

Coalition-directed Voting under Uncertainty

Short title: Coalition-directed Voting under Uncertainty

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Abstract

When voters support parties in multi-party democracies, it is often uncertain what coalition government the party will join. How do voters deal with the lack of clarity in parties' coalition government prospects? We develop a novel conceptualization of coalition-directed voting to study the effects of this type of uncertainty. We present observational and experimental evidence that supports the idea that voters are risk-averse when considering coalition government options. Observational survey analyses show that the perception of uncertain coalition prospects negatively affects the propensity to vote for such a party, even when holding the expected coalition government payoffs constant. Using a survey vignette experiment, we provide causal evidence that uncertain coalition prospects reduce the propensity to support a party, compared to certain coalition prospects given the same expected coalition government payoffs. Together, these findings provide insights for our understanding of party competition and parties' coalition strategies.

Keywords: Coalition Government; Strategic Voting; Risk Preferences; Uncertainty; Proportional Representation

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Democracy embodies institutionalized uncertainty because we do not know which party will come to power or which policies the new government will adopt (Przeworski et al., 2000). This uncertainty is particularly pronounced in proportional election systems, which often result in coalition governments and bring significant unpredictability regarding the formation of the government after the election. Comparative political scientists and democratic theorists have discussed how uncertainty undermines the potential for accountability and representation in such systems (Kam et al., 2020; Powell, 2000). The central threat to accountability is that “elections in polities characterized by coalition governments present uncertainty for voters” (Bargsted and Kedar, 2009, 207). The textbook perspective of this uncertainty is that coalition governments blur the clarity of responsibility if they implement compromises between the governing parties, making it difficult for voters to retrospectively sanction any particular party and to hold coalition governments accountable (Powell, 2000).

This uncertainty also impacts the prospective selection of the new government. Even if voters know which coalition government to sanction or reward, they typically cannot directly choose the government coalition. Instead, they must vote for parties. And while certain systematic factors, such as coalition size, a party’s past coalition history, and ideology (Martin and Stevenson, 2001), make coalition outcomes somewhat predictable for voters, some uncertainty remains about which coalition will ultimately form. As a result, voters lack complete clarity about parties’ government prospects, making it difficult for them to mandate a party for their preferred government and, in turn, hold parties accountable.

How voters consider the lack of clarity about parties’ government prospects is central to our understanding of accountability in proportional systems. Existing studies on coalition-directed voting emphasize that many voters take coalition government prospects into account (Duch et al., 2010; Meffert and Gschwend, 2010; Bargsted and Kedar, 2009; Kedar, 2012; Blais et al., 2006). However, previous research does not investigate how the lack of clarity about these prospects affects voting decisions. Do voters reject or tolerate uncertainty about what their party vote choice implies for the party’s government participation? Standard coalition-directed voting models (e.g. Duch et al., 2010), and research on party competition (e.g. Golder, 2006), assume that voters reject uncertainty, but this assumption remains untested. Moreover, there is no general coalition-directed voting model that allows us to

derive implications regarding the conditions under which voters would reject or tolerate uncertainty about government prospects.

At the heart of this discussion is the question about voters' risk preferences in coalition-directed voting decisions. Risk-averse, coalition-directed voters value more clarity, while risk-seeking coalition-directed voters are more willing to take a gamble if there is a chance to get their most preferred government in the end. Hence, two voters with the same preferences for coalition governments might end up voting for different parties given different risk preferences. Clarifying the role of risk preferences in the domain of coalition-directed voting helps scholars assess the degree to which voters actually use elections as instruments of democracy, either retrospectively, to hold governments accountable or prospectively, to provide a clear mandate for a future government (Powell, 2000).

We propose a novel conceptualization of coalition-directed voting grounded in expected utility theory to address how voters deal with the lack of clarity about parties' government prospects. Our starting points are models for coalition-directed voting in multiparty democracies. In these models, voters evaluate parties not only based on party characteristics itself, but also based on the evaluation of coalition governments a party is likely to negotiate (Duch et al., 2010; Gschwend et al., 2017).

In our model, a party either ends up in the opposition or in the government. A party has potentially several coalition government options. Thus, voters assign payoffs to all potential government or opposition outcomes of a party based on their preferences and evaluate how likely they might occur. We call this process a 'post-election lottery'. It encapsulates the uncertainty in voting outcomes for a party by combining the perceived payoffs for the potential outcomes and the probabilities of their occurrence within the framework of coalition-directed decision-making.

Voters' risk preferences, indicative of risk tolerance, play a crucial role in this process, as voters might derive different utilities from the same payoff. In the expected utility model, the type of risk preferences depends on the assumed functional form of the utility function that translates government and opposition payoffs into utilities. The expected utility derived from voting for a party is then the weighted average of the utilities for each outcome and the perceived probabilities of their occurrence. Ultimately, voters use these expected utilities to

compare and decide which party to support, effectively navigating through the uncertainty of post-election scenarios.

This conceptualization of coalition-directed voting permits us to study whether voters are risk-averse or risk-seeking when considering parties' government prospects. As it is difficult to observe (or even to estimate) the curvature of the utility function directly, we derive two observable implications from our model to infer rather than to assume average voters' risk preferences in coalition-directed voting. The first implication leads to an observational survey research design, the second to an experimental research design.

To test the first implication of our theory, we compile secondary data from 19 different surveys fielded during 15 election campaigns in Austria, Belgium, Germany, Netherlands, New Zealand, Spain, and Sweden that contain the necessary measures of perceived government probabilities, and associated government payoffs. A meta-analysis provides evidence that voters are risk-averse in coalition-directed decisions, as they are more likely to vote for a party if it is more certain what coalition government a party is likely to enter—holding the evaluation of a party's government prospects constant. We find the general conclusions to hold even if we control for potential confounders, such as partisan misperceptions of coalition governments.

To test the second implication of our theory, we conducted a pre-registered vignette survey experiment during the German 2021 election and show that the lack of clarity about coalition government prospects is also *causally* related to vote choice. We presented respondent-specific vignette scenarios based on pre-treatment measures of perceived government probabilities and payoffs, and ask them about their propensity to vote for a given party. While we again confirm that voters are risk-averse, the experiment shows that voters in the “certain” scenario have a higher propensity to vote for the respective party compared to two “uncertainty” scenarios with additional coalition government options while holding constant the government payoffs. Our experimental evidence, thus, increases confidence that the findings of our observational study are not due to unobserved confounding.

The finding that voters are risk-averse in the domain of coalition-directed voting has implications for our understanding of electoral institutions. The uncertainty that exists in electoral systems where voters cannot choose their government directly typically reduces vot-

ers' propensity to vote for parties with unclear coalition government prospects. It underlines that voters would like to support parties with clear coalition government prospects, to be able to provide a strong mandate for the future government (Golder, 2006). This raises the question of how harmful the consequences of this uncertainty are, and whether there are ways to mitigate them. Our research speaks to informal institutions that increase the predictability of the coalition government formation process in proportional systems. One informal institution is pre-electoral coalitions and coalition signals (Bowler et al., 2022; Debus, 2007; Golder, 2006; Gschwend et al., 2017). Parties that clearly signal what governments they are willing to enter reduce the uncertainty on the side of risk-averse coalition-directed voters. Thus, coalition signals endow proportional systems with desirable properties of majoritarian systems (Strom, 1990; Powell, 2000).

Coalition Government Prospects and Electoral Behavior

Voters in proportional representation systems face unclear prospects of what support for a party on election day implies for the future government, as parties negotiate government coalitions post-election. Before the 2021 German federal elections, for example, the political landscape in Germany saw notable shifts. Incumbent chancellor Angela Merkel from the right-of-center Christian Democratic Union (CDU/CSU) chose not to seek re-election, opening up competition between multiple parties to replace the grand coalition government between the Social Democrats (SPD) and the CDU/CSU. Voters were uncertain what a vote for CDU/CSU would imply for government formation. The CDU/CSU could either end up in a coalition with the left-of-center Greens and the centrist Free Democrats (FDP), continue a grand coalition with the left-of-center Social Democratic Party (SPD), or although considered very unlikely form a right-wing coalition together with the FDP and the populist-right AfD (*Alternative für Deutschland*). Alternatively (and as it turned out), should the CDU/CSU not be able to form a coalition, the party would find itself sitting on the opposition benches after the new government has been formed, and other options like the traffic light coalition (SPD-Greens-FDP) take on government responsibility.

