shown below.  
Please tell me how you would fill in this Ballot Paper if you were voting in the general election held on May 6th, by ranking the parties in your order of preference. You may rank as many or as few choices as you wish.

I set *sv.deduced* to 0 except if respondent's answer to iv is not the same than his answer to i AND that his vote choice obtained a higher share of votes in the elections than obtained his AV choice, in which case I set the value to 1. According to this measure, 4.2% of the voters voted strategically.

Finally, the main independent variable, *risk averse*, is based on the question:

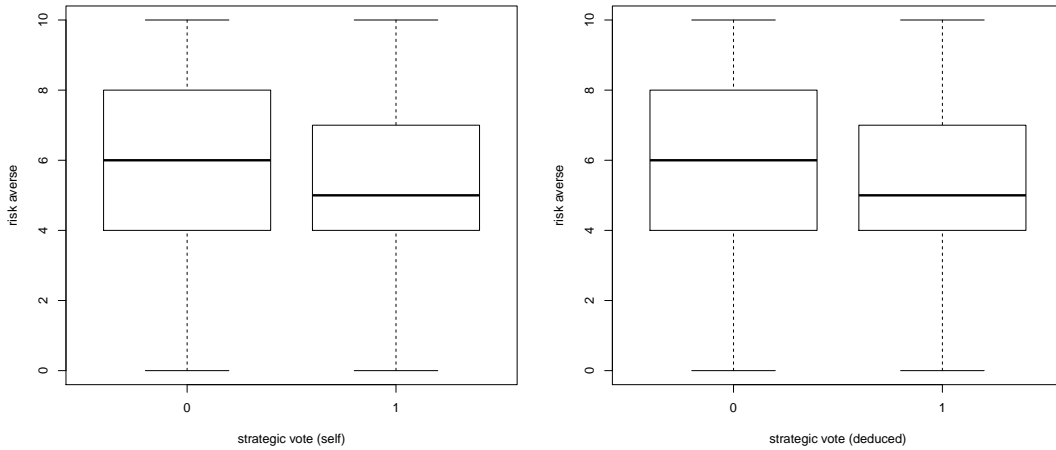
- v. In general do you dislike taking risks, or do you like taking risks? Please use the scale on this card where 0 means "really dislike taking risks" and 10 means "really like taking risks" to indicate how you generally feel about taking risks.

I changed the scale so that *risk averse* equals 10 if the respondent is very risk averse, and 0 if he is very risk acceptant. According to the self measure of strategic voting, 3.6% of the respondents who voted strategically, while according to the deduced measure, 4.2% of



the respondents voted strategically. In Figure 3.1, the boxplots show the distribution of the variable *risk averse* for sincere and strategic voters, according to the two different measures respectively:

Figure 3.1: Risk and Strategic Vote in the UK



The boxplots show that strategic voters tend to be slightly less risk averse than sincere voters, for the two measures. Now to test the effect of risk aversion on strategic voting, I run a binomial logit regression. As I explained above, I only run the analysis for respondents whose preferred party is not among the top two in their respective district, and who said they voted.<sup>7</sup> All control variables for the UK are described in Appendix A. Table 3.1 displays the results of the analysis. The regression with the self measure of strategic voting appears in Model 1, and the regression with the deduced measure of strategic voting appears in Model 2.

<sup>7</sup>I also removed “Blaenau Gwent” because this constituency has a local party that obtained approximately 20 percent of the votes, a party not comprised among the main options in the survey.

Table 3.1: Risk Aversion and Strategic Voting in the UK

	<i>Model 1</i> (DV = sv.self)	<i>Model 2</i> (DV = sv.deduced)
constant	-3.61** (1.20)	-2.92** (0.94)
risk averse	-0.16* (0.07)	-0.11* (0.05)
education	-0.01 (0.22)	0.21 (0.17)
supporter	0.21 (0.32)	-0.52* (0.26)
political knowledge	0.68 (1.10)	0.47 (0.87)
predict.is.pref	-1.30 (1.04)	-0.37 (0.57)
diff.pcv.top2	2.28 (1.53)	2.73* (1.18)
diff.pcv.pref.2nd	7.71*** (2.01)	8.21*** (1.63)
<i>N</i>	429	429
log <i>L</i>	-112.44	-169.71

Standard errors in parentheses

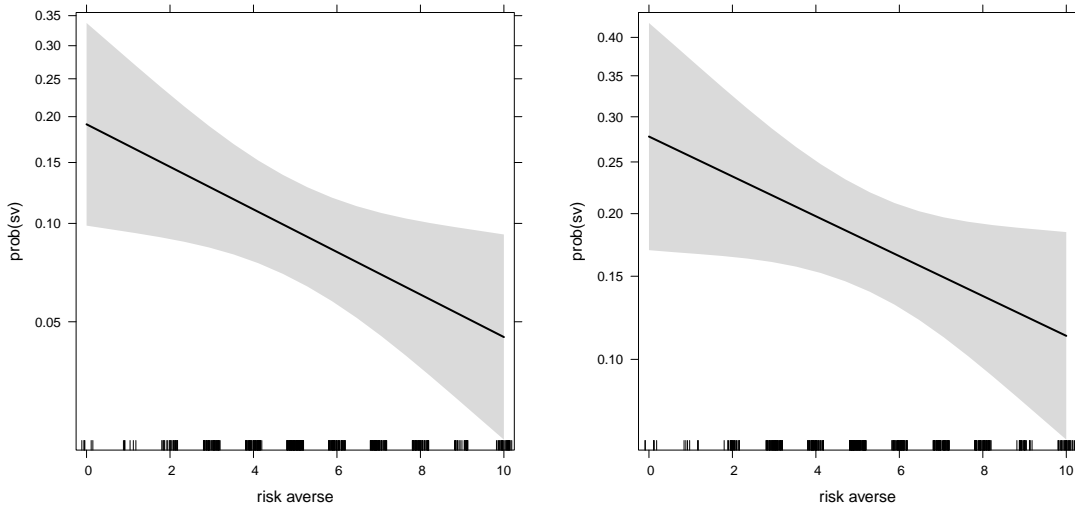
· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ 

The results support the *expression hypothesis*, and this for the two measures of the dependent variable. Risk-averse voters are less likely to vote strategically because they favor the sure gain of expressing their preference over the potential gain of not having wasted their vote. Concerning the control variables, it is surprising that education and political knowledge have no significant effect on strategic voting. To be a supporter has a negative and significant effect on the likelihood of voting strategically, as expected. However, I find no such effect in the first column. Also, the fact that voters expect their preferred party to win at the national level (*predict.is.pref*) has no significant effect on strategic voting. Concerning the relative strength of the top two parties at the constituency level, *diff.pcv.top2*, it does not have the expected sign: I find here that the higher the difference between the top two, the more likely a voter will vote strategically, but the effect is only significant in Model 2. Finally, the variable *diff.pcv.pref.2nd* has the expected sign, as the

higher the difference between the preferred party and the second party in terms of vote share, the more likely is strategic behavior.

Figure 3.2 displays graphically the effect of risk aversion on the probability of a strategic vote, estimated in Model 1 and Model 2 respectively. Both graphs show that the effect is negative and significant.

Figure 3.2: Confidence Intervals of the Effect of Risk on Strategic Voting - UK



To summarize, I find significant support for the *expression hypothesis*, and the difference of vote percentages between the preferred party and the second party (in absolute value) has a positive and significant effect on strategic voting. The next section presents a similar analysis for Canada.

### 3.3.2 Canada

There are three main parties in Canada: the Liberal party, the Conservative party, and the New Democratic party (NDP). The “bloc Québécois” is devoted to the protection of the interests of the province of Québec and is thus a regionally based party. Finally, the Green party has a small representation in the lower house. Because Québec is a special case given the presence of the Bloc, several authors run their analyses on other regions only, or add a control variable for the region (see for example Blais et al. (2001)). I decide not to treat the Québec case differently, as I control for the chances that the preferred party is the

main winner at the national level, and also for partisan strength. I use data from the 2011 Canadian Election Study (CES 2011) as well as the Constituency-Level Electoral Archive (CLEA) database for the vote percentages of each party in each constituency.<sup>8</sup>

In the CES 2011 survey, there is no question asking directly the respondent if he voted strategically.<sup>9</sup> However, I deduced two different measures of strategic voting. The first is very similar to the variable used in the UK analysis. It equals 1 if the respondent did not vote for his preferred party (based on feelings about parties) AND the preferred party obtained a lower percentage of votes than the party he voted for, and 0 otherwise. The measure is based on the following questions:

- i. Which party did you vote for?
- ii. How do you feel about the [Federal Conservative/ Federal Liberal/ Federal NDP/ Bloc/ Federal Green] party?

This measure gives a share of 15.4% of respondents who voted strategically. The survey also asks what would have been the second choice for the vote:

- iii. Which party was your second choice?

Thus, I construct a second measure for the variable *sv.deduced*, equals to 1 if the second choice of the respondent was his preferred party (still according to question *ii*) AND the second choice obtained less votes than the vote choice. This measure gives a share of 12.8% of respondents who voted strategically. Now concerning the measure of risk aversion, it is dichotomous and based on the question:

- iv. In general, do you like taking risks or do you try to avoid taking risks?

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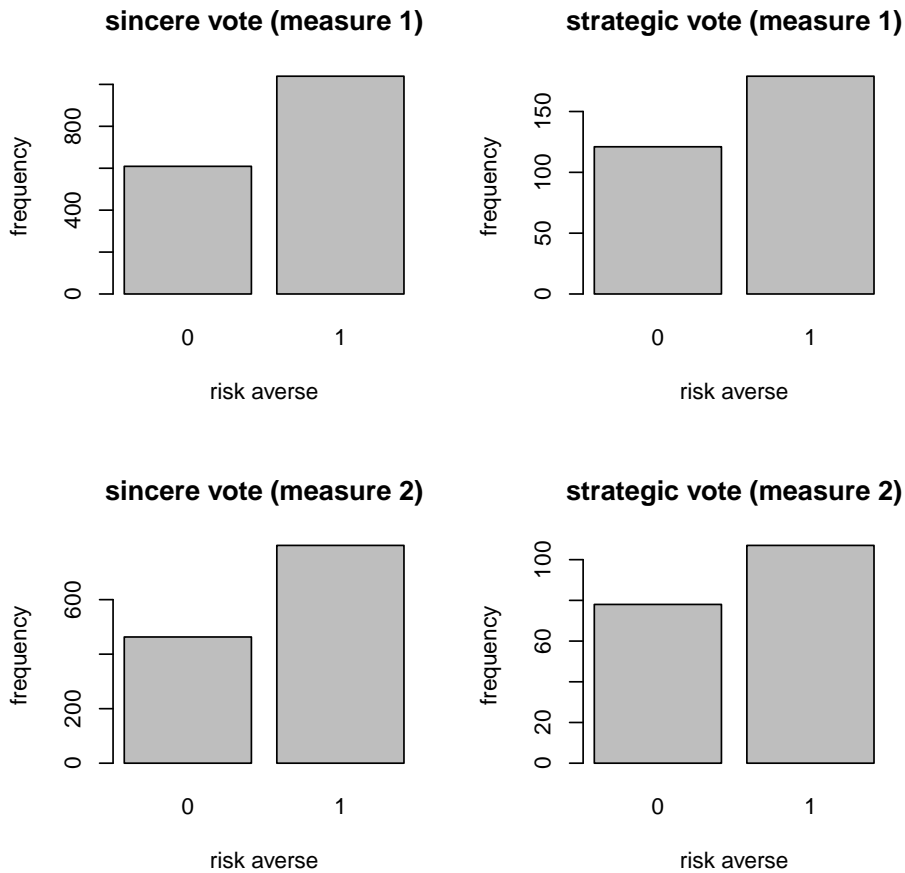
<sup>8</sup>Brancati, Dawn. Constituency-Level Elections (CLE) Dataset, 2007 rev. 2011 [clea\_20140812\_stata.dta]. New York: Constituency-Level Elections Dataset [[http : //www.electiondataarchive.org/](http://www.electiondataarchive.org/)], Date Accessed 07/22/2013. Website: <http://www.cle.wustl.edu>

<sup>9</sup>One question was close: “Which of the following was most important in your decision of voting for this party: you liked the leader, you liked your local candidate, you liked their policies, you didn’t like the other parties, or was it because the party was doing well in polls?” However, no respondent answered “because the party was doing well in polls” AND had a preferred party with lower vote percentage than his vote choice. Thus, the category of respondent who voted strategically was empty according to this coding.

The respondent can either respond by “I like taking risks” or “I try to avoid taking risks”. The variable equals 1 if the respondents is risk averse and 0 if he is risk acceptant. More details are given concerning the control variables in Appendix A.

The distribution of risk acceptance is displayed for each type of vote, strategic or sincere, according to each type of measure respectively, in Figure 3.3:

Figure 3.3: Risk and Strategic Vote in Canada



According to the first measure of strategic voting, 14.7% of risk-averse respondents voted strategically, and 16.6% of risk acceptant respondents voted strategically. According to the second measure, 5.1% of risk-averse respondents voted strategically, and 6.7% of risk-acceptant respondents voted strategically. To test my hypotheses, I run a binomial logit regression for each measure of strategic voting. Here again, I only run the analysis on respondents whose preferred party is not among the top two in their respective district,

and who said they voted. The results are displayed in Table 3.2:

Table 3.2: Risk Aversion and Strategic Voting in Canada

	<i>Model 1</i> (DV = sv.deduced 1 <sup>st</sup> measure)	<i>Model 2</i> (DV = sv.deduced 2 <sup>nd</sup> measure)
constant	-1.21** (0.46)	-1.06 (0.54)
risk averse	-0.40 (0.22)	-0.52* (0.25)
education	-0.04 (0.05)	-0.04 (0.06)
supporter	-1.24*** (0.29)	-0.93** (0.34)
political knowledge	-0.11 (0.28)	0.03 (0.33)
predict.is.pref	-0.28 (0.49)	-0.05 (0.58)
diff.pcv.top2	1.99** (0.69)	0.34 (0.82)
diff.pcv.pref.2nd	9.72*** (1.31)	5.11*** (1.36)
<i>N</i>	556	595
log <i>L</i>	-254.33	-208.42

Standard errors in parentheses

significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

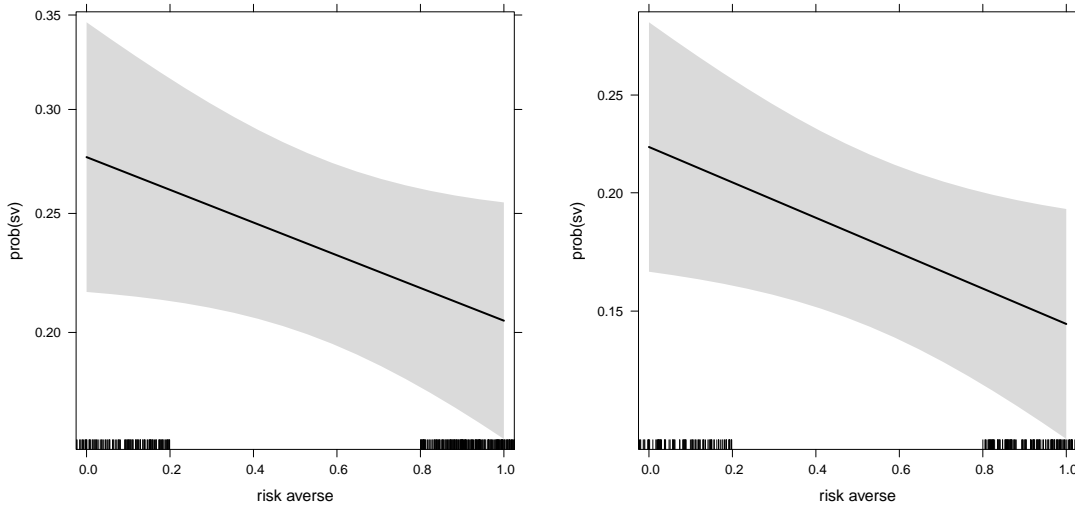
These results also show support for the *expression hypothesis*, risk aversion having a negative effect on strategic voting.<sup>10</sup> Here too, education and political knowledge have no impact. The fact that the voter is a supporter or not, however, has a negative and significant impact on the decision to vote strategically. Concerning the variables measuring the prediction of the results, the difference of vote share between the top two parties (*diff.pcv.top2*) has a positive effect on the dependent variable, but only in the first model. The difference of vote share between the preferred party and the second party (*diff.pcv.pref.2nd*) has a

<sup>10</sup>I also ran the same regressions using another question for party attachment: “have you ever volunteered for a political party or a candidate”, as the question used for the variable *supporter* (see Appendix A) probably includes a large pool of individuals, and I obtained similar levels of significance for the coefficient of risk attitudes.

positive and significant effect. This is consistent with Lanoue and Bowler (1992) who find that *diff.pcv.pref.2nd* explains strategic voting better than *diff.pcv.top2*.