A large literature on coalition-directed strategic voting in proportional systems reveals

that voters take these coalition government prospects into account when voting for parties (Bargsted and Kedar, 2009; Blais et al., 2006; Duch et al., 2010; Kedar, 2012; Meffert and Gschwend, 2010). Voters are able to assess the chances of coalition government formations (see e.g. Bowler et al., 2022), and their expected positions (see e.g. Bowler et al., 2020; Fortunato et al., 2021), permitting voters to integrate their expectations which coalition government will form into their decision calculus. Duch et al. (2010), for example, show that, across 30 countries, voters use the expected coalition ideology next to party ideology to inform their vote decision. These considerations can lead voters to desert their most preferred party and cast a strategic, coalition-directed vote (Bargsted and Kedar, 2009). The studies, thereby, confirm that voters judge a party not only by its cover but also by what government they get from it. And voters supposedly care about different government coalitions because of the possible policy positions they represent.

However, the aforementioned studies have not focused on the direct effect of the lack of clarity about coalition government prospects on voters' propensity to vote for parties. Coalition-directed vote choice models (e.g., Duch et al., 2010; Bahnsen et al., 2020) propose that voters can form expectations about the post-electoral bargain process and integrate them into their calculus. In contrast to previous research, we argue that the lack of clarity given the uncertainty regarding the coalition government prospects can have a separate and distinct effect on voters' evaluation of parties and, hence, on their vote choice, too.

Consider a voter in the example from the last German federal election above that supports the CDU/CSU-SPD coalition but opposes a coalition of the CDU/CSU with Greens and FDP. She can weigh the chances, form expectations about these different coalition government prospects of the CDU/CSU, and integrate them into her decision calculus. But the mere uncertainty of which governing coalition the CDU/CSU will join could deter such a coalition-directed voter from voting CDU/CSU, regardless of the expected coalition government payoffs for the CDU/CSU. Why voting for CDU/CSU if she could end up getting a non-preferred coalition with the Greens and the FDP? This would make the voter risk-averse with respect to the evaluation of the CDU/CSU as the party gets a penalty for unclear coalition government prospects. Instead, the voter might be willing to tolerate the lack of clarity and finds the mere prospect to get her preferred CDU/CSU-SPD coalition government at-

tractive enough to vote CDU/CSU, even at the chance that CDU/CSU could end up in the coalition with FDP and Greens. In this portrayal, the voter would be risk-seeking and tolerates the lack of clarity regarding the coalition government prospects of the CDU/CSU.

The role of risk preferences in coalition-directed voting decisions has not been studied yet. In expected utility models, that are common in the literature, the functional form of the utility function decides about the risk preferences of the decision-makers.¹ Previous literature dealt with risk preferences in political decisions by assuming certain risk profiles of voters in two-party (Shepsle, 1972) or multi-party systems (Golder, 2006). This also holds for coalition-directed voting. For example, Duch et al. (2010) assume a quadratic utility function that generally implies risk-averse behavior (see also Armstrong and Duch, 2010; Bargsted and Kedar, 2009; Kedar, 2005). In her study on pre-electoral coalitions, Golder argues that such coalitions could be electorally advantageous if voters are “risk-averse with regard to the policy positions of potential future governments” (Golder, 2006, p.7), but does provide no empirical analysis to evaluate this claim.

Other studies have developed observational and experimental approaches to evaluate risk preferences for other political decisions. Another area of political decisions identifies risk preferences for ambiguous policy platforms. Berinsky and Lewis (2007) use survey analyses to evaluate the functional form of a spatial utility function and find support for the notion that voters are risk-averse in spatial utility decisions. Tomz and Van Houweling (2009), to the contrary, uses experimental methods and find no clear indication of risk-aversion, rather risk-seeking or neutral behavior. No study, however, evaluated the role of risk preferences for coalition-directed voting.

Conceptualizing Coalition-directed Voting

In this section, we characterize coalition-directed voting for a party as a decision under uncertainty and use expected utility theory to conceptualize how the uncertainty in parties

¹There are two traditions of how to investigate risk preferences in decisions. One strand of the literature leverages citizens' individual variation in *stated* risk preferences as a predictor of certain types of political behavior, for instance, strategic voting (Martin, 2021) or voting for populist radical right parties (Oshri et al., 2023). We mainly follow the other strand of the literature that studies decisions using the expected utility model, through which individuals *reveal* their risk preferences.

coalition government prospects influences voters' decisions. The conceptualization permits to derive clear implications about the effect of risk-preferences on coalition-directed voting.

When voting in proportional systems, the final outcome of interest is which government ultimately forms after the election (see, e.g., [Bargsted and Kedar, 2009](#); [Duch et al., 2010](#); [Gschwend et al., 2017](#); [Indridason, 2011](#); [Kedar, 2005, 2012](#)). While voters' choice-set consists of parties, coalition-directed voters anticipate potential post-election coalition formation outcomes for each party before making their decision. They evaluate post-election outcomes of a party and judge how likely they will occur. For example, when voting for the CDU/CSU in the 2021 German federal election, one did not know for sure in advance whether the CDU/CSU would end up in a coalition with the Greens and the FDP, continue a grand coalition with SPD, or even (albeit unlikely) enter a right-wing coalition with the AfD and the FDP. And, of course, it was also uncertain if the CDU/CSU would end up in government at all, or find itself on the opposition benches. A voter in this election who is interested in choosing the next government evaluates these different CDU/CSU government outcomes and judges how likely they are.

The starting premise of our model is then that voters hold perceptions of the post-election process. The post-electoral coalition building process is highly strategic and not completely random. Coalition formation theories derive key aspects that influence coalition building, like the size of the coalition, a party's past coalition history, and ideology ([Martin and Stevenson, 2001](#)). Voters can employ similar heuristic models to form beliefs about the coalition-building process. In addition, "election campaigns, particularly the explicit communication efforts by the competing parties, provide voters with information about coalition formation likelihoods" ([Duch et al., 2010](#), p.702). The information includes the parties' pre-electoral coalition signals (e.g., [Bahnsen et al., 2020](#); [Bowler et al., 2022](#); [Falcó-Gimeno and Muñoz, 2017](#); [Gschwend et al., 2016, 2017](#)) or pre-electoral opinion polls ([Stoetzer and Orlowski, 2020](#)). These sources allow voters to form perceptions about the post-election process and pin down the uncertainty they face in choosing the prospective government. For our theoretical model, we presuppose that voters' perceptions are exogenous, as our main interest lays in understanding the effects of these uncertain coalition government prospects on voting.

Expected utility theory provides a framework for understanding decisions under uncertainty. The theory introduces the concept of a ‘lottery,’ defined as a probabilistic distribution over a set of possible outcomes, each associated with specific probabilities and payoffs. While the term ‘lottery’ in everyday language often suggests complete randomness, in expected utility theory, it represents a quantifiable level of uncertainty from the decision-maker’s perspective. In our context, a voter prefers certain government constellations over others and holds beliefs about the probabilities of a party ending up in specific government constellations. This conceptualization allows us to derive precise conditions under which we should observe whether voters are risk-averse or risk-seeking when considering parties’ government prospects.

We define a *post-election lottery* $L_{i,j}$ of voter i and party j by payoffs for all possible post-electoral outcomes for party j and their perceived probabilities (see Figure 1). Party j could either end up in opposition, resulting in an *opposition outcome* o_j , or in government, resulting in a *government outcome* g , with perceived probabilities $1 - \pi_{i,j}$ and $\pi_{i,j}$, respectively. We distinguish between opposition and government outcomes because this encompasses all post-election possibilities for a party and directly captures how voters evaluate coalition government options, particularly for parties with a high chance of entering government.²

Parties first discuss and negotiate coalitions with other parties and then enter a government based on the results of these negotiations. Thus, party j can enter one of several possible (coalition) *government outcomes* $g_{j_1}, \dots, g_{j_N}$, with perceived *government probabilities* $\gamma_{i,g_{j_1}}, \dots, \gamma_{i,g_{j_N}}$ where $\sum_k \gamma_{i,g_{j_k}} = 1$.³ Given that voters care about the different outcomes, the probability of a party entering the government is conditional on its ability to form a particular coalition.

Voters derive a perceived payoff from each opposition and government outcome.⁴ The

²Another potential scenario to consider is when a party fails to secure parliamentary representation due to electoral thresholds. However, we have chosen not to incorporate this option into our model since our primary focus is on analyzing risk preferences concerning post-election lotteries. Future research may choose to incorporate this aspect to investigate more specialized strategic voting behaviors, such as rental voting (Gschwend et al., 2016; Meffert and Gschwend, 2010).

³An option next to majority coalition governments that we consider implicitly are support agreements that are often used to elect minority governments (Krauss and Thürk, 2022). These can be integrated as additional post-electoral outcomes for a party.

⁴Perceived pay-offs can be shaped by voters’ preferences for multi-dimensional party positions and the corresponding anticipated coalition outcomes. When two coalition choices are equally attractive because a loss in one policy dimension is offset by a gain in another, we anticipate that they would exhibit

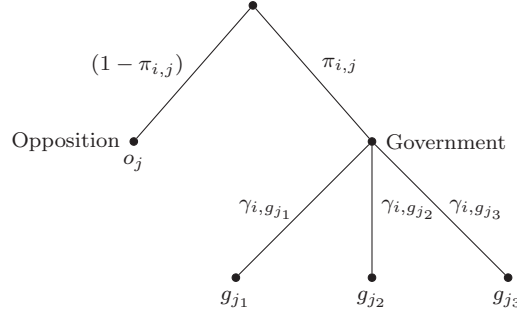


Figure 1: Post-election lottery $L_{i,j}$ for party j and voter i with post-electoral outcomes $(o_j, g_{j1}, g_{j2}, g_{j3})$ and perceived probabilities $(1 - \pi_{i,j}, \pi_{i,j}\gamma_{i,g_{j1}}, \pi_{i,j}\gamma_{i,g_{j2}}, \pi_{i,j}\gamma_{i,g_{j3}})$.

voter i derives a perceived *opposition payoff*, $O_{i,j} \in \mathbb{R}$, from the opposition outcome o_j , depending on how much she likes that party j is in parliamentary opposition versus not in parliament at all.⁵ The voter i derives perceived *government payoffs*, $G_{i,g_{j1}}, \dots, G_{i,g_{jN}} \in \mathbb{R}$, from the government outcomes $g_{j1}, \dots, g_{jN}$, depending on how much she likes the different governments party j could enter. The different governments include coalition governments, but can also encompass single party governments.⁶ For voter i and party j , we denote the post-election lottery by the perceived probabilities and payoffs for all possible post-election outcomes of party j :

$$L_{i,j} = \{1 - \pi_{i,j}, O_{i,j} ; \pi_{i,j}\gamma_{i,g_{j1}}, G_{i,g_{j1}} ; \dots ; \pi_{i,j}\gamma_{i,g_{jN}}, G_{i,g_{jN}}\}, \quad (1)$$

To stay with the example of the 2021 German federal election, voting for the CDU/CSU implies participating in lottery $L_{i,\text{CDU/CSU}} = \{1 - \pi_{i,\text{CDU/CSU}}, O_{i,\text{CDU/CSU}} ; \pi_{i,\text{CDU/CSU}}\gamma_{i,\text{CDU/CSU-Greens-FDP}}, G_{i,\text{CDU/CSU-Greens-FDP}} ; \pi_{i,\text{CDU/CSU}}\gamma_{i,\text{CDU/CSU-SPD}}, G_{i,\text{CDU/CSU-SPD}} ; \pi_{i,\text{CDU/CSU}}\gamma_{i,\text{CDU/CSU-AfD-FDP}}, G_{i,\text{CDU/CSU-AfD-FDP}}\}$.⁷ Analogously, a vote for the SPD implies participating in lottery $L_{i,\text{SPD}}$. The notation conveys that probabilities and payoffs are *perceived* quantities and thus individual-specific, as indicated by the subscript i .

Given that voters consider all post-election outcomes when evaluating their expected utility from voting for a party j , the opposition as well as all government outcomes, we consider

equivalent perceived pay-offs. However, the origin of these pay-offs extends beyond policy spaces and may encompass behavioral factors like partisanship, as well as valence aspects such as leader ratings, making the formulation more comprehensive.

⁵Accentuating the absence from parliament as the comparison is crucial, since otherwise the perceived payoffs can be confused with not being in government.

⁶The government payoffs are ordered such that $G_{i,g_{j1}} \leq G_{i,g_{j2}} \leq \dots \leq G_{i,g_{jN}}$.

⁷For simplicity of exposition, we assume that there were no other governments, the CDU/CSU could have entered after the election.

the respective post-election lottery $L_{i,j}$ as a *compound lottery* consisting of a *government lottery* ($L_{i,j}^G = \{\gamma_{i,g_{j_1}}, G_{i,g_{j_1}}; \dots; \gamma_{i,g_{j_N}}, G_{i,g_{j_N}}\}$) and an *opposition lottery* ($L_{i,j}^O = \{1, O_{i,j}\}$), such that $L_{i,j} = \pi_{i,j}L_{i,j}^G + (1 - \pi_{i,j})L_{i,j}^O$.

The expected utility, $E[u(L_{i,j})]$, voter i derives from post-election lottery $L_{i,j}$ is (see Figure 2):

$$E[u(L_{i,j})] = \pi_{i,j}E[u(L_{i,j}^G)] + (1 - \pi_{i,j})E[u(L_{i,j}^O)] \quad (2)$$

$$= \pi_{i,j} \sum_k \gamma_{i,g_{j_k}} u(G_{i,g_{j_k}}) + (1 - \pi_{i,j})u(O_{i,j}). \quad (3)$$

A monotonically increasing and continuous (Mas-Colell et al., 1995, p. 185) utility function $u(\cdot)$ describes how much utility the voter derives from opposition and government payoffs.⁸

In the previous example from the 2021 German federal election, maximizing expected utility implies comparing the expected utilities for all the different post-election lotteries, e.g., $E[u(L_{i,CDU/CSU})]$ and $E[u(L_{i,SPD})]$, and voting for the party whose post-election lottery has the highest expected utility. Figure 2 shows the calculation of the expected utilities for the two parties' lotteries for a fictional voter. The voter in this example has a particularly high payoff for a CDU/CSU-SPD coalition ($G_{i,CDU/CSU-SPD} = 8$), but perceives a higher probability for this coalition outcome in the CDU/CSU post-election lottery (0.8×0.7) versus the SPD post-election lottery (0.5×0.55). For the calculation of the expected utility of the lotteries, however, all utilities from the payoffs should be considered and weighted accordingly. Note, we can only calculate the expected utility in Figure 2 as a function of $u(\cdot)$, because we, unfortunately, do not know the functional form and, thus, cannot directly infer the voter's risk preference. The risk preferences of voter i in this coalition-directed voting model are determined by the functional form of the Bernoulli utility function $u(\cdot)$. Voter i is risk-averse if and only if $u(\cdot)$ is concave. She is risk-seeking if and only if $u(\cdot)$ is convex, and risk-neutral if and only if $u(\cdot)$ is linear.⁹

⁸Note that it is important to differentiate between the utility function $u(\cdot)$ and the expected utility function $E[u(\cdot)]$. While $u(\cdot)$ indicates utility derived from *payoffs*, $E[u(\cdot)]$ indicates utility derived from post-election *lotteries*. For better distinction, $u(\cdot)$ is typically called *Bernoulli utility function* whereas $E[u(\cdot)]$ is called *von Neumann-Morgenstern utility function* (see also Mas-Colell et al., 1995, p. 184). Also note the difference between $E[u(L_{i,j})]$, the *expected utility* and $E[L_{i,j}]$, the mean (*expected value*) of post-election lottery $L_{i,j}$.