Figure 3.4 displays graphically the effect of risk aversion on the probability of a strategic vote, according to Model 1 and Model 2 respectively. Both graphs show that the effect is negative and significant.

Figure 3.4: Confidence Intervals of the Effect of Risk on Strategic Voting - Canada



To summarize, risk averse individuals and partisan supporters are each less likely to vote strategically. Further, the difference in perceived success between the second party and the preferred party has a positive effect on strategic voting. The next section presents the results for the German case.

### 3.3.3 Germany

Germany is a multiparty system, with two main parties, the CDU/CSU and the SPD, and several smaller parties (essentially the Greens, the FDP, the Left and the SPD). Germany has a mixed member proportional representation system for the Bundestag (the lower house). In the first vote, voters elect a local candidate under plurality rule. In the second vote, voters opt for a party list and the results of this vote will determine the proportionality of each party in each region.

As Gschwend (2007) explains, there are different types of strategic voting in this system, and they might not all favor major parties. Indeed, supporters of small parties might follow the wasted vote logic and opt for a larger party in the first vote (the candidate vote), and supporters of large parties might try to help the coalition partner of their preferred party and vote for a smaller party in the second vote (the list vote). Given that my hypotheses concern the first type of strategic voting, I decide here to test if risk-averse respondents are more likely to vote strategically in the candidate vote.

For this analysis, I use the 2009 short-term campaign panel of the German Longitudinal Election Study, and the CLEA dataset for vote percentages. In this German survey, there is no question on the reasons for vote choice. Thus, I have no self measure of strategic voting. My two measures are deduced from party preferences, and vote choice in the first and second vote. My first measure is very similar to the first measures described in the two cases above. I set strategic voting to 1 if the respondent's preferred party obtained less votes than the respondent's vote choice, and 0 otherwise. The measure is based on the following questions:

- i. You had two votes in the federal election. The first vote was for a candidate from your constituency and the second for a party. Where did you place your crosses on the ballot?  
(A) First vote  
(B) Second vote
- ii. How do you feel about the political parties in general? Please use a scale ranging from -5 to +5. (question asked for each party)

For the second measure, I assume that the second vote generates less strategic voting than the first (at least the type of strategic voting where voters opt for a larger party), because it is proportional representation. I thus set the measure of strategic voting to 1 if the party chosen by the respondent in the first vote is stronger than the party chosen by the respondent in the second vote. The strength of both parties are compared using the results of the first vote, as it is for the first vote that we need to know if there was strategic behavior. If the party chosen for the second vote had a smaller vote share than the party



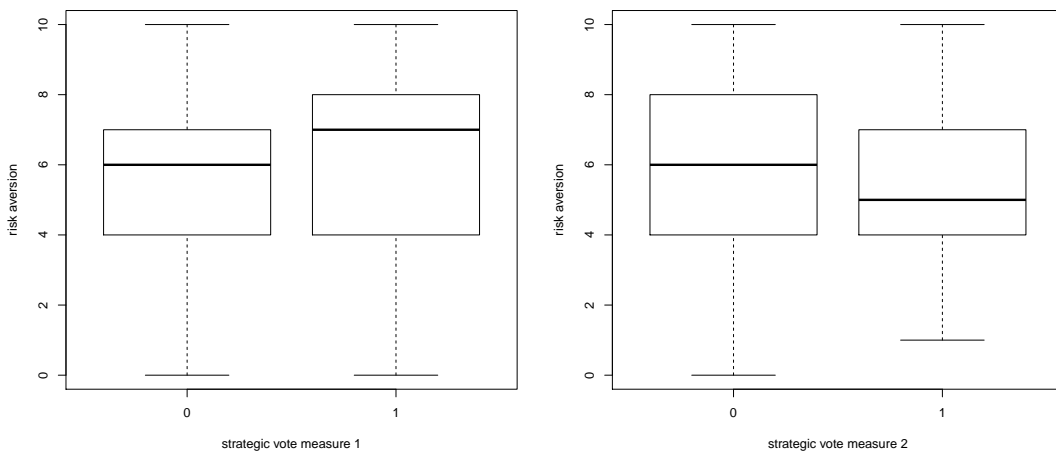
chosen for the first vote, I set the variable to 1. Otherwise, the variable equals 0.<sup>11</sup>

Finally, the main dependent variable is given by the following question:

- iii. How would you assess yourself: Are you a person prepared to take risks or do you seek to avoid risks? (scale goes from 1 = “Seek to avoid risks” to 11 = “Prepared to take risks”).

I rescaled the answer such that the variable equals 10 for very risk-averse individuals, and 0 for very risk-acceptant ones. The distribution of risk attitudes for sincere as well as strategic voters is given in Figure 3.5:

Figure 3.5: Risk and Strategic Vote in Germany



The boxplots here do not show any clear pattern between risk attitudes and strategic voting. To test my hypotheses, I run a logistic regression, whose results are displayed in Table 3.3. I only run the analysis for respondents whose preferred party is not among the top two in their respective district, who said they voted, and who understand the difference between the first and the second vote.<sup>12</sup> Model 1 and Model 2 are the regressions with the first and second deduced measures of strategic voting, respectively.

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<sup>11</sup>This measure does not include the second type of strategic voting described by Gschwend (2007), as it concerns voters who opted for smaller parties in the second vote than in the first vote.

<sup>12</sup>This measure is based on question 3 of the item “political knowledge” given in Appendix A.

Table 3.3: Risk Aversion and Strategic Voting in Germany

	<i>Model 1</i> (DV = sv.deduced 1 <sup>st</sup> measure)	<i>Model 2</i> (DV = sv.deduced 2 <sup>nd</sup> measure)
constant	-3.09 (1.70)	-5.34* (2.09)
risk averse	-0.02 (0.09)	-0.18 (0.10)
education	0.27 (0.54)	0.69 (0.61)
supporter	-0.92 (0.85)	-0.03 (0.88)
political knowledge	1.03 (1.45)	3.36 (1.84)
diff.pcv.top2	4.35 (2.58)	7.44* (2.99)
diff.pcv.pref.2nd	7.65* (3.50)	5.74 (4.04)
<i>N</i>	131	131
log <i>L</i>	-64.51	-51.68

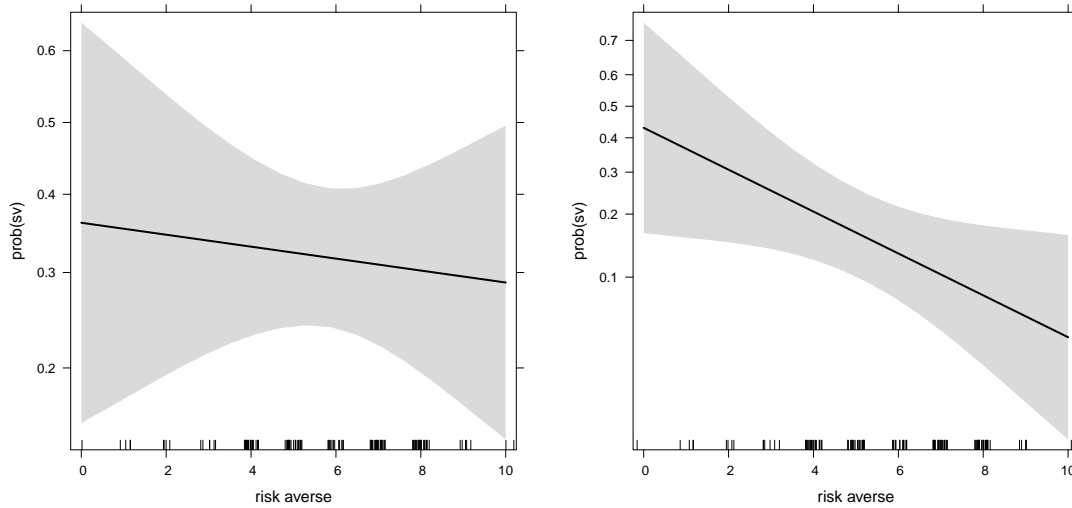
Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ 

Here I find support for the *expression hypothesis* only in the second model, and at the 10% significance level. The only other significant effects in these two models concern the variables measuring relative party strength at the constituency level. The higher the difference between the top two, the more likely the voter will opt for a strategic behavior. Moreover, the higher the difference between the voter's preferred party and the second party, the more likely he is to vote strategically.

Figure 3.6 displays graphically the effect of risk aversion on the probability of a strategic vote, as estimated by Model 1 and Model 2 respectively. Both graphs show that the effect is negative, but only significant in the second model.

Figure 3.6: Confidence Intervals of the Effect of Risk on Strategic Voting - Germany



To summarize, the effect of risk aversion decreases strategic voting, but the effect is only significant in Model 2, and at the 10% level only. Contrarily to what could be expected, the difference of votes between the first and second party in a district increases strategic voting here. Finally, as expected the difference between the preferred party and the second party increases the likelihood of voting strategically, although only significantly in Model 1.

### 3.4 Conclusion

The aim of this paper is to test if risk aversion has an effect on the likelihood of voting strategically, in order to bring additional evidence that there is strategic behavior led by the wasted vote logic. I argue that there are two components in the calculus of voting: the utility of expression, and the utility of efficaciousness. I explain that if the utility of expressing a preference when voting is important relative to the utility of having voted for a winner, then strategic voting is more risky than sincere voting (*expression hypothesis*). I analyse survey data from the UK, Germany and Canada, and find that risk-averse voters are less likely to vote strategically than risk-acceptant ones. This results support the *expression hypothesis*.

One consequence of this result is that it confirms that voters behave strategically, driven

by the wasted vote logic, and do not only follow advice from candidates. This means that systems favoring strategic voting are not necessarily more advantageous for candidates with easy access to media. However, risk aversion is positively correlated with right ideology. Thus, strategic voting may be more important on the left, suggesting that representation is more proportional on the right than on the left. This would be an interesting point to investigate for future research.

Finally, although voting strategically may be seen as less risky because it decreases the likelihood of wasting its vote, the results here suggest that this is not the case because expressing a preference is an important part of the utility of a vote choice.

## 3.5 Appendix A: Survey Data

### 3.5.1 Survey Data UK

This section gives a list of the measures and corresponding survey questions that I used in the UK analysis, and the number of missing values (NAs) for each measure. There are 3512 respondents in this survey.

#### **Risk Acceptance:**

In general do you dislike taking risks, or do you like taking risks? Please use the scale on this card where 0 means “really dislike taking risks” and 10 means “really like taking risks” to indicate how you generally feel about taking risks. (454 NAs)

#### **Vote Choice:**

Which party did you vote for in the general election? (1243 NAs)

#### **Reasons for Vote Choice:**

People give different reasons for why they vote for one party rather than another. Which of the following best describes your reasons?

- 1 The party had the best policies,
- 2 The party had the best leader,
- 3 I really preferred another party but it stood no chance of winning in my constituency,
- 4 I voted tactically,
- 5 Other.

If 3 or 4, which party did you really prefer? (1232 NAs)

#### **AV votes:**

In 2010 the House of Commons voted for a new style of ballot paper to be introduced soon if voters approve, which is shown below. Please tell me how you would fill in this Ballot Paper if you were voting in the general election held on May 6th, by ranking the parties in your order of preference. You may rank as many or as few choices as you wish. (773 NAs)

#### **Education:**

Do you have any educational or work-related qualifications? (Yes/No)

IF yes AT [previous question]: What is the highest qualification you have? (941 NAs)

#### **Supporter:**

Some people think of themselves as usually being a supporter of one political party rather

than another. Do you usually think of yourself as being a supporter of one particular party or not? (Yes/No)

IF yes: Which party is that? (473 NAs)

**Political Knowledge:**

Please tell me if you think that the following statements are true or false.

- Polling stations close at 10.00pm on election day.
- The Liberal Democrats favour a system of proportional representation for Westminster elections.
- The minimum voting age is 16.
- The standard rate of income tax payable is 26p in the pound.
- The Chancellor of the Exchequer is responsible for setting interest rates in the UK.
- Labour promises withdrawing all British troops from Afghanistan by the end of 2010.
- The Conservative Party favours reducing the budget deficit without cutting funding for the National Health Service.
- Any registered voter can obtain a postal vote if they want one by contacting their local council and asking for a postal vote.

For each question, I define an item equal to 1 if the answer was right and 0 otherwise (I follow Rapeli (2013) to define correct and wrong answers). Then, my measure of political knowledge is simply the mean of these eight items. I allow for six missing values among the eight. (473 NAs)

**predict.is.pref:**

On the 0 to 10 scale, where 0 means very unlikely and 10 means very likely: How likely is it that the [Labour/Conservative Party/Liberal Democrats] will win the general election? (547 NAs)

**Turnout:**

Talking with people about the general election on May 6th, we have found that a lot of people didn't manage to vote. How about you, did you manage to vote in the general election? (442 NAs, 2392 yes, 678 no)

**diff.pcv.top2 and diff.pcv.pref.2nd:**

I used election results at the district level included in the survey to estimate these two variables (0 NAs for diff.pcv.top2 and 825 NAs for diff.pcv.pref.2nd).

### 3.5.2 Survey Data Canada

This section gives a list of the measures and corresponding survey questions that I used in the Canadian analysis, and the number of missing values for each measure. There are 4308 respondents in this survey.

#### **Risk Acceptance:**

In general, do you like taking risks or do you try to avoid taking risks?

#### **Vote Choice:**

Which party did you vote for? (1028 NAs)

#### **Second Choice:**

Which party was your second choice?(1586 NAs)

#### **Feeling about Political Parties** (used to define the preferred party):

How do you feel about the [federal Conservative party / federal Liberal party / federal NDP / Bloc Québécois / federal Green party]?

Use any number from zero to one hundred. Zero means you REALLY DISLIKE the party and one hundred means you REALLY LIKE the party. (NAs are respectively 232, 239, 302, 3127, and 813.)

#### **Education:**

What is the highest level of education that you have completed? (24 NAs)

#### **Supporter (Partisan Strength):**

- In federal politics, do you usually think of yourself as a Liberal, Conservative, NDP, Bloc Québécois, Green Party, or none of these?
- In federal politics, do you usually identify with the Liberals, Conservatives, NDP, Bloc Québécois, Green Party, or none of these?
- How strongly [party given above] do you feel: very strongly, fairly strongly, or not very strongly?

The measure equals 1 if the respondent answered “very strongly” and 0 otherwise (1768 NAs).