⁹Voters' risk preferences could also have more complex functional forms including both concave and convex parts. Then, one cannot work with the established typology (risk-averse, risk-seeking) anymore.

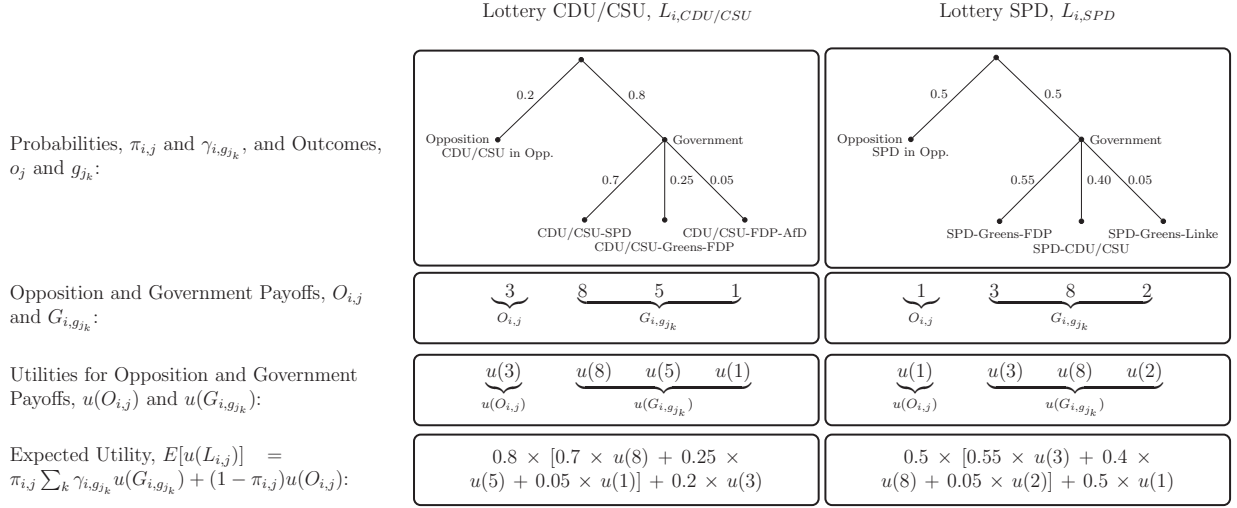


Figure 2: Example for post-election lotteries for the CDU/CSU and the SPD in the 2021 German federal election for a fictional voter i .

Several aspects merit discussion. Firstly, our model assumes that the same utility function for voters, aligning with established conventions in the literature, such as spatial and issue voting models (Berinsky and Lewis, 2007; Carroll et al., 2013). When applied to data, we will ascertain which functional form assumption best suits the observed coalition-directed decisions, providing insights into voters' risk preferences. Secondly, we assume the same utility functions across all parties, indicating that voters hold the same risk preferences regardless of the party they consider. However, this does not imply identical marginal effects on voting if uncertainty, i.e., the party's government lottery variance increases, as such effects can be influenced by factors like a party's perceived likelihood of entering government, as we demonstrate in an observable implication on mean-preserving spreads. Thirdly, next to coalition-directed voting considerations, voters care about party specific considerations. Gschwend et al. (2017) and Duch et al. (2010) both present utility specifications that mix coalition-directed with party specific considerations. Our model can be extended to account for these other aspects, but given that our primary focus is on the effects of uncertainty from coalition-directed voting, we focus on the coalition-directed voting considerations.

So far, we have developed a new decision-theoretic formalization of coalition-directed voting. The remaining challenge is to clarify what we can learn about risk preferences without knowing the shape of the Bernoulli utility function $u(\cdot)$? Employing parametric models to estimate the utility function in voting decisions can deliver results that are sensitive to

the model specifications. Instead, we develop two observable implications from our theory and use different empirical strategies to test them: (1) by using the approach of the mean-variance approximation, we obtain observational evidence and (2) by using the concept of the mean-preserving spread, we gather experimental evidence on voters' risk preferences.

Observational Evidence

In this section, we assess whether there is consistent evidence in a wide range of countries that voters are risk-averse, risk-seeking, or risk-neutral when it comes to coalition-directed voting. We first derive an observable implication from our theory, drawing on the mean-variance approximation of the voters' unknown (expected) utility function. Second, we describe how we test this implication using primary and secondary data in 17 surveys from 13 election campaigns from 2009 to 2021 in seven countries. Third, we show that the observational evidence is consistent with the idea that voters are risk-averse when it comes to coalition-directed voting.

Observable Implication: Mean-Variance Approximation

In order to extract voters' risk preferences from observational data without making functional-form assumptions, we make use of the mean-variance approach originating from financial economics and mathematical finance (Markowitz, 1952; Levy and Markowitz, 1979). The idea is to first approximate expected utility $E[u(L_{i,j})]$ by a function of the mean, $E[L_{i,j}]$, and the variance, $Var[L_{i,j}]$, of the post-election lottery. We then exploit this approximation to derive an observable implication of how risk preferences influence expected utilities. Specifically, the mean-variance approximation reveals that we can infer the shape of voters' utility functions from the sign of the marginal effect of the government lottery's variance, $Var[L_{i,j}^G]$, on its expected utility, $E[u(L_{i,j})]$. This marginal effect turns out to be (the full mathematical derivation can be found in SM A.1)

$$\frac{dE[u(L_{i,j})]}{dVar[L_{i,j}^G]} \approx \frac{1}{2}\pi_{i,j}^2 u''(E[L_{i,j}]). \quad (4)$$

Without making additional assumptions about the functional form, the sign of the marginal effect allows us to infer the shape of voters' utility functions. If this marginal effect is negative, $u''(\cdot)$ must also be negative, indicating that the utility function is concave and that voter i is risk-averse. Conversely, if this marginal effect is positive, $u''(\cdot)$ must be positive, suggesting that the utility function is convex and that voter i is risk-seeking. We can exploit this observable implication (see Equation 4) to formulate the following hypothesis:

Hypothesis 1. If the marginal effect of voters' perceived government lottery variance on its expected utility is negative (positive), voters are risk-averse (risk-seeking).

If a model predicting the expected utility derived from voting shows a negative (positive) marginal effect of voters' perceived government lottery variance, we can infer that voters are risk-averse (risk-seeking). This implies that risk-averse (risk-seeking) voters are more likely to vote for a party the less (more) uncertain they are about the party's government prospects.

Our theoretical differentiation between opposition and government outcomes leads to an additional implication: the perceived probability that party j will govern, denoted as $\pi_{i,j}$, influences voters' perceived government lottery variance on its expected utility. Specifically, the absolute value of the marginal effect of $Var[L_{i,j}^G]$ on $E[u(L_{i,j})]$ increases with $\pi_{i,j}$. If $\pi_{i,j} = 0$ —indicating that voter i expects party j to end up in opposition with certainty—then the marginal effect of the perceived government lottery variance on the voter's expected utility is zero. Therefore, if this marginal effect to zero, voter i might be risk-neutral, as risk-neutrality implies a linear utility function where $u''(\cdot) = 0$. However, a marginal effect of zero might also simply reflect low chances of government participation.

Research Design

Our strategy in the last section is to derive a clear implication of when we should observe risk aversion in observational data analysis. To evaluate this, we regress voters' perceived

variance of a party's government lottery on the expected utility derived from voting for that party in the upcoming election. The estimated sign of the respective regression coefficient (i.e., the marginal effect in Equation (4)) provides a direct test of voters' risk preferences without requiring any assumptions about the functional form of how voters derive utility from perceived government payoffs. To construct measures of voters' perceived government lottery variance, we need to capture voters' perceptions of government lotteries—specifically, we need survey measures that assess how likely voters believe certain coalition governments are to govern and what payoffs these would imply.