#### **Political Knowledge:**

- We would like to see how widely known some political figures are. Do you happen to recall the name of the federal Minister of Finance?

- And the name of the Governor-General of Canada who just finished her term last December?

I derive two items from these questions. I set them equal to 1 if the answer was correct and 0 otherwise. The measure of political knowledge is then simply the mean of the two items (0 NAs).

**predict.is.pref**

Which party is ahead in the national polls right now? If you are not sure, just let me know. (1091 NAs)

**Turnout:**

Did you vote in the election? (0 NAs, 2019 voted and 1289 did not)

**diff.pcv.top2** and **diff.pcv.pref.2nd:**

I used election results at the district level from CLEA to estimate these two variables (NAs are respectively 168 and 1155).



### 3.5.3 Survey Data Germany

This section gives a list of the measures and corresponding survey questions that I used in the German analysis, and the number of missing values for each measure. There are 1025 respondents in this survey.

#### **Risk Acceptance:**

How would you assess yourself: Are you a person prepared to take risks or do you seek to avoid risks? Coding:(1) Seek to avoid risks - (11) Prepared to take risks. (177 NAs)

#### **Vote Choice:**

You had two votes in the federal election. The first vote was for a candidate from your constituency and the second for a party. Where did you place your crosses on the ballot?

(A) First vote

(B) Second vote (305 NAs)

#### **Feeling:**

How do you feel about the political parties in general? Please use a scale ranging from -5 to +5 [CDU / CSU / SPD / FDP / The Greens / The Left]. (respectively 180, 183,181,181,183 and 185 NAs)

#### **Education:**

What general school leaving certificate do you have? (12 NAs)

#### **Supporter:**

As part of our study we would like to find out what people mean when they say that they are attached to a particular political party or identify more closely with one party rather than with others. Would you please tell me how accurately the following views reflect yours?

This party is very important to me. (strongly disagree / rather disagree / neither agree nor disagree / rather agree / strongly agree)

The variable equals 1 for respondents who answered “strongly agree” and 0 otherwise (339 NAs).

#### **Political Knowledge:**

- How many percent of the votes must a party gain to be definitely represented in the Bundestag?
- What does the term “secrecy of the ballot” mean? (The secrecy of the ballot does not exist. / You are not to talk about your vote. / You dont know which person you

voted for because you can only vote for a party. / Nobody can figure out who you voted for unless you tell it. / Dont know)

- You have two votes in the federal election, a first vote and a second vote. Which one is more important, thus determining how strongly the party is represented in the Bundestag? (The first vote / The second vote / Both votes are equally important / Dont know)
- Do you know how many federal states in total the Federal Republic of Germany consists of today if you add up the old and the new federal states?
- Who elects the Chancellor of the Federal Republic of Germany? (The Federal Council (Bundesrat) / The Federal Assembly (Bundesversammlung) / The Federal Parliament (Bundestag) / The people / Dont know)
- Do you happen to know who currently holds the majority in the Federal Council (Bundesrat)? (The states (Bundeslaender) led by SPD / The states (Bundeslnder) led by CDU/CSU / None of the parties holds the majority in the Federal Council. / Dont know)

For each question, I define an item equal to 1 if the answer was right and 0 otherwise.

Then, my measure of political knowledge is simply the mean of these six items. I allow for four missing values among the six. (83 NAs)

**predict.is.pref:**

What percentage of the second votes do you think will the parties gain at the federal election on 27 September 2009 [CDU/CSU, SPD, FDP, The Greens, The Left, Other parties]? (0 NAs)

**Turnout:**

Many people did not make it to the polls at the federal election on September 27th or didnt vote due to other reasons. How about you? Did you vote or not? (Yes, I voted / No, I did not vote) (178 NAs, 58 no and 789 yes)

**diff.pcv.top2 and diff.pcv.pref.2nd:**

I used election results at the district level from CLEA to estimate these two variables.

## 3.6 Appendix B: Additional Analyses

### 3.6.1 Risk Aversion and its Main Covariates

This section presents the correlations between the risk measures and its main covariates. Consistent with the literature (Riley and Chow, 1992; Byrnes, Miller and Schafer, 1999; Kam and Simas, 2010), Tables 3.4 to 3.6 show a positive correlation between gender (female) and risk aversion, a positive correlation between age and risk aversion, a negative correlation between education and risk aversion, a negative correlation between income and risk aversion, and finally a positive correlation between right ideology and risk aversion. The correlations are significant for the UK and Canada, but less convincing for Germany, probably due to the smaller sample size (the respondents with a measure of risk are 3058, 3280, and 848 in the UK, Canada, and Germany respectively).

Table 3.4: Risk Aversion and its Main Covariates - UK

	risk
gender (female)	0.206***
age	0.268***
education	-0.148***
income	-0.194***
ideology (left-right)	0.077***

\*\*\*:  $p < .01$

Table 3.5: Risk Acceptance and its Main Covariates - Canada

	risk
gender (female)	0.080***
age	0.117***
education	-0.115***
income	-0.122***
ideology (left-right)	0.048

\*\*\*:  $p < .01$

Table 3.6: Risk Acceptance and its Main Covariates - Germany

	risk
gender (female)	0.220***
age	-0.070
education	-0.001
income	-0.085
ideology (left-right)	0.021

\*\*\*:  $p < .01$

### 3.6.2 Risk Attitudes and Accuracy of Predictions: A Robustness Test

Here I test if risk aversion has an effect on the accuracy of predictions of party vote share. The measure of accuracy is based on the following question from the GLES survey:

What percentage of the second votes do you think will the parties gain at the federal election on 27 September 2009?[CDU/CSU, SPD, FDP, The Greens, The Left, Other parties]

I run a regression where the dependent variable is the sum of the absolute differences between party prediction and party results, for each party except the category “others”. The dependent variable is thus a measure of *unaccuracy*. Regression results are displayed in Table 3.7:

Table 3.7: Risk Attitudes and Unaccuracy of Predictions

	Model 1
constant	39.52*** (2.58)
risk averse	0.28 (0.23)
education	-5.21*** (1.52)
political knowledge	-21.35*** (2.67)
$N$	821
$R^2$	0.11

Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

Results show that risk attitudes have no significant effect on the accuracy of electoral predictions, suggesting that the sample selection should not bias the main results.

## CHAPTER IV

# Risk Aversion: Implications for Legislative Voting

Most of the work on voting behavior assumes that individuals maximize their expected utility, formulated as the statistical expectation of the utility of all potential outcomes. However, the propensity to take risks varies across individuals risk aversion affects voters' behavior. This paper relaxes the assumption of homogeneity of risk attitudes and considers the effect of risk aversion for representatives. Using an original dataset that combines a survey measuring risk propensity of Swiss legislators and their legislative behavior (votes), I find that although risk propensity has an effect on legislative voting, this effect is mediated by ideology.

### 4.1 Introduction

In a large share of the work in political science, assumptions about how people behave are made based on utility theory. More specifically, most of the rational-choice studies assume that for every actor, the expected utility of an alternative is the mean of the utility of every possible outcome weighted by its probability of happening. In other words, these studies assume risk neutrality for all. The extensive use of this assumption has been strongly criticized. One early example of such a critique is the paper by Allais (1953). He criticizes the American school of his time for making this assumption and strongly deplores the lack of time that scholars spend on discussing the axioms underlying decision processes compared to the time they spend on developing the consequences of these axioms once they have

assumed that they hold. In particular, two of Allais's (1953) suggestions seem to have been taken into consideration in more recent literature, and both have led to important developments in decision theory.

First, according to prospect theory, expected utility cannot be approximated by the sum of the value of each possible outcome weighted by its probability of occurring. Two of the main characteristics of prospect theory are that the subjective (or psychological) value is not a linear function of the objective (monetary) value, and that people tend to overestimate some probabilities and underestimate some others (Bernoulli, 1738/1954; Kahneman and Tversky, 1979; Kahneman and Tversky, 1983).

Second, not all individuals behave similarly when confronted to risk. In the literature in psychology, economics, and political science, work has showed that individuals have different attitudes towards risk (Pratt, 1964; Kelling, Zirkes and Myerowitz, 1976; Zuckerman, 1991; Kam and Simas, 2010). Indeed, as already suggested by Allais (1953, p.508), some individuals “believe in their fortune” and others “consider themselves pursued by the adversity” when making decisions.<sup>1</sup> Such variation of risk attitudes across individuals seems likely to be consequential, and so should be taken into account when studying voting decisions. This is made even more crucial by the fact that risk aversion is correlated with the left-right dimension. Rightists are more likely to avoid risks, which might lead them to behave differently than leftists when making choices under uncertainty.

Several empirical as well as theoretical studies investigate how varying risk attitudes affects voting behavior (Pratt, 1964; Shepsle, 1972; Nadeau, Martin and Blais, 1999; Morgenstern and Zechmeister, 2001; Berinsky and Lewis, 2007; Helmke, 2009; Ehrlich and Maestas, 2010; Kam and Simas, 2010; Kam, 2012; Kam and Simas, 2012). However, to the best of my knowledge, no study investigates the effect of risk attitudes among representatives. The goal of the present paper is to see if the variation of risk aversion across members of parliament (MPs) has an effect on their voting behavior. Why is this important? In democratic systems, voters choose according to the information they have on parties and candidates. This information generally concerns political attitudes of parties and candidates. If risk

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<sup>1</sup>personal translation

attitudes of MPs affect their voting behavior, and voters are not informed about individual traits of candidates, this might lead to an important bias in terms of representation. This can be even more pronounced in systems where electors vote for parties, not candidates. In the next section, I present the literature on risk aversion and voting behavior and I discuss different ways risk propensity could influence the legislators' vote choice. In the third section I present the data and the results of my analysis. In the last section, I add some concluding remarks.

## 4.2 Risk Aversion and Voting Behavior

Several empirical as well as theoretical studies explore how varying risk attitudes affects voting behavior. These studies can be classified into two main groups, based on the approach used. In the first approach, the authors assume a spatial model and try to incorporate the variation of risk attitudes in the model. Pratt (1964) proves that given the assumption of spatial voting models, risk-averse voters should have a more concave utility function than risk-acceptant voters. Berinsky and Lewis (2007) find consistently that voters have less concave utility functions if they are inclined to accept risks, in the context of the US elections. Assuming Pratt's result, Shepsle (1972) shows that the uncertainty specific to a candidate has a different effect depending on the level of risk aversion of the voters.

In the second approach, the authors focus on a specific choice, explain why one alternative is more uncertain than the other, and show that risk-averse voters are less likely to opt for the more uncertain option. For example, Nadeau, Martin and Blais (1999) show that risk-averse voters are less likely to accept the Quebec referendum on sovereignty, seen as a more uncertain alternative than the status quo. Morgenstern and Zechmeister (2001) find that in the context of the 2007 elections in Mexico, risk-acceptant voters are more likely to support the opposition. Helmke (2009) shows that risk-averse voters in Mexico are more likely to split their vote between the incumbent and the opposition. This split-ticket is seen as a security and consequently entails less uncertainty. Ehrlich and Maestas (2010) showed



that risk aversion has an effect on attitudes on free trade. Kam (2012) showed that risk acceptance has a positive effect on several types of political participation.<sup>2</sup> Finally, Kam and Simas (2012) find that risk-averse voters are more likely to vote for the incumbent, as incumbents represent a more uncertain alternative.

In the present paper, I could use one of the two approaches presented above. First, I could test if risk aversion has an effect on the convexity of the spatial utility functions of the legislators. Second, I could assume that among the two alternatives of each vote, one option entails more uncertainty than the other and test if the level of risk aversion of the legislators has an effect on their choices. Here I decide to focus on the second approach and argue that new proposals are likely to entail more uncertainty than the status quo, as only the consequences of the status quo are observed. Thus, risk-averse legislators should be more likely to opt for the status quo than risk-acceptant ones, all else being equal.

In general, it is well known that there is a bias towards the status quo. This can be explained by Kahneman and Tversky's (1983) approach: as the subjective value function is steeper for losses than gains, a proposal has to have significantly more advantages than drawbacks compared to the status quo in order to be preferred. An equivalent proposal (for example better on two dimensions and worse on two other dimensions) has no chance to be preferred as voters will have the impression to lose more than they win. Quattrone and Tversky (1988) show, using an experiment, that people are more likely to be willing to keep the same policy than to change toward more inflation and less unemployment, and the same is true in the other direction: less inflation and more unemployment. So, there is a bias toward the status quo implied by voters' decision processes.<sup>3</sup> This is consistent with the fact that there are generally more risk-averse people than risk-acceptant ones (Dohmen et al., 2011).

However, we don't know much about risk attitudes and their effects for representatives. Although the rational choice literature takes risk attitudes into account to model leaders'

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<sup>2</sup>The underlying explanation is however a little different here as she "combine[s] th[e] risk-return theoretical framework with the literature on individual differences in sensation seeking to understand how risk attitudes might affect participation." (p.1)

<sup>3</sup>This is without accounting for the bias toward the status quo explained by the characteristics of the political institutions (see for example Tsebelis (1995) and Gilens (2012)).

decisions related to war, the risk propensity of the leaders are typically defined by the country's characteristics rather than by the leader's ones (Mesquita, 1985; McDermott, 1998). Kowert and Hermann (1997) show that personality traits explain risk taking and suggest that leaders' personality (and thus risk attitudes) could be important in understanding foreign policy. However, to the best of my knowledge, no study on leaders' risk attitudes exists. I will thus assume that risk aversion has the same effect for representatives than for any individual and argue that as the status quo is less risky, risk-averse MPs should be less likely to vote for the new alternative. Consequently, the following hypothesis will be tested in the present paper:

*Hypothesis 1:* The more MPs are risk averse, the more likely they are to vote for the status quo, *ceteris paribus*.

The next section presents the Swiss case, the data collected to estimate risk attitudes of the members of the Swiss Upper House, and the results.

## 4.3 Analysis

### 4.3.1 The Swiss Case

The Swiss case has some features necessary to test my hypothesis. Indeed, the MPs are known as being quite approachable (see Bütikofer and Hug (2015) who interviewed the Swiss legislators), which allowed to conduct face-to-face interviews. As risk aversion is a personal trait, it is important to ensure that the legislators themselves answer the survey, so face-to-face interviews are preferred over questionnaires sent by mail or email. Another advantage of the Swiss case for the present paper is that MPs' votes are accessible. I use all final votes of the 49<sup>th</sup> legislature (2011 - 2015). Thus, I have a measure of risk aversion for legislators, that I can link to their roll call votes. Before presenting the data, it is important to present a brief overview of the Swiss political system to help evaluating the external validity of my analysis.

Switzerland is a federal system that is neither a parliamentary nor a presidential one. The seven members of the government are elected by the Federal Assembly (composed by the Lower House and the Upper House) for four years. There is no possible motion of no confidence. Moreover, in the government, the number of seats by party is stable over time and all main parties are represented (Klöti, 2001). The two Chambers of the Federal Assembly have equal powers. They are mainly responsible for legislation but their power relative to the government has increased recently (Klöti, 2001). MPs vote for, and can propose bills. However, because Switzerland is a semi-direct democracy, the people also have the power to reject or propose a bill, under certain circumstances. Switzerland has non negligible party discipline (Hertig, 1978) but the members of the Upper House are less likely to follow the party line than members of the lower house because most of them are elected through majority rule, and the district magnitude equals one or two (see Carey and Shugart (1995) and Hertig (1978)).

There seem to be no reason to think that if we find an effect of risk on voting behavior for the legislators, this result should not apply to other political systems. Of course, depending on the importance of party discipline, the strength of the relation can vary. The extreme case would be a system where party discipline is so strong that personal traits do not affect vote choice among legislators within the same party. This is not the case in Switzerland. Moreover, in other countries, MPs may be more or less inclined to vote for the status quo if their own party is in the government or not. In the present case, there is no need to control for which party is in government. Indeed, as all main parties are in government, there is no such variation to control for.

### **4.3.2 The Data**

The main independent variable is the propensity to take risks among representatives. To estimate this variable, I conducted a survey during the 2014 summer session of the Swiss Upper House. Among the 46 members of the Upper House, 35 agreed to answer my

survey.<sup>4</sup> In the Appendix, I show that ideology, age, gender, and education do not explain participation in the survey. So there is no apparent bias in the sample. The survey includes seven questions on risk. To estimate risk attitudes of representatives, it is necessary to have questions on various topics, but especially on topics related to political decisions, as risk aversion varies across contexts (Slovic, 1964; Slovic, 1972), although it has a clear personal component too (Dohmen et al., 2011). Among the seven questions, four are related to uncertainty in political decisions, and three pertain to risk attitudes in life in general. The questions are presented in the Appendix.

In order to measure the reliability of my data, I first follow the internal consistency method and estimate three Cronbach's alphas: one for items on personal risk attitudes, one for items on risk specific to political decisions, and finally one for all seven items. I call "items" the answers to the corresponding questions, standardized with a minimum of 0 (risk acceptant) and a maximum of 1 (risk averse). The alphas estimated using the 31 legislators who answered all questions are presented in Table 4.1.

Table 4.1: Cronbach's Alpha Measures

Questions about personal risk attitudes (items 6-8)	0.28
Questions about risk specific to political decisions (items 1-4)	-0.01
All questions about risk (items 1-4 and 6-8)	0.23

These low values might be due to the fact that several items are measuring more than one concept, or that the different variables generate different types of response sets (see for example Carmines and Zeller (1979)).

The problem with the estimations of reliability is that it rely on the assumption that the items are parallel. According to Armor (1974), there are two ways in which this assumption can be violated: First, the items measure a single concept unequally. Second, the items measure more than one concept, and this, equally or unequally. This is clearly the case for

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<sup>4</sup>In fact there were 36 legislators, but one refused to answer any of the questions. Among the 35, 6 did not answer all questions. See Table 4.10 in the Appendix for a more detailed description of the missing values.

all questions measuring risk aversion in a specific context. For example, question 3 asks the respondent how likely he will be to vote for an environmental bill that implies a certain cost and whose outcome is uncertain. One will clearly expect the members of the Green party to be more inclined to accept this bill. Given that the items are not parallel, a principal component analysis (PCA) on the seven items measuring risk attitudes could shed some light on the relation between them. The loadings will allow to tell to which extent each item is related to risk and eventually other traits, and the eigenvalue will give a measure of the variability of the data explained by each dimension.<sup>5</sup> As there are seven questions, the PCA estimates seven orthogonal dimensions. This estimation is based on the 31 legislators who answered all questions. In Table 4.2, each eigenvalue divided by the sum of eigenvalues tells how much variability the corresponding dimension explains. The loadings are presented in Table 4.3 (all items used have a minimum value of 0 (risk acceptant) and a maximum value of 1 (risk averse)):

Table 4.2: PCA: Variability by Dimension

Dimension	1	2	3	4	5	6	7
Variability	.25	.23	.16	.11	.09	.08	.07

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<sup>5</sup>It is also important to keep in mind that our data are not continuous and consequently, that the matrix of variance-covariance estimated for the PCA is biased.

Table 4.3: PCA Loadings

	PC1	PC2	PC3	PC4	PC5	PC6	PC7
q1 (Asian disease)	0.63	-0.76	0.02	-0.09	0.02	-0.13	0.04
q2 (new international agreement)	0.09	0.21	-0.24	-0.62	0.4	-0.5	-0.29
q3 (solar energy bill)	0.72	0.56	0.33	0.15	0.1	0.13	-0.04
q4 (new economy bill)	-0.15	-0.02	0.78	-0.31	-0.4	-0.33	-0.01
q6 (self-reported)	0.16	0.22	-0.36	0.02	-0.45	-0.45	0.63
q7 (betting on horses)	-0.02	0.01	0.11	-0.56	0.25	0.48	0.62
q8 (adventure and risks taking)	0.16	0.07	-0.29	-0.41	-0.64	0.41	-0.38

Question 5 is not included because it does not measure risk attitudes.

The results show that the second dimension is almost as important as the first one. Then the variability explained starts to decrease from the 3rd to the 7th dimension. Consequently, it is difficult to know if the first dimension measures risk aversion or not. Indeed, as we expect every variable to measure risk aversion, it is surprising that the first dimension is not much more important than the others. Also problematic is the fact that for most questions, the loadings are bigger for the other dimensions than they are for the first dimension, with the exception of questions 1 and 3. However, most of the loadings of the first dimension are positive. The two loadings that are not positive are not very large. Thus, it is possible that the first dimension measures risk aversion.

Because the analysis of internal consistency presents ambiguous results, I decide to estimate a Cronbach's alpha for each possible combination of the variables (i.e. any combination of 2 to 7 of these items). To increase the chances of having a meaningful measure, I use a combination of the items that has one of the highest alphas. The highest Cronbach's alpha is 0.615 and includes three questions (questions 2, 6 and 8 in the Appendix). The second highest is 0.597 and includes four questions (question 2, 3, 6 and 8 in the Appendix). Because the alpha is not much smaller and because it combines two questions related to political decisions with two more general questions on risk, I decide to aggregate these four

questions to measure risk. The four questions included in the measure are:

- “How inclined are you to vote for a new agreement between Switzerland and another country if among the 3 sources you trust the most, 2 predict that it will be favorable to the people you represent and one says that it will be unfavorable to them? (very inclined/somewhat inclined/neither inclined no disinclined/somewhat disinclined/very disinclined)”
- “The state of Epsilon is interested in developing clean and safe alternative sources of energy. Two programs for establishing solar energy within the state are considered. If program X is adopted, then it is virtually certain that over the next four years the state will save 20 million CHF in energy expenditures. If program Y is adopted, then there is a 80% chance that the state will save 30 million CHF in energy expenditures over the next four years and a 20% chance that because of cost overruns, the program will produce no savings in energy expenditures at all. To summarize, the alternative policies and their probable consequences are:
  - Program X: 40 million CHF savings with certainty
  - Program Y: 80% chance of saving 60 million CHF, 20% chance of no saving.

Imagine you were faced with the decision of adopting program X or program Y. Which would you select?”

(This question is from Quattrone and Tversky (1988).)

- “In general, how easy or difficult is it for you to accept taking risks?” (very easy; somewhat easy; somewhat difficult; very difficult)

(This is a question examined by Nadeau, Martin and Blais (1999)).

- “Now I will briefly describe a person. Would you please indicate whether that person is: very much like you; like you; somewhat like you; little like you ;not like you; not at all like you? Adventure and taking risks are important to this person; to have an exciting life.”

(This question is part of the World Values Survey.)

I construct the measure of risk aversion by taking the mean of these four rescaled items. For the legislators who did not answer all questions, I take the mean of the non missing values among these four items (two MPs have two missing values among the four items, and two have one).

Now that I have defined my measure (see the distribution in Figure 4.2 in the Appendix), I can discuss the construct validity of it. However, estimating the construct validity of this measure is difficult for three main reasons. First, risk propensity varies across contexts. Thus, because different measures of risk attitudes refer to different contexts, no clear correlation pattern with other covariates emerge from the literature. Second, as authors in the same field often tend to use similar measures (either self-reported or observed behavior), this can lead to even more differences in correlation patterns from one context to another. A measurement bias might not directly be linked to the context but to the most current measure used in this context. Third, the main correlates are highly dependent. So, depending on the characteristics of the population under study, a different correlation structure might emerge. In the present case, the characteristics of the population are quite specific as Swiss legislators have relatively high education levels, medium to high income levels, and an age of 34 or above. Thus, specific correlation patterns might occur. To summarize, the task content, the measurement method as well as the sample under study might generate different correlation structures and consequently, construct validity is difficult to test for risk attitudes, especially in a new context. Table 4.4 presents the correlations with the main known covariates of risk (except income) for the 31 legislators (i.e. only the ones with no missing item).

Table 4.4: Risk Aversion and its Main Covariates

	correlation	<i>p</i> -value
female	-0.03	0.89
age	0.34	0.06
left-right	0.26	0.16

The correlation between gender and risk aversion among legislators is close to zero.



Byrnes, Miller and Schafer (1999) present a meta-analysis of 150 studies testing the effect of age on risk propensity. They find that men take generally more risks than women. However, they also find that the gender gap decreases over age. They show that the effect of gender on risk attitudes decreases after 21 years old. As the mean age of our sample is 56 and the range goes from 34 to 69, this can explain why gender is not significantly correlated with risk attitudes in my sample. Table 4.4 shows a positive but weak correlation between age and risk aversion. MacCrimmon and Wehrung (1990) find that their measure of “maturity” (an aggregation of age, seniority in the firm and the number of dependents) explains the difference between highly risk acceptant and highly risk averse executives, the higher on the “maturity” scale being more risk averse. Riley and Chow (1992) find that the relation between age and risk aversion has a U shape, risky asset allocation being more frequent among people between 20 and 65 years old.<sup>6</sup> The sign of the correlation between age and risk aversion is thus consistent with the literature. Also included in Table 4.4 is the correlation coefficient between risk aversion and the left-right scale. The measure used here to estimate the location on the left-right dimension is the left-right location of the MP’s party as estimated by the respondents of the Swiss Electoral Survey of 2011. By using this measure, I lose some variability because every MP from the same party has the same value, but as the main argument of this paper is that risk aversion might have an effect on voting behavior, it does not make sense to use an estimation of the left-right location based on roll call votes. Leftists being generally more risk acceptant than rightists, the sign in Table 4.4 is as expected, but the relation is not significant.

To summarize, one correlation is null, one covariate is correlated significantly (at the 10% level) with risk attitudes in a way that is consistent with the literature, and one correlation has a  $p$ -value of 0.16 and its sign is consistent with the literature. So, although the correlations are weak, the patterns are quite consistent with the literature. I will thus

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<sup>6</sup>However, as the authors explain, their result might be explained by wealth and income, as they tend to increase until retirement and then decrease.

use this measure to test my hypothesis.<sup>7</sup>

Now let us turn to the votes. I use all final votes of the Upper House of the 49<sup>th</sup> legislature from December 2011 until September 2014. I use final votes only, because MPs tend to behave strategically in non-final votes (Bütikofer and Hug, 2015), and this can bias the results. The votes were counted via a show of hands until the beginning of 2014. Since then, final votes are electronically registered.<sup>8</sup> Thus, I registered the votes from watching the videos of the sessions until the end of 2013, and accessed the more recent votes online.<sup>9</sup> During the 49<sup>th</sup> legislature, there has been a total number of 298 votes, of which 131 are non-unanimous, and 95 are non-unanimous among the 35 legislators for whom I have a measure of risk aversion. I remove all votes having only one “Yea” or one “Nay” among the legislators of my sample because otherwise some fixed effects have very large variances. So the number of votes is 95. As there are 481 missing values in this 35 by 95 matrix of votes, this makes a total of 2853 observations.<sup>10</sup>

### 4.3.3 Results

To test the effect of risk aversion on the likelihood of voting for the new alternative, I use a binomial logit model. The dependent variable is coded 1 if the legislator chose the new alternative and 0 if he chose the status quo. The independent variable is the measure of risk attitudes presented above. According to *Hypothesis 1*, the coefficient on risk aversion should be negative. As new alternatives do not all entail similar levels of uncertainty, the model estimates a fixed effect for each vote. For the regression, even if the number of observations

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<sup>7</sup>I also estimated the correlations between these covariates and other measures of risk aversion: the measure deduced from the first principal component (female: -0.15 (0.44), age: 0.45 (0.01), left-right 0.02 (0.91)), risk specific to political decisions (female: -0.04 (0.83), age: 0.42 (0.02), left-right: 0.02 (0.92)), and general risk attitudes (female: -0.13 (0.49), age: 0.13 (0.49), left-right: 0.14 (0.46)). The correlation patterns here are similar, although the negative correlations between risk and female tend to be larger and the correlations between risk and ideology tend to be smaller.

<sup>8</sup>see <http://www.parlament.ch/d/mm/2013/seiten/mm-bue-2013-08-23.aspx>

<sup>9</sup>See the official website of the Swiss parliament.

<sup>10</sup>Missing values can be due to several reasons. If the MP is president of the House, he will not vote except if there is a tie. Also, concerning the votes registered watching the videos, I coded all unclear votes as missing. Finally, the MPs can be absent, or decide to abstain. As abstention could also be a way to avoid taking some risks, I regress the share of abstentions of each MP on his level of risk, in Table 4.13 in the Appendix. The results show no significant effect of risk aversion on the likelihood of abstaining of voting.

is high, it is important to keep in mind that there are not many degrees of freedom for the MP-level variables, as only 35 MPs are included in the analysis. Thus, not many MP-level variables can be included in the regression.

In a first model, I only include the main independent variable measuring risk aversion. In a second model, because the ideological dimension should explain part of the variability, I add the location of the MP's party on the left-right scale as well.<sup>11</sup> In a third model, I include risk aversion and the two other covariates, gender and age. I do not include all covariates in a fourth model because as explained above, the degree of freedom is too low. Table 4.5 displays the results.

Table 4.5: The Effect of Risk Attitudes on the Likelihood of Voting for the New Alternative

	Model 1	Model 2	Model 3
constant	2.348*** (0.561)	4.384*** (0.612)	2.548*** (0.667)
risk averse	-1.171*** (0.258)	-0.069 (0.282)	-1.110*** (0.269)
ideology (l-r)		-0.484*** (0.037)	
age			-0.006 (0.007)
female			0.448** (0.137)
<i>N</i>	2853	2685	2853
log <i>L</i>	-905.363	-744.944	-892.251

Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

In Model 1, risk aversion decreases the likelihood of voting for the new alternative, and the effect is significant. However, when adding the left-right dimension, the effect of risk attitudes becomes insignificant. The effect of left-right ideology on the likelihood of voting for the new alternative is positive and significant. In Model 3, risk has the expected significant effect and women are significantly more likely to vote for the new alternative than men. Age does not have any significant effect. Thus, it seems that most of the variability

<sup>11</sup>As mentioned earlier, this measure is party specific.

is explained by the left-right scale.

#### 4.3.4 Robustness Checks

As the left-right measure is party specific, and because members of a same party often vote similarly (even if party discipline is not very high in the Swiss Upper House (Hertig, 1978)), it might explain the strong relationship between left-right and the dependent variable. Using another measure of ideology,<sup>12</sup> I estimate again the three models for only 27 MPs, due to missing values. The results are displayed in Table 4.6 and show that ideology still explains the main part of the variability.

Table 4.6: The Effect of Risk Attitudes on the Likelihood of Voting for the New Alternative, Using the Smartvote Measure

	Model 1	Model 2	Model 3
constant	-0.558 (0.479)	0.174 (0.502)	-0.610 (0.657)
risk averse	-0.717* (0.364)	0.214 (0.384)	-0.823* (0.371)
ideology smartvotes (l-r)		-3.297*** (0.377)	
age			-0.000 (0.008)
female			0.391* (0.156)
<i>N</i>	1785	1785	1785
log <i>L</i>	-538.382	-493.124	-528.901

Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

I also reestimated the models in Table 4.5 after removing all popular votes. Indeed, as these votes are more visible to the voters, MPs might have more incentives to follow their respective party line for these votes and be less driven by other factors. The results are

<sup>12</sup>Based on questionnaires on political issues, the project “smartvote” ([www.smartvote.ch](http://www.smartvote.ch)) estimates and compares the ideological positions of parties, candidates, and any voter who wants to. Any internet user can go on the website, answer the questionnaire, and smartvote will give him the candidates who most closely shares his views. This method is criticized because MPs tend to follow the party line when answering the survey. However, this survey among candidates gives me another measure of left-right preferences.

displayed in Table 4.7 and here again, the main result seems to hold.