We draw on a broad set of different surveys and leverage data from 17 pre-election studies out of 13 election campaigns in seven countries with coalition governments (Austria, Belgium, Germany, Netherlands, New Zealand, Spain, and Sweden) that include the necessary measures to assess voters' perceptions of government lotteries in order to assess risk preferences of voters with respect to coalition-directed voting. These are survey data that include comprehensive measures of perceived government payoffs, perceived government probabilities, and relevant confounders.¹⁰ Two of the surveys, those conducted in the run-up to the 2018 Swedish parliamentary elections and the 2020 New Zealand general elections, were conducted by ourselves to provide the best conceivable measures to test our theory.

The key independent variable of our analysis is the perceived variance of a party's government lottery ($Var[L_{i,j}^G]$). We compute respondent i 's perceived variance of party j 's government lottery in the following way. For the different government options g_{jk} of party j , we need measures of respondent i 's perceived payoffs, $G_{i,g_{jk}}$, and perceived probabilities, $\gamma_{i,g_{jk}}$.¹¹ As a measure for perceived government payoffs, $G_{i,g_{jk}}$, we use typical survey questions that ask respondents to evaluate different coalitions as government options of party j on like-dislike scales (so-called coalition scalometers). To measure perceived government probabilities, we use survey questions that ask respondents to indicate their perceived probability of party j entering different government options.¹²

¹⁰SM B.1 describes our data sources.

¹¹Our data allow us to construct government lotteries for different parties within a survey. Figure SM2 indicates the parties for which the required measures were available in each survey.

¹²Given that we heavily rely on secondary data, the measures we employ differ slightly from study to study. SM B shows also for each survey the question wordings for the coalition government like-dislike scales and for the perceived government probability scales.

Where available, we used questions that ask about the perceived probabilities that party j would enter different governments *conditional on being in the government at all*.¹³ These conditional probabilities are closer to what constitutes the government probabilities defined in the theory section. We normalize the reported probabilities by applying the standard exponential function to each reported probability and dividing each of them by the sum of all these exponentials. This guarantees that each perceived probability lies within the interval $[0, 1]$ and that $\sum_k \gamma_{i,g_{j_k}} = 1$. We then calculate respondent i 's perceived mean of party j 's government lottery, $\mu_{i,j}$, by computing $\mu_{i,j} = \sum_k \gamma_{i,g_{j_k}} G_{i,g_{j_k}}$. Finally, we calculate respondent i 's perceived variance of party j 's government lottery, $\sigma_{i,j}^2$, by computing $\sigma_{i,j}^2 = \sum_k (G_{i,g_{j_k}} - \mu_{i,j})^2 \gamma_{i,g_{j_k}}$. We rescaled the perceived mean and variance of party j 's government lottery into the 0-1 range, where 0 is the theoretically possible minimum and 1 is the theoretically possible maximum.

The dependent variable of our analysis is the expected utility derived from voting for a party in the upcoming election. Where available, we followed [van der Eijk et al. \(2006\)](#) and used *propensity to vote* questions to directly measure the utility that respondent i derives from party j . We rescaled propensities to vote into the 0-1 range. Where not available, we considered the intended vote choice for a party (1 = yes, 0 = no) as the dependent variable.¹⁴

Our aim is to draw model-based inference about how the perception of uncertain coalition prospects of a party — reflected by larger perceived variances of the party's government lottery — affects the propensity to vote for this party. For each party under consideration, we run a linear regression of the propensity to vote for the party on σ_j^2 , which is the perceived variance of the party's government lottery ($\text{Var}[L_{i,j}^G]$). For surveys that did not provide propensities to vote, we run linear probability models, i.e. linear regression of vote choice for the party on σ_j^2 .¹⁵

We control for μ_j , i.e., the perceived mean of the party's government lottery ($E[L_{i,j}^G]$) because it is a confounder. μ_j directly affects σ_j^2 as well as the dependent variable (see

¹³Such questions were only included in the primary data we collected, the pre-election surveys we fielded in Sweden in 2018 and New Zealand in 2020.

¹⁴Propensities to vote for a party in the upcoming election were only asked for in the self-conducted surveys from both Sweden 2018 and New Zealand 2020. SM B shows the wording of the corresponding questions.

¹⁵For the linear probability models we use heteroskedasticity-consistent standard errors.

	<i>Dependent variable: PTV for Propensity to vote for</i>		
	Moderates (Sweden 2018)	SAP (Sweden 2018)	Labour (NZ 2020)
Government Lottery Variance (σ_j^2)	-0.127*** (0.039)	-0.256*** (0.062)	-0.242** (0.095)
Government Lottery Mean (μ_j)	0.163*** (0.023)	0.157*** (0.023)	0.428*** (0.062)
Controls Party Evaluation	Yes	Yes	Yes
Controls Sociodemographics	Yes	Yes	Yes
Observations	1,736	1,734	453
R ²	0.698	0.695	0.724

Table 1: Linear regressions of propensities to vote on perceived government lottery variance and mean. We control for the party evaluation as well as gender, age, and education. Standard errors are in parentheses, alongside the p-value (*p<0.1; **p<0.05; ***p<0.01).

Equation 7 in SM A.1 for why we expect the perceived lottery mean to affect our dependent variable). Also, individual partisan misperceptions could confound the effect of interest. This is because coalition expectations (and thus perceived government lottery variances) can be distorted by party evaluations in terms of “wishful thinking” (Meffert et al., 2011). Therefore, we control for party evaluations, which we measure analogous to coalition evaluations with traditional like-dislike scales.¹⁶ Other sources of wishful thinking that could confound the relationship, such as partisan identification, are not available in all surveys, and we do not include it as a control. However, partisan identification causally proceeds our direct measure of party evaluation and hence is indirectly controlled for. We still control for available sociodemographic variables (e.g., gender, age, education) because they can directly influence our dependent variable and, thus, allow us to estimate our quantity of interest, the marginal effect of σ_j^2 , more precisely.

Results

The analysis of survey data provides evidence for risk-aversion of voters when it comes to coalition-directed voting. We first illustrate this for the data that we collected ourselves. Table 1 shows the results of the linear regressions of propensities to vote on perceived government lottery variance while controlling among others for the perceived government lottery mean. The results indicate that voters are more likely to vote for a party the less uncertain they are about the party's coalition prospects. Thus, the results indicate that voters of those parties are risk-averse because the marginal effects are negative. This applies consistently to all three parties considered: the Moderate Party and the Social Democratic Party in the context of the 2018 Swedish parliamentary elections, as well as the Labour Party in the 2020 New Zealand general election.

The size of the estimated effects of the perceived government lottery variance is sizable. On average and holding everything else constant, increasing the variance of a government lottery from 0 — which mimics the situation where the party entered into a pre-election coalition — to 1 — which mimics the situation where the party could join a highly desirable coalition and a highly undesirable coalition with equal probability — reduces the propensity to vote for the Swedish Social Democratic Party by 0.256 (0.127 for Swedish Moderate Party; 0.242 and New Zealand Labour Party) points on a 0 to 1 scale. Thus, the estimated effect corresponds to a change of about 25% of the range of the dependent variable, for the Swedish Social Democratic Party and the New Zealand Labour Party while to about half of it for the Swedish Moderate Party even when holding everything else constant.

In the second step of our analysis, we evaluate the same relationship for all the parties we have the necessary data for across 17 surveys from 13 election campaigns. We report the results in more detail in SM B.2. Overall, in 22 of the models, we obtain evidence that voters are risk-averse, with significantly negative regression coefficients for the government lottery variance (σ_j^2). These models show that the propensity (or, respectively, the probability) to vote for a party is significantly negatively affected by the uncertainty of the party's coalition

¹⁶In some surveys, like-dislike scales for parties were not available. In these cases, we instead added two control variables: (1) the squared distance of left-right party placement and self-placement, as well as (2) the party leader rating. The tables in SM B indicates for which of the surveys this applies. We also conduct a robustness check by adding partisanship as a control variable in addition to party evaluation measures (see SM B.2.2).