Table 4.7: The Effect of Risk Attitudes on the Likelihood of Voting for the New Alternative, Without Popular Votes

	Model 1	Model 2	Model 3
constant	2.583*** (0.571)	5.571*** (0.669)	2.707*** (0.723)
risk averse	-1.610*** (0.309)	-0.219 (0.345)	-1.585*** (0.323)
ideology (l-r)		-0.668*** (0.052)	
age			-0.005 (0.008)
female			0.708*** (0.182)
<i>N</i>	2160	2034	2160
$\log L$	-622.361	-470.269	-606.737

Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

#### 4.3.5 Mediation Analysis

The fact that risk aversion alone has a significant effect on voting behavior is interesting. This suggests it might be useful to investigate the relation between risk attitudes, left-right ideology and the dependent variable a bit further. Indeed, risk attitudes and conservatism are closely connected and several authors see risk and conservatism as very close concepts.

Four different approaches have been used to explain ideology. The variation of ideological preferences across individuals is generally explained by social structure, social learning, personality, or genetics. In the work taking the personality approach (Hermann, 1980; Jost, Glaser, Kruglanski and Sulloway, 2003; Jost, Fitzsimons and Kay, 2004; Gerber, Huber, Doherty, Dowling and Ha, 2010; Mondak, 2010), Jost et al. (2003) find that tolerance to uncertainty has a negative effect on conservatism. Thus, I argue that the effect of risk on the likelihood to vote for the status quo is mediated by ideology: risk aversion is a personality trait that affects ideological preferences, and ideology, then, affects voting behavior.

In order to test the mediation effect, I first regress ideology on risk aversion (Table 4.8):

Table 4.8: Explaining the Left-right Dimension

	Model 1	Model 2
constant	4.231 *** (0.802)	4.685 * (2.256)
risk averse	2.002 (1.508)	2.028 (1.587)
age		-0.005 (0.040)
female		-0.884 (0.785)
$N$	35	35
$R^2$	0.051	0.089

Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ 

Model 1 in Table 4.8 shows that risk aversion has a positive relation to the left-right dimension, although this effect is not strongly significant. This is, according to Baron and Kenny (1986), the first of three necessary but not sufficient conditions for a mediation effect to take place. The second necessary condition is that the main independent variable (risk attitudes) must affect the dependent variable “voting for a new alternative”. This effect is visible in Model 1 of Table 4.5. The effect is negative and significant. The third necessary condition is that the mediating variable must affect the dependent variable when the dependent variable “voting for a new alternative” is regressed on the two variables; the main dependent variable and the mediating variable (ideology and risk attitudes). This effect is verified by Model 2 of Table 4.5. To summarize, although the effect of the first condition is not significant, the three necessary conditions are verified.

Thus, I estimate the mediation effect using the package `mediation` (Tingley, Yacamamoto, Hirose, Keele and Imai, 2014) because it is adapted for binomial models (see Imai, Keele and Tingley (2010)). The model is estimated using quasi-Bayesian approximation, with 2000 simulations.

Table 4.9: Mediation Analysis

	coefficient	95% confidence interval
mediation effect	-0.135	[-0.166 , -0.109]
direct effect	-0.003	[-0.064 , 0.054]
total effect	-0.139	[-0.209 , -0.074]

The results in Table 4.9 show that there is a negative effect of risk aversion on the likelihood to vote for a new alternative mediated by ideology. However, there is no significant direct effect of risk aversion on the dependent variable. Thus, the effect of risk on voting behavior is fully mediated by ideology.

#### 4.4 Conclusion

This project investigates how individual risk attitudes affect legislative voting. Using a new dataset that estimates risk attitudes of the Members of the Swiss Upper House, I estimated a binomial model and found that risk attitudes have an effect on legislative voting, an effect mediated by ideology. In the introduction, I evoked a potential problem for democratic representation if risk attitudes affect legislative voting, because personal traits of candidates are not necessarily known by voters, depending on the electoral system. However, because this effect is mediated by ideology, I conclude that there is not necessarily a bias in democratic representation due to the effect of risk attitudes on legislative voting.

In this paper I focused on the decision of voting for the new alternative versus the status quo. Yet many other variations in terms of risk exist for MPs. For example, following the party line may be more or less risky than following constituents in some contexts. Moreover, deciding not to vote may allow MPs to avoid overly risky choices. These are all effects to be investigated in the future.

## 4.5 Appendix

### 4.5.1 Survey Participation

Among the 35 legislators who agreed to answer the survey, some of them refused to answer a few questions. The number of missing values is displayed in Table 4.10 below for each question.

Table 4.10: Missing Values

Questions	1	2	3	4	5	6	7	8
number of NAs	5	3	3	3	0	0	1	0

Among 46 legislators, 35 agreed to participate in the survey. In order to know if this sample of 35 legislators is likely to be representative of all members of the Upper House, I present the relation between several covariates of risk and participation. Table 4.11 displays the participation rates for the main parties.

Table 4.11: Participation by Party

Party	Number of MPs	Survey Participation
CVP	11	0.82
FDPL	11	0.82
SP	11	0.82
SVP	5	0.80
OTHER	7	0.57

Although the legislators who do not belong to one of the main parties tend to participate less, the participation for the four main parties is very similar.

I also estimate a binomial model to test the effect of age, gender, education and ideology on participation. Table 4.12 shows that none of these variables have a significant effect on the likelihood of participating in the survey. Thus, there is no reason to believe that the sample is not representative of the Upper House.



Table 4.12: Explaining Participation

	Model 1	Model 2	Model 3	Model 4	Model 5
constant	1.453** (0.474)	0.778*** (0.071)	0.605* (0.230)	0.840*** (0.174)	1.172* (0.560)
age	-0.012 (0.008)				-0.010 (0.008)
female		-0.000 (0.158)			0.023 (0.182)
educ			0.068 (0.103)		0.075 (0.100)
ideology (l-r)				0.003 (0.032)	0.016 (0.040)
$N$	45	45	40	41	36
$R^2$	0.046	0.000	0.011	0.000	0.060

Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

#### 4.5.2 The Survey

The main goal of the survey is to estimate the level of risk aversion of each MP of the Upper House in Switzerland. The survey includes seven questions on risk and one aiming at estimating how likely MPs are to follow the party line. The questions are displayed below:

**Question 1:** Imagine that Switzerland is preparing for an outbreak of an unusual disease which is expected to kill 600 people. Two alternative programs to combat the disease are proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If program A is adopted, 400 people will die. If program B is adopted, there is a 1/3 probability that no one will die, and 2/3 probability that 600 people will die. Which of the two programs would you favor?

**Question 2:** How inclined are you to vote for a new agreement between Switzerland and another country if among the 3 sources you trust the most, 2 predict that it will be favorable to the people you represent and one say that it will be unfavorable to them?

0 very inclined

1 somewhat inclined

2 neither somewhat inclined nor somewhat disinclined

3 somewhat disinclined

4 very disinclined

**Question 3:** The state of Epsilon is interested in developing clean and safe alternative sources of energy. Two programs for establishing solar energy within the state are considered. If program X is adopted, then it is virtually certain that over the next four years the state will save 20 million CHF in energy expenditures. If program Y is adopted, then there is a 80% chance that the state will save 30 million CHF in energy expenditures over the next four years and a 20% chance that because of cost overruns, the program will produce no savings in energy expenditures at all. To summarize, the alternative policies and their probable consequences are:

Program X: 40 million CHF savings with certainty

Program Y: 80% chance of saving 60 million CHF, 20% chance of no saving.

Imagine you were faced with the decision of adopting program X or program Y. Which would you select?

**Question 4:** How inclined are you to vote for a new economy bill that has 70% chance to lead to a better outcome for the people you represent and 30% chances that it will lead to a worse outcome?

0 very inclined

1 somewhat inclined

2 neither somewhat inclined nor somewhat disinclined

3 somewhat disinclined

4 very disinclined

**Question 5:** [NOTE: THIS QUESTION IS NOT USED IN THIS PAPER] If you are unsure about the outcome of a bill, how likely are you to turn to your co-partisans as reliable sources of information about the effect of the bill on the constituents?

0 very likely

1 somewhat likely

2 neither somewhat likely nor somewhat unlikely

3 somewhat unlikely

4 very unlikely

**Question 6:** In general, how easy or difficult is it for you to accept taking risks? (very easy; somewhat easy; somewhat difficult; very difficult)

**Question 7:** Suppose you were betting on horses and were a big winner in a race. Would you be more likely to continue playing or take your winnings?

-definitely continue playing;

-probably continue playing; not sure;

-probably take my winnings;

-definitely take my winnings

**Question 8:** Now I will briefly describe a person. Would you please indicate whether that person is:

- very much like you,
- like you,
- somewhat like you,
- little like you,
- not like you, or
- not at all like you?

Adventure and taking risks are important to this person; to have an exciting life.

### **4.5.3 Distribution of Risk**

Below the distributions of each item measuring risk are displayed in Figure 4.1 and the distribution of the variable risk is shown in Figure 4.2. The items and variable go from 0 (risk acceptant) to 1 (risk averse). Interestingly enough, the distribution of risk seems consistent with Kam and Simas's (2010) suggestion that risk-acceptant voters might be overrepresented as risk aversion has a negative effect on political participation (although ideally we should compare to the distribution of voters on the same scale to affirm that). Finally, Figures 4.3 and 4.4 show how risk aversion varies by party and by ideology.

Figure 4.1: Distribution of Risk Aversion Items

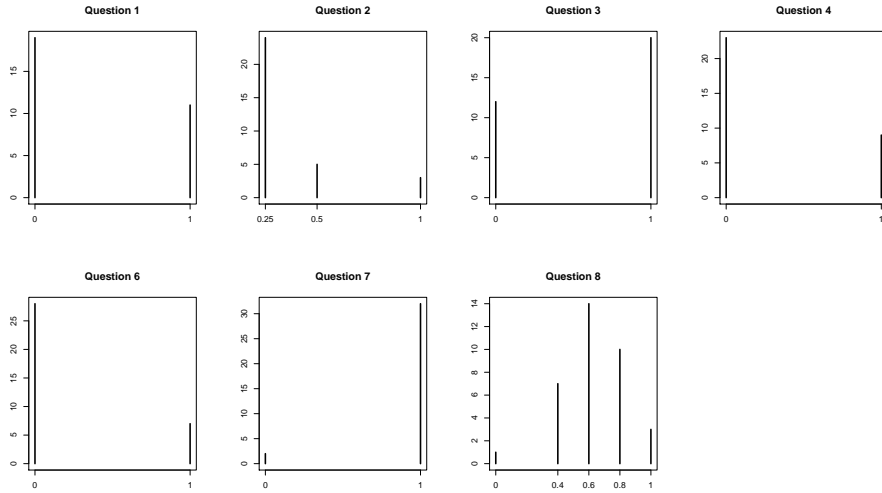


Figure 4.2: Distribution of Risk Aversion

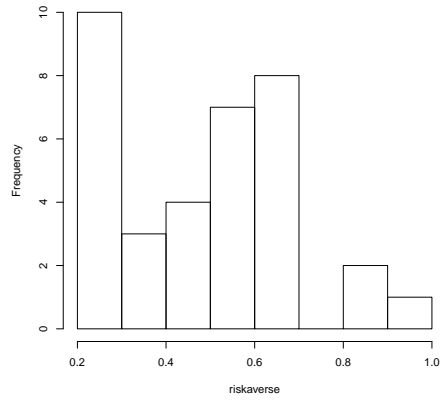


Figure 4.3: Risk by Party

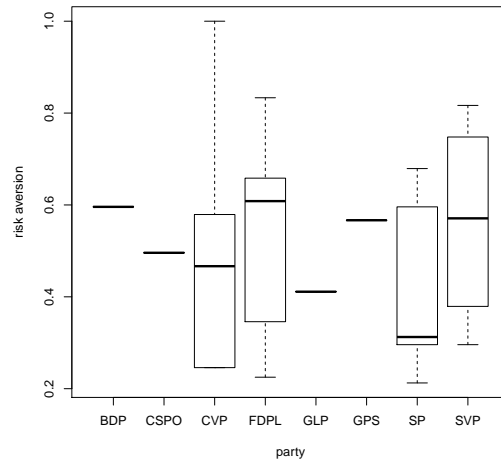
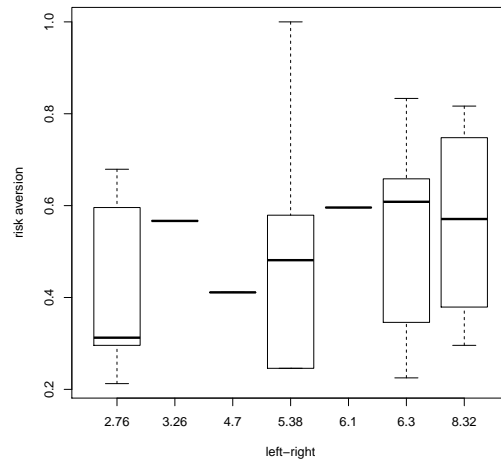


Figure 4.4: Risk by Ideology



#### 4.5.4 Explaining Abstentions

Here I briefly test if risk attitudes explain how frequently some legislators abstain from voting. Indeed, deciding to abstain from voting might be a way to avoid the risk of contradicting the party or the voters. Table 4.13 below shows that risk attitudes

have no effect on the share of abstentions per legislator.<sup>13</sup>

Table 4.13: Risk Attitudes and Vote Abstentions (DV: share of abstentions)

	Model 1	Model 2	Model 3
constant	0.024*	0.017	-0.005
	(0.011)	(0.015)	(0.033)
risk averse	0.009	0.006	0.001
	(0.020)	(0.021)	(0.022)
lr		0.002	0.002
		(0.002)	(0.002)
age			0.000
			(0.001)
female			0.004
			(0.011)
<i>N</i>	35	35	35
<i>R</i> <sup>2</sup>	0.006	0.023	0.041

Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

<sup>13</sup>The share of abstentions equals the number of abstentions divided by the number of all votes answered by “Nay”, “Yea”, or “abstention” by a legislator (this excludes all other type of missing value).

## CHAPTER V

### Risk Aversion and Roll Call Votes

Spatial models of parliamentary voting (SMPVs), allowing to locate legislators (or any other type of voters) on latent dimensions gave rise to an important number of studies in the literature on representation. These models assume that all actors have similar risk attitudes, however, the propensity to take risks does vary across individuals. In the present paper, I discuss if such heterogeneity could (and should) be taken into account in these models. I propose three different ways to do so. First, legislators can have differently shaped utility functions depending on their level of risk aversion. Second, one can allow for the status quo bias to be stronger among risk-averse legislators. Third, risk aversion could increase or decrease the predictability of legislators' behavior in SMPVs. I find theoretical reasons for not pursuing the first method. Concerning the second and the third, I use a new survey of Swiss Legislators and find no significant relationship between risk attitudes and the likelihood of voting for the status quo. These results suggest that relaxing the assumption that all actors have the same level of risk aversion does not necessarily represent a serious drawback for the estimation of ideal points.

## 5.1 Introduction

SMPVs use votes to locate voters, generally members of parliament (MPs), on latent issues. These models now have an important place in the study of legislative behavior. Most of these models assume that all voters try to maximize their expected utility and have similar utility functions: either a normal distribution (Poole and Rosenthal, 1985) or a quadratic function (Martin and Quinn, 2002; Clinton, Jackman and Rivers, 2004) with a maxima at their ideal point. More recently, attempts have been made to differentiate the variance of the utility function across actors (Lauderdale, 2010; Carroll, Lewis, Lo, Poole and Rosenthal, 2013). Parallel to these developments, in the literature in psychology, economics, and political science, work shows that individuals might have different attitudes towards risk (Kelling and Myerowitz, 1976; Zuckerman, 1991; Kam and Simas, 2010), as previously suggested by Allais (1953).

SMPVs are models using vote choices to estimate ideological positions. Because risk taking is an integral part of all decision processes and because ideology is a covariate of risk aversion, it is important to investigate if a model ignoring the variation of risk attitudes across individuals leads to biased estimations of ideal points. Indeed, rightists are more likely to avoid risks, which might lead them to behave differently than leftists when making choices under uncertainty. Biased estimations of ideal points might lead to wrong conclusions in work on representation. However, to my knowledge, no study discusses the implication of risk attitudes in the estimation of ideal points.

I discuss three different methods to take this heterogeneity into account in SMPVs. First, I suggest that risk aversion could be incorporated in the model by using more concave utility functions for risk-averse legislators. In political psychology, beside the literature on foreign policy (Mesquita, 1985; Winter, 1992; Kowert and Hermann, 1997; Mondak, 2010), several studies on voting behavior investigate how risk attitudes



affect decisions. Among these studies, several use an approach based on spatial models (Pratt, 1964; Berinsky and Lewis, 2007; Shepsle, 1972).<sup>1</sup> Pratt (1964) proves theoretically that risk-averse voters have a more concave utility function than risk-acceptant voters. Berinsky and Lewis (2007) find consistently that voters have less concave utility functions if they are inclined to accept risks, in the context of the US elections. Assuming Pratt's result, Shepsle (1972) shows that the uncertainty specific to a candidate has a different effect depending on the level of risk aversion of the voters. In this paper I explain that varying the convexity of the utility function leads to serious drawbacks, namely that the effects of risk aversion and unpredictability (i.e. Mavericks) cannot be disentangled.

Second, I follow the literature testing if risk-averse voters are more likely to opt for the more certain option (Nadeau, Martin and Blais, 1999; Morgenstern and Zechmeister, 2001; Helmke, 2009; Ehrlich and Maestas, 2010; Kam and Simas, 2010; Kam, 2012; Kam and Simas, 2012) and add a weight to all new alternatives for risk-averse voters in a SMPV, to test if risk-averse legislators are more likely to opt for the status quo.

Third, I follow the literature on party discipline and personal vote (Carey and Shugart, 1995; Mainwaring and Pérez, 1997; Tavits, 2009) and test if risk-averse actors in districts with low magnitude are less predictable than others.

In the next section, I present the difficulty and drawbacks of conceptualizing risk attitudes as the level of convexity of utility functions in SMPVs. In the third section, I test if adding a weight to all new alternatives for risk-averse MPs would improve the estimation of ideal points. In the fourth section, I test if risk-averse MPs are less predictable than others using Lauderdale's (2010) model. In the last section, I will add some concluding remarks.

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<sup>1</sup>I call spatial models any model assuming that preferences can be located in an ideological space. I call SMPVs models using votes to locate actors in an ideological space.

## 5.2 Risk Aversion and the Shape of the Utility Function

Kahneman and Tversky (1983) define risk aversion as follows: “In general, a preference for a sure outcome over a gamble that has higher or equal expectation is called risk averse, and the rejection of a sure thing in favor of a gamble of lower or equal expectation is called risk seeking”. Thus, a risk-averse behavior is a behavior revealing a preference for a more certain but more moderate gain (loss) over a less certain but more important gain (loss). Based on this definition, if we assume perceptual errors, the expected utility for a voter  $v_i$  to choose a specific alternative  $a_j$  may be written as follows:

$$E[g(\|x_{v_i} - x_{a_j}\|)] = \int g(\|x_{v_i} - x_{a_j}\|)f(x_{a_j})dx_{a_j},$$

with  $x_{v_i}$  the ideal point of voter  $i$ ,  $x_{a_j}$  the perceived ideological location of the alternative  $j$ , a random variable, and  $\|x_{v_i} - x_{a_j}\|$  the distance between these two points. The function  $f$  is the distribution function of  $x_{a_j}$ , and  $g$  a monotonic decreasing function.

Pratt (1964) shows that the level of risk aversion of an actor can be modeled as the level of convexity of its spatial utility function. In Appendix A, I present the main idea of this argument. The intuition behind this is that the more concave the utility function (i.e. the more risk averse the actor), the more the uncertainty of the alternative will lower the expected utility compared to a similar alternative (same location) without uncertainty. Thus, according to this approach, people have utility functions with different levels of concavity, the ones with the more concave utility function being the more risk averse.

The SMPVs, however, assume that the concavity of the utility function is constant across voters (except for the “Optimal Classification” model that does not make any assumption about the shape of the utility function and error terms). In these models, the random utility function is defined as follows:

$$U(a_j) = g(\|x_{v_i} - x_{a_j}\|) + \epsilon_j,$$

$g$  having either the shape of the normal distribution (Poole and Rosenthal, 1985) or a quadratic utility function (Martin and Quinn, 2002; Clinton, Jackman and Rivers, 2004).<sup>2</sup> So,  $\epsilon_j$  can be better understood as a “classification error” than an error specific to the location of the alternative (i.e. a “perceptual error”) because the random component is outside the parentheses. According to this specification, the noise affects all voters similarly and can thus not be used to model risk attitudes by varying the shape of the utility function. It is interesting to note that Poole and Rosenthal (1985, p.361) discuss this feature in a footnote:

“Technically, spatial error should appear in [the distance]. For example, in the case of perceptual error, an individual might use  $[x_{a_j}] + [\gamma]$ , where  $[\gamma]$  is the perceptual error, instead of  $[x_{a_j}]$  to compute [the distance]. We avoided this complex specification in order to make the problem tractable. We do not think this is a serious problem, however. In our Monte Carlo work we found that the recovery of the  $[x_i]$  and the  $[x_{a_j}]$  to be reasonably robust to a misspecification of the form of the utility function.”

So if there was a perceptual error, the random utility function would have the form:

$$U_{v_i}(a_j) = g_i(\|x_{v_i} - (x_{a_j} + \epsilon_j)\|).$$

and with  $g_i$  more or less concave for each actor  $i$ , it would be possible to model risk attitudes. However, as suggested by the footnote cited above, it would be difficult to

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<sup>2</sup>Carroll et al. (2013) allow the shape of the utility function to be a mixture of a quadratic utility function and a normal distribution but the function does not vary across individuals. Then they assume that the utility function has a normal shape with variance that can vary across individuals. Also, Lauderdale (2010) assumes a quadratic utility function for all actors but adds a variance parameter at the individual level.

estimate a model with perceptual errors.<sup>3</sup>

To summarize, the way Pratt (1964) and Berinsky and Lewis (2007) conceptualize risk aversion directly comes from the assumption that the alternatives entail some uncertainty. The more the actor is risk averse, the more the utility function is concave, and the more the uncertainty specific to an alternative will lower the utility of this alternative. Existing SMPVs are far from this conceptualization because they do not allow the concavity of the utility function to vary across actors,<sup>4</sup> and more importantly, because they do not have alternative specific (conceptual) error terms.

Even if we were able to circumvent this difficulty, I argue that other drawbacks of this conceptualization exist when applied to SMPVs. Indeed, this approach makes sense particularly when comparing the utilities of two actors with different levels of risk propensity, facing alternatives that may entail uncertainty but it also would lead to some inconsistencies if used in a model of legislative voting. According to this conceptualization of risk aversion in spatial models, for a sure alternative, the utilities between two actors with similar ideal points and different risk propensities differ. Indeed, risk-averse actors do not only have a more concave utility function but also a steeper one, as we assume that the function is differentiable and monotonic decreasing.<sup>5</sup> This has particularly strong implications for spatial voting models, because some actors (the risk-averse ones) would have much more impact on the log-likelihood than others. More specifically, risk-averse actors would have a higher effect on the likelihood (and consequently the estimation of the votes' parameters and thus indirectly all ideal points) than other actors because their utility function is steeper.

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<sup>3</sup>This is because in both models, a strong assumption on the distribution of the difference of the two error terms (the error term of the “yea” option and the error term of the “nay” option of each vote), allows to render the problem tractable. Such assumption would not be possible if the error terms were inside the distance function.

<sup>4</sup>Lauderdale (2010), and Carroll et al. (2013) allow for varying shapes of the utility function, but not varying levels of convexity of the utility function.

<sup>5</sup>If the utility function is differentiable, and decreases with the distance to the ideal point, its slope is zero at the location of the ideal point. As the utility functions are monotonic decreasing and at  $distance = 0$ , a more concave utility function will necessarily be steeper than a less concave one.

Thus, I argue that this approach is not appropriate for SMPVs.

Interestingly enough, in Lauderdale’s (2010) model, “mavericks” have a flatter utility function and so have less impact than others on the likelihood. Consequently, it might be difficult to disentangle the two in a model (mavericks and risk-averse legislators).

Given the difficulties presented above, I suggest two ways of testing the influence of risk attitudes in SMPVs. First, in the next section, I estimate ideal points by adding a weight to all new alternatives. This weight should affect risk-averse voters more than others. Second, I test if risk-averse MPs are more “maverick” than others. Third, a discussion section will summarize the main results.

### 5.3 Risk Aversion and the Status Quo Bias

In general, it is well known that there is a bias towards the status quo (Samuelson and Zeckhauser, 1988; Quattrone and Tversky, 1988). This can be explained by Kahneman and Tversky’s (1983) approach: as the subjective value function is steeper for gains than losses, a proposal has to have significantly more advantages than drawbacks compared to the status quo in order to be preferred. An equivalent proposal (for example better on two dimensions and worse on two other dimensions) has no chance to be preferred as voters will have the impression that they are losing more than they are winning. So, there is a bias toward the status quo implied by voters’ decision processes.<sup>6</sup> This is consistent with the fact that there are generally more risk-averse people than risk-acceptant ones (Dohmen et al., 2011).

However, is this bias stronger for risk-averse people? Several studies show that this is true for voters (Nadeau, Martin and Blais, 1999; Morgenstern and Zechmeister, 2001; Helmke, 2009; Ehrlich and Maestas, 2010; Kam and Simas, 2010; Kam,

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<sup>6</sup>This is without counting for the bias toward the status quo explained by the characteristics of political institutions (see for example Tsebelis (1995) and Gilens (2012)).

2012; Kam and Simas, 2012). I will assume that this is true for representatives. I argue that as the status quo is less risky, risk-averse legislators (MPs) should be less likely to vote for the new alternative. Consequently, I propose the following hypothesis:

*Hypothesis 1:* The more MPs are risk averse, the more likely they are to vote for the status quo, *ceteris paribus*.

I will test this in the estimation of a SMPV. I include a weight for new alternatives by modifying the item response theory (IRT) model. This model is presented in Appendix A. It estimates the following binomial probit models for every legislator  $i$  and every vote  $j$  and estimates votes' and legislators' parameters iteratively:

$$p(v_{ij} = \text{yes}) = \Phi(\beta_j x_i - \alpha_j),$$

The legislators ideal points are the  $x_i$ 's,  $v_{ij}$  is the vote choice of legislator  $i$  for object  $j$ , and  $\Phi$  is the cumulative density function of a standard normal distribution. The vote parameter  $\alpha_j$  is called the difficulty parameter of vote  $j$ . In psychometrics, it measures the difficulty of the questions, all answers being coded 1 if they are correct and 0 if they are wrong. It then measures the difficulty of the question. However, as a "yea" vote is sometimes coded 1 sometimes 0, this parameter is here less intuitive. The parameter  $\beta_j$  is the discrimination parameter of vote  $j$ . Its absolute value is a measure of how effectively the vote can discriminate between right and left preferences. If voting "yea" corresponds to a more rightist position than voting NO,  $\beta_j$  is positive. The model defines priors for each parameter, and then estimates each of them iteratively.

To this model, I add a "penalty" to all new alternatives and this penalty is multiplied by the level of risk aversion of legislator  $i$  (see the measure of risk aversion of legislators described below). This penalty should decrease (increase) the probability of voting "yea" for all risk-averse (risk-acceptant) legislators if the "yea" is the new

alternative, and increase (decrease) it if the “yea” is the status quo. The probability of voter  $i$  to select “yea” on vote  $j$  becomes:

$$p(v_{ij} = \text{yes}) = \Phi(\beta_j x_i - \alpha_j + \lambda * riskav_i * Iyna_j),$$

with  $\lambda$  the coefficient to be estimated,  $riskav_i$  a measure of risk aversion of legislator  $i$ , and  $Iyna_j$  an indicator equal to 1 if “yea” of vote  $j$  corresponds to the new alternative and  $-1$  if “yea” corresponds to the status quo. I expect  $\lambda$  to be negative, as risk aversion should decrease the likelihood of choosing the new alternative. This will allow me to test *hypothesis 1*. The next section presents the Swiss case and the data collected to estimate risk attitudes of the members of the Swiss Upper House.

### 5.3.1 The Data

The measure of risk aversion comes from a survey conducted on the Members of the Swiss Upper House during the 49th legislature in 2014. To build this variable, I combine several questions measuring risk aversion (see more details in Appendix B). The roll call votes are all final votes<sup>7</sup> of this chamber between 2011 and 2015.<sup>8</sup>

I have a measure of risk for 35 MPs and 126 votes are non-unanimous among these MPs. So, the roll call matrix is 35 by 126.<sup>9</sup> I estimate the modified IRT model, presented above, using the **R** package *rjags* (Plummer, 2014) and expect  $\lambda$ , the estimated parameter, to be negative.

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<sup>7</sup>I use final votes only, to avoid selection effect (Bütikofer and Hug, 2015).

<sup>8</sup>There is a total of 298 final votes. I recorded the first 167 based on videos of the sessions, and the last 131 were accessible online ([www.parlament.ch](http://www.parlament.ch)) as the chamber changed from a show of hands voting method to a recorded votes method in 2014. In these data, missing values can be due to several reasons. If the MP is president of the House, he will not vote except if there is a tie. Also, concerning the votes registered watching the videos, I coded all unclear votes as missing. Finally, the MPs can be absent, or decide to abstain.

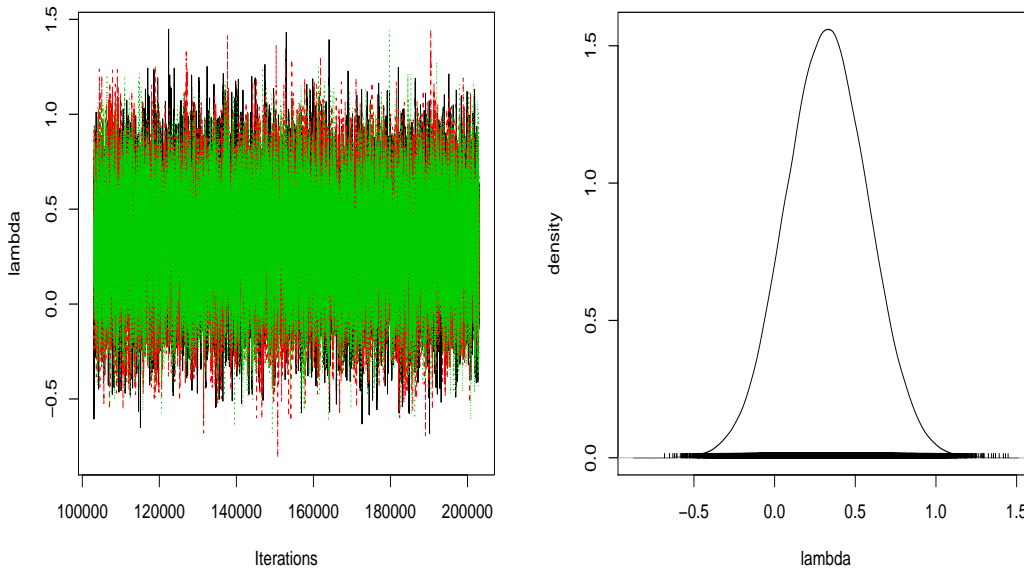
<sup>9</sup>As abstention could also be a way to avoid taking some risks, I regressed the share of abstention of each MP on his level of risk, but found no significant effect of risk aversion on the likelihood of abstaining from voting.