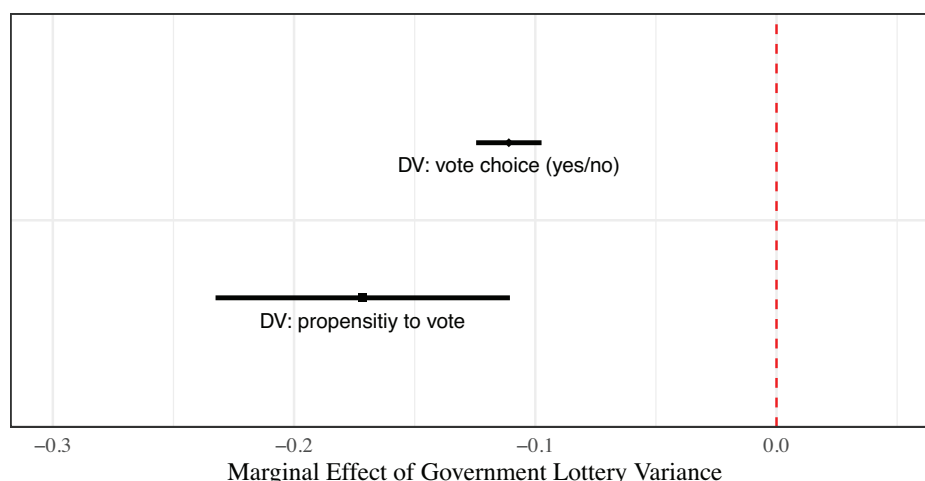


Figure 3: Meta-analysis estimates are based on inverse variance weighting (Rice et al., 2018) from models for all survey data sources. Intervals display 95% confidence intervals. See SM B for the single studies' regression tables and SM17 for the meta analysis' regression table.

prospects. Only three of the models suggest risk-seeking as indicated by the significantly positive marginal effect. The marginal effects of the remaining models are not statistically significantly different from zero on conventional levels. This does not necessarily imply risk-neutrality, though, as derived above (Mean-Variance Approximation).

We analyze all estimated models together in a meta-analysis to provide an overall picture of voters' risk preferences across all studies. We use the established inverse variance weighting (Rice et al., 2018) to combine the estimates from models for all survey data sources. Figure 3 shows the results of the meta-analysis. We compute two averaged quantities — one for the models with propensities to vote as the dependent variable and one for the linear probability models. The weighted average of the estimates derived from the linear probability models is of size -0.111 and significantly different from zero at conventional levels. Substantively, this means that becoming more uncertain about a party's government prospects, i.e., increasing the variance of a government lottery from minimum to maximum, while holding everything else constant, reduces the probability of voting for the party by 11.1 percentage points on average. The weighted averaged quantity for those models using propensities to vote as the dependent variable is of size -0.172 and also significantly different from zero at the conventional levels. Substantively, this means that increasing the variance of a government lottery from minimum to maximum, while holding everything else constant,

reduces the propensity to vote for the party by 0.172 points on the rescaled interval from 0 to 1. Thus, the results of the meta-analysis provide clear evidence that the voters are risk-averse when it comes to coalition-directed voting.

Experimental Evidence

In this section, we present results from an experimental vignette study. Unlike the observational study, this experiment presents respondents with randomized scenarios that vary the government lottery variances representing the uncertainty they face in choosing the prospective government while holding the payoff constant. This design tests whether the lack of clarity about coalition government prospects—and thus an change in a party's government lottery variance—is causally related to vote choice. Specifically, we examine whether more uncertainty reduces the propensity to vote for the party associated with the uncertain outcome. By taking advantage of the concept of the mean-preserving spread, we causally separate out the effect of the uncertainty represented by the perceived variance of the party's government lottery from the perceived mean of the party's government lottery. We manipulate the uncertainty perception of government lotteries even though the expected payoff is fixed. This increases our confidence that the findings in the previous section are not due to unobserved confounding.

Observable Implication: Mean-preserving Spreads

In addition to the mean-variance approach discussed above, there is another methods to infer voters' risk preferences without making assumptions about the functional form of the Bernoulli utility $u(\cdot)$. This method utilizes the concept of a mean-preserving spread from microeconomic theory (e.g., [Mas-Colell et al., 1995](#)). Consider the hypothetical situation in which a voter could decide between two post-election lotteries $L_{i,j}$ and $L_{i,j}^*$ for a party j , where both lotteries have the same expected value such that $E[L_{i,j}] = E[L_{i,j}^*]$. Lottery $L_{i,j}^*$ is called a *mean-preserving spread* of $L_{i,j}$ if, simply put, we can construct lottery $L_{i,j}^*$ out of lottery $L_{i,j}$ by reducing the probability of government outcomes with medium payoff and increasing the probability of government outcomes with extreme payoff (i.e. with very

small and very large payoff), while not changing the expected value of lottery $L_{i,j}$ (see for a formal definition in SM A.2). Hence, if $L_{i,j}^*$ is a mean-preserving spread of $L_{i,j}$ then its variance is larger (i.e., $Var[L_{i,j}^*] > Var[L_{i,j}]$).

Mean-preserving spreads of a lottery are helpful to generate yet another observable implication to infer the nature of voters' risk preferences. Without making assumptions about the functional form of the utility function, we can directly deduce risk preferences if we could observe a voter's choice between a lottery $L_{i,j}$ and its mean-preserving spread $L_{i,j}^*$. If she chooses $L_{i,j}$ and, hence, opts for less uncertainty, $u(\cdot)$ is concave, which implies risk-aversion. If she chooses $L_{i,j}^*$ and, thus, values the additional opportunities, $u(\cdot)$ is convex, which implies risk-seeking. Thus, if voters' perceived variance of a party's government lottery, i.e., the uncertainty, decreases (increases), the expected utility of voting for that party increases (decreases), then the voter is risk-averse (risk-seeking). If the voter is indifferent between the lotteries, $u(\cdot)$ is linear, which implies risk-neutrality. We provide an example of a mean-preserving spread of a government lottery in SM A.2.3.

The observable implications of mean-preserving spreads create opportunities for experimental designs. Experiments can apply the general construction rules for mean-preserving spreads of a party's government lottery and measure voters' expected utilities as their propensity to vote for that party given coalition government lotteries with low and high variance. These lotteries reflect different levels of perceived uncertainty regarding the party's coalition government prospects. The experimental design we present in the next section implements this idea by creating a mean-preserving spread of a party's government lottery for each respondent while holding constant its opposition lottery and the probability that the party will govern at all (see SM A.2 for details on this strategy). For each of the party's post-election lotteries, we will then measure a respondent's propensity to vote for the party in light of these coalition prospects to isolate the causal effect of increasing government lottery variances on the propensity to vote for that party while holding constant the mean of the coalition government lottery. This enables us to formulate a hypothesis about the effect of uncertainty regarding a party's coalition government prospects on the propensity to vote for that party.

Hypothesis 2. The more uncertainty, reflected in a higher perceived variance of a party's

government lottery, the lower (or higher) the propensity to vote for that party, if voters are risk-averse (or risk-seeking), while holding the mean of the party-specific government lottery constant.

Research Design

We conducted our study in Germany prior to the 2021 federal election. As Europe's largest country with a stable multi-party democracy and a history of coalition governments, Germany is an typical case for our investigation. The electorate's familiarity with coalition politics allows for exploring electoral behavior in multi-party democracies. Additionally, the 2021 election featured unprecedented uncertainty about coalition formation, with a high likelihood of a three-party coalition government. This context provided an ideal real-world setting for manipulating voter perceptions of coalition prospects.

We field a survey to study the role of risk preferences in coalition-directed voting decisions at the beginning of the election campaign. The survey contains two within-subject experiments that allow us to test whether voters are risk-averse or risk-seeking when considering coalition government options. The survey includes pre-treatment measures of sociodemographic characteristics and political orientations.

We then introduce the general theme of the experiment: "After the federal election, there will probably be a coalition government" and ask respondents about their opinion of different coalition governments for the CDU/CSU first, and afterward for the Greens. We choose the Green party next to the CDU/CSU as during the field time the Greens were perceived as the main competitor and closest to the CDU/CSU in the polls. In line with this, the two parties had the highest probability of participating in a government, as indicated by [Debus \(2022\)](#). According to our theory, the chance of government participation is a crucial moderating factor for the impact of coalition composition variability post-election (see Section on Mean-Variance Approximation). Consequently, the CDU/CSU and the Greens represent the two cases where the effects should be most evident.¹⁷

We conduct the complete within-subject design first for the CDU/CSU and then for

¹⁷The experiment with the Greens might be compromised by the fact that, toward the end of the campaign, it became clear that the SPD, rather than the Greens, was the main competitor to the CDU/CSU. At the end, the SPD also became the largest party.

the Greens. Pre-treatment, we let the respondents rate various coalition options of the CDU/CSU and the Greens, on a scale from -5 to +5.¹⁸ The survey includes such ratings of seven two-party and three-party government constellations for the CDU/CSU and five Green coalition governments. Consistent with the observational study in the last section, we use the same scale to measure coalition government payoffs. Afterward, we ask respondents about the probabilities that a party will end up in a certain government coalition, i.e., their perceived government probabilities. “Suppose the [party] is part of the next government. In which coalition government is the [party] likely to be part of?” The scale ranges from 0 (very unlikely) to 10 (very likely). We re-scale the question by dividing each answer by the sum of all answers and use the respective values as our measure of perceived government probabilities. Then, we ask respondents about their general propensity to vote for the [party] on a scale from 0 (very unlikely) to 10 (very likely).

For the within-subject experiment, we choose three randomized vignettes to describe different scenarios. A sentence introduces the three vignettes to respondents: “Below we present three different situations. We will ask you each time how likely it is that you would vote for the [party].” A detailed explanation of how to understand the probabilities follows the introduction. The three scenarios are calculated conditional on respondents’ previous answers to the coalition government payoffs such that the three coalition lotteries are mean-preserving spreads. For this, we automatically choose three [party] coalition governments for each respondent: the coalition government with the lowest respondent evaluation, one with medium evaluation, and the one with the highest evaluation.¹⁹ The set of coalition governments that are part of the experiment varies between respondents.²⁰

The first vignette presents a scenario in which only the medium coalition government is feasible due to the coalition signals of the party. “Imagine that the [party] says that after the election it will only enter into one coalition with [Coalition with medium rating]

¹⁸The wording of the question is: “Regardless of the outcome of the Bundestag election, how desirable do you personally consider the following coalition governments?”.

¹⁹We found the coalition with medium evaluation by selecting the coalition with the median (lower median) evaluation. If there were several coalitions to which this criterion applied, we selected one at random. Also, if there was more than one coalition that received the worst (best) rating, one of these coalitions was selected at random.

²⁰In some unlikely cases, it is not possible to choose three separate coalition governments, as respondents do not provide three distinct coalition government evaluations. We excluded those respondents, 11% for the CDU/CSU and 20% for the Greens, from the experiment.

and that it will rule out all other coalitions.” It assigns 100% to the probability of the medium coalition. The first vignette thereby presents a scenario with a certain coalition lottery, in which voters know what coalition government a party could end up in. We regard this scenario as analogous to a firm pre-electoral coalition commitment, in which the party would face significant electoral repercussions if it were to deviate from the pre-electoral coalition (Bowler et al., 2010; Strom et al., 1994). In such cases, alternative coalition government outcomes appear highly improbable.

The second vignette puts weight on the lowest and highest rated coalition government while preserving the expected government payoff, that is the combination of a respondents’ evaluation of the government options by their manipulated chance of occurring.²¹ This scenario is introduced: “Now imagine if the [party] did not clearly state which coalition they would like to join after the election.” The third vignette puts even more weight on the lowest and highest rated coalition government, such that only a 1% chance for the medium remains. The scenarios, thereby, present ever more uncertain coalition lotteries and allow us to directly estimate the effect of uncertainty on voting propensities, holding the expected coalition government payoffs constant.²²

In our experiment, within-party comparisons also play a crucial role in comprehending how voters arrive at decisions between political parties. Within-party comparisons involve assessing a voter’s counterfactual utility evaluation of a party under different post-electoral coalition scenarios. If we detect a decline in the propensity to vote for a party as coalition outcomes become more uncertain, this shift should correspondingly boost support for other parties, since the difference in utility evaluations matters for support. Our primary objective, however, is to uncover insights into the shape of the utility function that drives these choices. Importantly, these insights hold analytical implications for the voting decisions made between different parties.

The survey experiment and the analysis are pre-registered.²³ We recruit 1577 respondents from the online-access panel RespondI with quotas based on age, gender, and region (see

²¹We describe the calculations for the construction of the second and third vignette in SM C.2.

²²SM C.7 describes the pretest results of an open question indicating that there were no systematic issues in comprehending the vignettes.

²³We discuss ethical considerations in SM C.1.

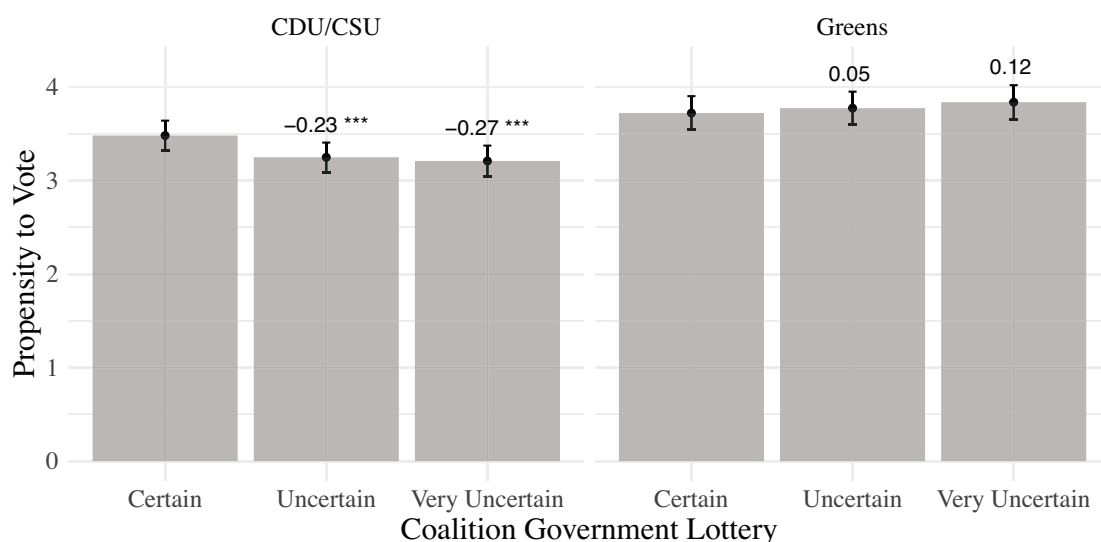


Figure 4: Average propensity to vote for the CDU/CSU and the Green Party for the different scenarios, with 95% confidence intervals. The values show treatment effects of the uncertain and very uncertain condition compared to the certain condition, alongside their p-value (** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$). The regression table for the treatment effects is in SM C.6.

SM C.4). The survey field time was between August 10th and September 7th, 2021. The median response to the survey took around 11 minutes, for which respondents received compensation from the panel provider.

Results

What is the effect of uncertainty—specifically, a lack of clarity about coalition government prospects—on vote choice? We hypothesized that increased uncertainty, reflected in a higher perceived variance of a party’s government lottery, decreases the propensity to vote for that party if voters are risk-averse, but increases it for risk-seeking voters, holding the mean of the party-specific coalition lottery constant. Therefore, if voters are risk-averse, we should observe higher support under more certain coalition scenarios compared to more uncertain ones.