### 5.3.2 Results

The estimation of 3 chains of length 10 000, with a thinning interval of 20, and a burn-in of 3000 for each, gives a parameter  $\lambda$  of mean 0.327 and standard deviation 0.255, which is not consistent with *hypothesis 1* and not significant.<sup>10</sup>

Figure 5.1 shows the three chains and the distribution of the estimated parameter  $\lambda$ .

Figure 5.1: Coefficient Risk: Trace and Density Plots



As the chains overlap, it seems that the three estimations have converged towards the same value. As  $\lambda$  is not significantly different from 0, I cannot conclude that risk attitudes have an effect on the estimation of ideal points based SMPVs. In the next section, I test if risk-averse legislators are less predictable than risk acceptant legislators.

<sup>10</sup>As one could argue that the effect of the coefficient lambda should be proportional to the discrimination parameter, I also tried to run the model based on the following equation:  $p(v_{ij} = yes) = \Phi(\beta_j x_i - \alpha_j + \lambda * riskav_i * Iyna_j * abs(\beta_j))$ , with  $abs(\cdot)$  the absolute value function. However,  $\lambda$  was also positive and non significant.



## 5.4 Risk Attitudes and Mavericks

The literature on legislative voting mainly focuses on institutional features as dependent variables (Diermeier and Feddersen, 1998; Owens, 2003; Hix, Noury and Roland, 2005; Sieberer, 2006; Carey, 2007). An important result in this literature is that electoral systems have an effect on party cohesion (and thus predictability), and more specifically that proportionality increases party cohesion (Lancaster, 1986), although other studies find no effect of the electoral rule (Morgenstern and Swindle, 2005; Desposato, 2006). Several authors also focus on individual characteristics to explain legislators' votes (Mainwaring and Pérez, 1997; Tavits, 2009). I decide to take into account the institutional characteristics and to focus on individual level effects. I follow Tavits (2009) who defines a “maverick” as a legislator who does not follow the party line, and argue that in districts with low magnitude, risk-averse legislators are more likely to be maverick (i.e. unpredictable). Indeed, if district magnitude is low, voters choose among candidates rather than among parties (i.e. personalized campaigns). As stated by Lancaster (1986), “[t]he closer an incumbent’s identity is tied to a territorial base, the greater the incentive to support territorially based distributive policies.” Consequently, following the party line may be more risky. Thus, I test the following hypothesis:

*Hypothesis 2:* For representatives in districts with personalized campaigns, the likelihood to be a maverick increases with the level of risk aversion.

As 24 of the 26 Swiss cantons have plurality elections for the members of the Upper House, and that district magnitude varies between 1 and 2, I test my second hypothesis using the data in Switzerland presented in section 3 above.

### 5.4.1 Analysis

The idea of allowing heterogeneity across legislators in SMPVs comes from Poole (2001). He suggested that the variance of the utility function could be specific to each legislator. However he sees this variance ( $\sigma_i$ ) as a nuisance parameter, while Lauderdale (2010) suggests to interpret this variance as a measure of unpredictability of legislators. He finds that individuals with a larger variance of the error terms ( $\sigma_i$ ) are the ones called “mavericks” by the press in the US and he explains that this lower predictability is mainly due to “particularistic constituency interests” and “idiosyncratic legislator preferences” (p.151). His model is a modification of Martin and Quinn’s (2002) model and allows for flatter or steeper utility functions (although having constant levels of convexity). While other IRT models for roll call votes assume that the utility of an alternative is the square of the distance  $d$  (earlier represented as  $\|\cdot\|$ ) between the alternative and the ideal point of the legislator, here the likelihood is based on the following utility function:<sup>11</sup>

$$g(d) = -\frac{1}{\sigma_i}(d)^2, \quad \text{with } \sigma_i > 1$$

with  $g$  a monotonic decreasing function. The larger is  $\sigma_i$ , the flatter the utility function, and the less predictable the legislator. His model should thus allow to detect the so called “Mavericks” among Swiss legislators of the Upper House using all final votes of the 49th legislature.<sup>12</sup> Once I estimated a measure of predictability for each legislator, I will regress this measure on the level of risk aversion of the legislators. Figure 5.2 displays the estimated parameters of the IRT model. The first graph on the

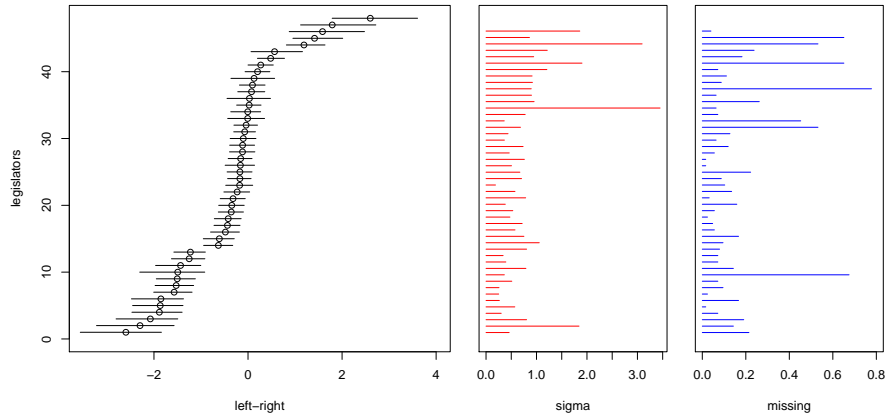
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<sup>11</sup>By assuming a different variance for each legislator ( $\sigma_j^2$ ), Lauderdale (2010) obtains a variant of the equation used by Clinton, Jackman and Rivers (2004):  $p(v_{ij} = yes) = \Phi(\frac{\beta_j x_i - \alpha_j}{\sigma_j})$ . Assuming  $g(d) = -\frac{1}{\sigma_j}(d)^2$  also leads to this same variant.

<sup>12</sup>I estimated the model using 3000 burn-in iterations, a thinning interval of 20, 3 chains of 10000 iterations each. Among a total of 298 votes, I used the 126 votes for which there was at least one “yea” and one “nay”. I used the `rjags` package from Plummer (2014).

left displays the estimated ideal points with their 95 percent confidence intervals.<sup>13</sup> The two bar plots on Figure 5.2 show the size of the estimated  $\sigma$  (unpredictability) for each legislator (in the middle) and also the share of missing votes for each legislator in the matrix of roll call votes (on the right).

Figure 5.2: Heterogeneous Model



Now that I have an estimation of how unpredictable Swiss MPs are, I can test if risk attitude has an effect on unpredictability. I estimate a regression with *unpredictability* ( $\sigma$ ) as the dependent variable and *risk aversion* as the main independent variable. As a control variable, I include the share of missing votes. Indeed, the model will not perform well for legislators who have a lot of missing votes and might give a large  $\sigma$ . I also add a control variable “local ties” as Tavits (2009) shows that the more legislators have local ties, the less they follow the party line (and thus the less they are predictable).<sup>14</sup> Table 5.1 displays the results.

<sup>13</sup>A similar graph locating all legislators of the Upper House of the 49<sup>th</sup> legislature and based on the same IRT model as Clinton, Jackman and Rivers (2004) is displayed in Appendix A, with the name, party, and Canton of each legislator.

<sup>14</sup>My measure is similar as hers. A legislator has a value of 1 if he was either mayor, municipal council member or cantonal council member and is in the national parliament since less than two terms.

Table 5.1: Explaining Maverick Behavior

	Model 1	Model 2
constant	0.60*	0.37
	(0.24)	(0.27)
risk averse	0.23	0.29
	(0.46)	(0.45)
share of missing		0.80
		(0.58)
local ties		0.17
		(0.18)
$N$	35	35
$R^2$	0.01	0.11

Standard errors in parentheses

· significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

The results are consistent with *hypothesis 2*, as risk averse voters seem to be more likely to behave like mavericks, although the effect is not significant. Besides this result, the effect of local ties seems to confirm Tavits' (2009) finding, namely that legislators with strong local ties are less likely to follow the party line. Finally, the share of missing values seems to increase the level of unpredictability of a legislator, although this might be due to the assumptions of the model concerning missing values.<sup>15</sup>

## 5.5 Conclusion

This paper discusses how risk attitudes could affect the estimation of ideal points using SMPVs. I explain that varying the convexity of actors according to their level of risk aversion leads to some drawbacks and is thus not appropriate for SMPVs. Moreover, I don't find any significant effect of risk aversion on the likelihood to vote for the status quo, in SMPVs. Finally, I find that risk-averse legislators in a system

<sup>15</sup>The model from Clinton, Jackman and Rivers (2004) on which Lauderdale's (2010) model is based, samples difference in utilities between a "yea" and a "nay" from an untruncated normal distribution with mean equal to  $\beta_j x_i - \alpha_j$ . This sampled probability is then used in the sampling of the ideal point of the legislator. These untruncated distributions might lead to higher variance.

with small district magnitude are less predictable than risk-acceptant ones, although the effect is not significant.

The results suggest that there is no significant effect of risk attitudes on ideal point estimation based on SMPVs. However, these hypotheses need additional tests on larger samples.

## 5.6 Appendix A

### 5.6.1 Risk Aversion and the Shape of the Utility Function

In spatial voting models, it is generally assumed that the utility  $U$  of a voter to choose a particular alternative is a function of the distance ( $d$ ) between his ideal point ( $x_v$ ) and the location of the alternative  $a$  ( $x_a$ ):

$$U = g(d), \quad \text{with } d = \|x_v - x_a\|, \text{ and } g \text{ a monotonic decreasing function.}$$

If the location of the alternative entails some uncertainty,  $x_a$  can be seen as a random variable and the expected utility for a voter to choose a specific alternative may be written as follows:

$$E[g(\|x_v - x_a\|)] = \int g(\|x_v - x_a\|)f(x_a)dx_a,$$

with  $f$  the distribution function of the random variable  $x_a$ . Following Pratt (1964) and Berinsky and Lewis (2007), let us assume now that there are two voters with the same ideal point  $x_v$ , the first being less risk averse than the second. For the first voter, the expected utility of choosing the alternative  $a$  corresponds to the utility of choosing a sure outcome at a distance  $d_1$  ( $g_1$  is the utility function of the first voter):

$$E[g_1(\|x_{v_1} - x_a\|)] = \int g_1(\|x_{v_1} - x_a\|)f(x_a)dx_a = g_1(d_1),$$

If the second voter is more risk averse than the first, then the expected utility for him to choose the alternative  $a$  is smaller than the utility to choose a sure alternative with distance  $d_1$  ( $g_2$  is the utility function of the second voter):

$$E[g_2(\|x_{v_1} - x_a\|)] = \int g_2(\|x_{v_1} - x_a\|)f(x_a)dx_a \leq g_2(d_1)$$

This holds for any alternative  $a$  if  $g_2^{-1}(g_1(d))$  is concave (see Pratt (1964) for a proof), or in other words, if  $g_1$  is more concave than  $g_2$ .

### 5.6.2 The Main Existing SMPVs

Beside the Optimal Classification model where no functional form of the utility is assumed, the main existing spatial voting models assume either a normal utility function, principally the model “NOMINATE” developed by Poole and Rosenthal (1985), or a quadratic utility function, issued from IRT (see for example Albert and Chib (1993) and Martin and Quinn (2002)). These two models use Bayesian estimation to estimate iteratively the votes parameters and the legislators’ ideal points. The models, mainly characterized by their respective conditional distribution, are described below.

#### 5.6.2.1 Poole and Rosenthal’s model and its main assumptions

In this model, the utility of voter  $i$  ( $i = 1, \dots, n$ ) to choose “yea” on vote  $j$  ( $j = 1, \dots, m$ ) is defined as:

$$U_{ijY} = u_{ijY} + \varepsilon_{ijY} = \gamma \cdot \exp\left(\frac{-w^2 \cdot \|x_i - z_{jY}\|^2}{2}\right) + \varepsilon_{ijY},$$

with  $x_i$  the location of voter  $i$ ,  $z_{jY}$  the location of the “yea” alternative of vote  $j$ , and  $\varepsilon_{ijY}$  a random variable independent and identically distributed following a Weibull distribution. The parameters  $\gamma$  and  $w$  equal  $1/(\sqrt{2\pi}\sigma^2)$  and  $1/\sigma$  respectively, if the normal distribution has variance  $\sigma^2$ .<sup>16</sup> Thus, the greater the distance between the voter’s ideal point and the location of the “yea”, the smaller the utility for this voter to opt for the “yea”. Similarly, the utility of voter  $i$  to choose “nay” for vote  $j$  is:

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<sup>16</sup>Poole and Rosenthal (1985) then set  $\gamma$  to 1/2 in their estimation.

$$U_{ijN} = u_{ijN} + \varepsilon_{ijN} = \gamma \cdot \exp\left(\frac{-w^2 \cdot \|x_i - z_{jN}\|^2}{2}\right) + \varepsilon_{ijN},$$

with  $x_i$  the location of voter  $i$ ,  $z_{jN}$  the location of the “nay” of vote  $j$ , and  $\varepsilon_{ijN}$  a random variable iid distributed following the log of the inverse exponential distribution. Thus, the greater the distance between the voter’s ideal point and the location of the “nay” , the smaller the utility for this voter to opt for the “nay” . The probability of voter  $i$  to answer “yea” on vote  $j$  is defined as follows:

$$\begin{aligned} p(v_{ij} = yes) &= p(U_{ijN} < U_{ijY}) \\ &= p(u_{ijN} + \varepsilon_{ijN} < u_{ijY} + \varepsilon_{ijY}) \\ &= p\left(\gamma \cdot \exp\left(\frac{-w^2 \cdot \|x_i - z_{jN}\|^2}{2}\right) + \varepsilon_{ijN} \right. \\ &\quad \left. < \gamma \cdot \exp\left(\frac{-w^2 \cdot \|x_i - z_{jY}\|^2}{2}\right) + \varepsilon_{ijY}\right) \end{aligned}$$

and by defining:

$$\epsilon_{ij} = \varepsilon_{ijN} - \varepsilon_{ijY},$$

$\epsilon_{ij}$  follows the logistic distribution with mean 0 and standard deviation 1, and the probability of voter  $i$  to answer “yea” on vote  $j$  becomes:<sup>17</sup>

$$\begin{aligned} p(v_{ij} = yes) &= \int_{-\infty}^{u_{ijN} - u_{ijY}} \frac{\exp(-x)}{(1 + \exp(-x))^2} dx \\ &= \frac{\exp(u_{ijY})}{\exp(u_{ijY}) + \exp(u_{ijN})} \end{aligned}$$

This model estimates iteratively the parameters  $\gamma$  and  $w$ , the locations of the legislators, and the locations of the alternatives.

---

<sup>17</sup>The full equation is:

$$p(v_{ij} = yes) = \frac{\exp\left(\gamma \cdot \exp\left(\frac{-w^2 \cdot \|x_i - z_{jY}\|^2}{2}\right)\right)}{\exp\left(\gamma \cdot \exp\left(\frac{-w^2 \cdot \|x_i - z_{jY}\|^2}{2}\right)\right) + \exp\left(\gamma \cdot \exp\left(\frac{-w^2 \cdot \|x_i - z_{jN}\|^2}{2}\right)\right)}$$



### 5.6.2.2 Martin and Quinn's model and its main assumptions

In this model, the utility of voter  $i$  ( $i = 1, \dots, n$ ) to choose “yea” on vote  $j$  ( $j = 1, \dots, m$ ) is defined as:

$$U_{ijY} = -\|x_i - \zeta_j\|^2 + \eta_{ij},$$

with  $x_i$  the location of voter  $i$ ,  $\zeta_j$  the location of the “yea” of vote  $j$  and  $\eta_{ij}$  a random variable following a normal distribution with mean 0. Thus, the greater the distance from the voter to the “yea” location, the lower the utility of this option. Similarly, the utility of voter  $i$  to choose “nay” for vote  $j$  is:

$$U_{ijN} = -\|x_i - \psi_j\|^2 + \nu_{ij},$$

with  $x_i$  the location of voter  $i$ ,  $\psi_j$  the location of the “nay” of vote  $j$  and  $\nu_{ij}$  a random variable following a normal distribution with mean 0. Thus, the greater the distance from the voter to the “yea” location, the lower the utility of this option. Given the utilities above, the probability of voter  $i$  to answer “yea” on vote  $j$  is defined as follows:

$$\begin{aligned} p(v_{ij} = \text{yes}) &= p(U_{ijN} < U_{ijY}) \\ &= p(-\|x_i - \psi_j\|^2 + \nu_{ij} < -\|x_i - \zeta_j\|^2 + \eta_{ij}) \\ &= p(\nu_{ij} - \eta_{ij} < \|x_i - \psi_j\|^2 - \|x_i - \zeta_j\|^2) \\ &= p(\nu_{ij} - \eta_{ij} < \psi_j^2 - \zeta_j^2 - 2x_i\psi_j + 2x_i\zeta_j) \\ &= \Phi(\beta_j x_i - \alpha_j), \end{aligned}$$

with  $\alpha_j = (\zeta_j^2 - \psi_j^2)/\sigma_j$ , the difficulty parameter. The discrimination parameter is  $\beta_j = 2(\zeta_j - \psi_j)/\sigma_j$ , and  $\sigma_j$  is the standard deviation of  $(\nu_j - \eta_j)$  that is assumed to follow a normal distribution  $N(0, \sigma_j)$ .

These two models assume that the utility is a function of the exact distance between a voter and an alternative, plus a random noise. In other words, it assumes

that the noise is not due to a lack of perception of the effective distance. As I will discuss, this has implications concerning how risk attitudes can be taken into account in these spatial voting models.

## 5.7 Appendix B

### 5.7.1 Risk Attitudes Among Swiss Legislators

In the analyses of the present paper, the main independent variable is the propensity to take risks among representatives. To estimate this variable, I conducted a survey during the 2014 summer session of the Swiss Upper House. Among the 46 members of the Upper House, 35 agreed to answer my survey.<sup>18</sup> The survey includes seven questions on risk. To estimate risk attitudes of representatives, it is necessary to have questions on various topics, but especially on topics related to political decisions, as risk aversion varies across contexts (Slovic, 1964; Slovic, 1972), although it has a clear personal component too (Dohmen et al., 2011). Among the seven questions, four are related to uncertainty in political decisions, and three to risk attitudes in life in general:

**Question 1:** Imagine that Switzerland is preparing for an outbreak of an unusual disease which is expected to kill 600 people. Two alternative programs to combat the disease are proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If program A is adopted, 400 people will die. If program B is adopted, there is a 1/3 probability that no one will die, and 2/3 probability that 600 people will die. Which of the two programs would you favor?

**Question 2:** How inclined are you to vote for a new agreement between Switzerland and another country if among the 3 sources you trust the most, 2 predict that it will be favorable to the people you represent and one say that it will be unfavorable to them?

0 very inclined

1 somewhat inclined

2 neither somewhat inclined nor somewhat disinclined

3 somewhat disinclined

4 very disinclined

---

<sup>18</sup>In fact there were 36 legislators, but one refused to answer any of the questions. Among the 35, 6 did not answer all questions. I find that the main known covariates of risk aversion, ideology, age, gender, and education do not explain participation to this survey. So there is no apparent bias in the sample.

**Question 3:** The state of Epsilon is interested in developing clean and safe alternative sources of energy. Two programs for establishing solar energy within the state are considered. If program X is adopted, then it is virtually certain that over the next four years the state will save 20 million CHF in energy expenditures. If program Y is adopted, then there is a 80% chance that the state will save 30 million CHF in energy expenditures over the next four years and a 20% chance that because of cost overruns, the program will produce no savings in energy expenditures at all. To summarize, the alternative policies and their probable consequences are:

Program X: 40 million CHF savings with certainty

Program Y: 80% chance of saving 60 million CHF, 20% chance of no saving.

Imagine you were faced with the decision of adopting program X or program Y. Which would you select?

**Question 4:** How inclined are you to vote for a new economy bill that has 70% chance to lead to a better outcome for the people you represent and 30% chances that it will lead to a worse outcome?

0 very inclined

1 somewhat inclined

2 neither somewhat inclined nor somewhat disinclined

3 somewhat disinclined

4 very disinclined

**Question 5:** [NOTE: THIS QUESTION IS NOT USED IN THIS PAPER] If you are unsure about the outcome of a bill, how likely are you to turn to your co-partisans as reliable sources of information about the effect of the bill on the constituents?

0 very likely

1 somewhat likely

2 neither somewhat likely nor somewhat unlikely

3 somewhat unlikely

4 very unlikely

**Question 6:** In general, how easy or difficult is it for you to accept taking risks? (very easy; somewhat easy; somewhat difficult; very difficult)

**Question 7:** Suppose you were betting on horses and were a big winner in a race. Would you be more likely to continue playing or take your winnings?

-definitely continue playing;

-probably continue playing; not sure;

-probably take my winnings;

-definitely take my winnings

**Question 8:** Now I will briefly describe a person. Would you please indicate whether that person is:

- very much like you,
- like you,
- somewhat like you,
- little like you,
- not like you, or
- not at all like you?

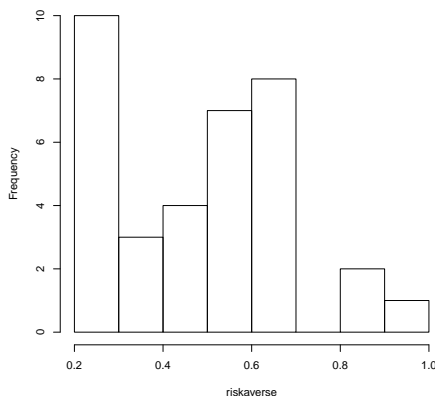
Adventure and taking risks are important to this person; to have an exciting life.

### 5.7.2 Measuring Risk Aversion

In order to find the best possible combination of these variables, and because the Cronbach's alpha of all items combined is weak, I decide to estimate a Cronbach's alpha for each possible combination of the variables (i.e. any combination of 2 to 7 of these items). To increase the chances of having a meaningful measure, I use a combination of the items that has one of the highest alphas. The highest Cronbach's alpha is 0.615 and includes three questions (2, 6 and 8). The second highest is 0.597 and includes four questions (2, 3, 6 and 8). Because the alpha is not much smaller and because it combines two questions related to political decisions with two more general questions on risk, I decide to aggregate these four questions to measure risk.

I construct the measure of risk aversion by taking the mean of these four items rescaled from 0 (risk acceptant) to 1 (risk averse). For the legislators who did not answer all questions, I take the mean of the non missing values among these four items (two MPs have two missing values among the four items, and two have one). The distribution of the measure is displayed in Figure 5.3:

Figure 5.3: Distribution of Risk Aversion



Now that I have defined my measure, I can test the correlation pattern between risk and its main covariates. Table 5.2 presents the correlations with the main known covariates of risk (except income) for the 31 legislators (i.e. only the ones with no missing item).

Table 5.2: Risk Aversion and its Main Covariates

	correlation p-value	
female	-0.03	0.89
age	0.34	0.06
left-right	0.26	0.16

The correlation between gender and risk aversion among legislators is close to zero. Byrnes, Miller and Schafer (1999) present a meta-analysis of 150 studies testing the effect of age on risk propensity. They find that men take generally more risks than women. However, they also find that the gender gap decreases over age. They show that the effect of gender on risk attitudes decreases after 21 years old. As the mean age of our sample is 56 and the range goes from 34 to 69, this can explain why gender is not significantly correlated with risk attitudes in my sample. Table 5.2 shows a positive but weak correlation between age and risk aversion. MacCrimmon and Wehrung (1990) find that their measure of “maturity” (an aggregation of age, seniority in the firm and the number of dependents)

explains the difference between high risk-taking and high risk-averse executives, the higher on the “maturity” scale being more risk averse. Riley and Chow (1992) find that the relation between age and risk aversion has a U shape, risky asset allocation being more frequent among people between 20 and 65 years old.<sup>19</sup> The sign of the correlation between age and risk aversion is thus consistent with the literature. Also included in Table 5.2 is the correlation coefficient between risk aversion and the left-right scale. The measure used here to estimate the location on the left-right dimension is the left-right location of the MP’s party as estimated by the respondents of the Swiss Electoral Survey of 2011. By using this measure, I lose some variability because every MP from the same party has the same value, but as the main argument of this paper is that risk aversion might have an effect on voting behavior, it does not make sense to use an estimation of the left-right location based on rollcall votes. Leftists being generally more risk acceptant than rightists, the sign in Table 5.2 is as expected, but the relation is not significant.

To summarize, one correlation is null, one covariate is correlated significantly (at the 10% level) with risk attitudes in a way that is consistent with the literature, and one correlation has a p-value of 0.16 but the sign is consistent with the literature. So, although the correlations are weak, the patterns are quite consistent with the literature.

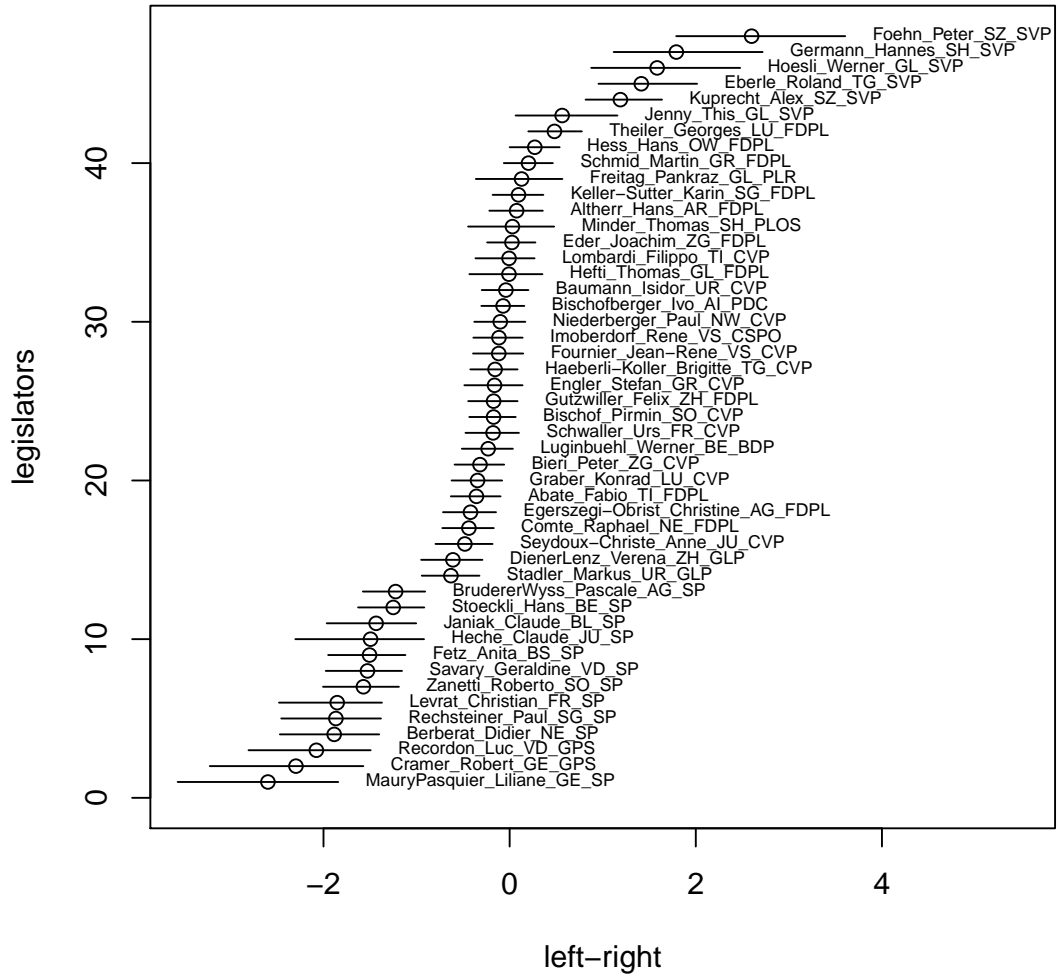
### 5.7.3 Legislators Ideal Points

Figure 5.4 below displays the left-right locations of legislators, estimated using the model of Clinton, Jackman and Rivers (2004). Beside the ideal points, the legislator name, the canton, as well as the party are displayed.

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<sup>19</sup>However, as the authors explain, their result might be explained by wealth and income, as they tend to increase until retirement and then decrease.

Figure 5.4: Homogeneous Model





## CHAPTER VI

### Conclusion

The main motivation for conducting the four studies presented in this work was that risk attitudes are ignored in most analyses on representation, this probably because scholars see risk as a component of ideology. However, I think that it is precisely because risk is a covariate of ideology that this trait should not be ignored. Indeed, if risk affects voting behavior, it can lead to important biases in democratic representation because risk is correlated with ideology.

In Chapter 2, I find that risk attitudes do affect the behavior of voters. Risk averse voters are less likely to vote for a new party. This suggests that party entry is more more difficult on the right, where voters are more risk averse. Thus, rightist party may worry less about new party entry and feel less pressure to adapt to changes in their voters preferences. I also find in Chapter 3 that risk averse voters are less likely to vote strategically. This result has implications for the party system. Indeed, as risk and ideology are correlated, representation may be more proportional on the right. This suggests that leftist parties may be represent a broader ideological range (catch-all parties) and thus reflect the preferences of voters less truly than parties on the right. It would be interesting to test, in future research, if such difference exists and varies over the proportionality of the electoral system.

Concerning representatives, although I find in Chapter 4 that risk aversion has an effect on the likelihood of voting strategically, this effect is mediated by ideology. It is interesting to note that in Chapter 2, risk aversion of voters has a direct effect on the likelihood of voting for a new party, while in Chapter 4, the effect of risk aversion of representatives

on the likelihood of voting for a new proposal is mediated by ideology. Maybe this means that representatives are not influenced by their own characteristics but only by the level of risk attitudes corresponding with the ideology they represent. It would be interesting to test if the effect of risk on the likelihood of voting for a new alternative has a direct effect or is also mediated by ideology, among voters, using objects of direct democracy. Finally, in Chapter 5 I find that risk aversion does not significantly affect the estimation of ideal points. However, similar analyses should be conducted using a larger sample.

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