The results support the notion that voters are risk-averse when considering the coalition government options of the CDU/CSU. Figure 4 shows a negative treatment effect of the uncertain and very uncertain coalition lotteries compared to certain coalition government prospects. The effect with around 1/4 scale point is comparable between the uncertain (-0.23) and very uncertain coalition option (-0.27) while we can reject the null hypothesis for

both. Our results imply that respondents systematically evaluate the CDU/CSU higher if the party signals which coalition government it intends to form. We do not find a difference between the uncertain and very uncertain coalition lottery, although we would have expected it for risk-averse voters. For the Greens, we do not find a clear difference between the three scenarios. SM C.6 provides the regression tables and shows that this pattern also holds when using two pre-registered alternative modeling strategies, controlling for respondent and scenario-specific fixed effects.²⁴

One reason why we do not observe significant treatment effects for the Greens but for the CDU/CSU could be due to the difference in the uncertainty regarding the government prospects of the two parties prior to the 2021 German Federal election. In general, respondents' perceived probability that the CDU/CSU would enter government at all was higher than the probability that the Greens would enter government at all. When most of our respondents participated in the survey, the CDU/CSU was the strongest party according to the polls. According to the perceived government probabilities presented in [Debus \(2022, third scenario\)](#), the probability that there would be a government with CDU/CSU participation was about 87.2% to 89.2%, while the same probability for the Greens was only about 58.2% to 59.2%. The null findings align with implications from the mean-variance approach, which suggests that the perceived likelihood of a party governing reduces the impact of uncertainty about the government coalitions we manipulated in our experiment.

One concern with these estimates is that the observed decrease for the CDU/CSU is primarily due to a strong dislike of any coalition with the AfD, not risk-aversion *per se*. A coalition including the AfD is indeed the least preferred government option in the vignettes for many respondents. In SM C.8 we show that we still observe negative treatment effects when we exclude respondents for whom the AfD was the least preferred government option in the vignettes for the CDU/CSU. Another concern is that the vignettes are not credible and do not manipulate respondents' perceptions on which they decide.²⁵ In SM C.7, we

²⁴The results for the within-subject design are well-powered. Given our sample size and the baseline standard deviation in the propensity to vote, the minimal detectable effects with 90% power at an alpha level of 0.05 are 0.17 for the CDU/CSU and 0.19 for the Greens.

²⁵The successful application of similar vignette experiments in previous research supports the validity of our approach ([Gschwend et al., 2017](#); [Irwin and van Holsteyn, 2012](#)). As standard manipulation checks (e.g. change in perception) are more challenging due to the hypothetical nature of our scenarios, previous studies using similar designs have not typically relied on such checks.

discuss this point and confirm that the effects for the CDU/CSU are particularly pronounced among respondents, for whom the vignette's probabilities do not deviate strongly from prior expectations. This provides some evidence that the vignette particularly induced treatment effects, when it was credible.

As part of the pre-registered experiment plan, we also evaluate whether the patterns are influenced by the *stated* risk preferences of the respondents. It could be that risk-averse coalition-directed voting is particularly pronounced among respondents who indicate that they are generally willing to take risks. For respondents who indicate that they are very willing to take a risk, we could even observe risk-seeking behavior.²⁶ SM C.5 reveals some patterns that underline that the relationship is related to stated risk preferences. For the Greens, we find that respondents with high stated risk preferences are risk-seeking, as both an uncertain and a very uncertain coalition lottery increase their propensity to vote for the Greens. However, not all expectations in this analysis confirm the conditional hypothesis, e.g., we find no effects for the Greens among respondents with low risk preferences and even some negative significant effects for respondents who are willing to seek risks for the CDU/CSU.

We also assess an additional pre-registered hypothesis, according to which the treatment effect might be conditional on the initial propensity to vote for the parties. Only respondents who have some propensity to vote for the parties consider their coalition government options and, hence, react negatively to more uncertain coalition lotteries. We find some support for the hypothesis for respondents with a middle-level propensity to vote for the two parties. SM C.5 shows a decay of voting propensities over the three scenarios for the CDU/CSU for respondents with a middle-level propensity to vote.

To sum up, we find evidence consistent with our pre-registered hypotheses that voters are risk-averse when considering the coalition government options of the CDU/CSU. Respondents have systematically a higher propensity to vote for the CDU/CSU *because* the party signals which coalition government it intends to form and, hence, reduces the lack of clarity about coalition government prospects. The findings from the experiment thereby confirm the cross-country pattern observed in the observational analysis, reinforcing the notion that

²⁶We use a standard survey question to ask about risk preferences for the respondents.

voters prefer clear coalition government outlooks. Given that Germany serves as a typical case in this context, these results are likely to generalize to other parliamentary democracies with similar proportional representation systems. This suggests that risk aversion is a factor that may be applicable across countries where coalition-building plays a central role in government formation.

Discussion

In this paper, we show that on average, voters are risk-averse when it comes to the uncertainty that arises from coalition governments. Based on expected utility theory we identify conditions under which we expect risk preferences to influence voting decisions and evaluate them in observational survey research and an experimental study. The results show that even when holding the expected payoff from coalition government outcomes constant, voters prefer more certain outcomes.

Our research has implications for understanding accountability in systems where voters cannot directly choose their party-governments. Government performance plays a crucial role in voter decision-making, as accountability enables voters to retain well-performing governments and remove poorly performing ones in elections where the party-vote connection to government formation is clear. This clarity exists when there are identifiable coalition-government options before the election (Powell, 2000), allowing voters to hold parties accountable based on their expected roles in the government. However, when this identifiability is low, it becomes more challenging for voters to hold parties accountable, as the uncertainty surrounding which parties will form the government complicates their evaluations. Our work demonstrates that voters are acutely aware of this uncertainty, and it negatively impacts their evaluations of parties. This finding underscores the importance of institutions that can help reduce this type of uncertainty, thereby enhancing accountability.

These findings contribute to our understanding of inter-party competition in general. In electoral systems where coalition governments are common, our work demonstrates that voters who care about parties' government prospects can influence the strategies of political parties. Although strategies are often driven by party elites these elites must still account for

the electorate's coalition-directed behavior. Voter support for, or opposition to, particular coalition configurations can either bolster or constrain the strategic options available to parties. During electoral campaigns, therefore, parties may need to cooperate—by finding ideological overlaps or identifying personnel who can work together—to signal clear coalition government prospects to voters.

Our findings further inform under what conditions parties should send coalition signals already before the election. For parties, it should pay off to send signals to reduce uncertainty in their coalition prospects, when they meet a risk-averse electorate. However, coalition signals can be a double-edged sword, as they decrease uncertainty, but also influence what coalition payoffs voters expect to get from the party. Coalition signals change the expected coalition payoffs, which can have positive or negative electoral effects, depending on voters' average evaluation of the coalition option. In this regard, signaling popular coalitions could show a doubling effect on the electoral support for a party because it increases clarity of its coalition prospects and boosts the average expectation of government payoff from the party. Hence, if popular coalition options are feasible, parties could have clear incentives to signal them already before the election.²⁷

This underscores the importance of coalition signals in electoral systems where coalition governments are the norm. However, sending clear coalition signals has become increasingly difficult in recent years due to rising polarization and fragmented party systems. These factors not only complicate coalition formation and heighten voter uncertainty, making it more challenging to evaluate potential government outcomes, but they may also impair overall satisfaction with electoral choices.

In highly fragmented party systems, where election outcomes are less predictable, this uncertainty weakens voters' evaluations of parties' government prospects, potentially diminishing their overall satisfaction with electoral options. In contrast, in bipolar party systems, where competition tends to revolve around two dominant polarized blocs, the expectation of coalition outcomes may still be clear, and voters are less likely to be discouraged. In

²⁷We have to add that this can also depend on the distribution of evaluations of coalition options in the electorate. If the coalition government is unpopular among the primary constituents of a party, signaling the “popular” coalition by this party could reduce its primary constituents' propensity to vote for the party, which could outweigh the electoral gains from other voters.

this regard, our findings may also have implications for voter satisfaction with the electoral process in democratic systems.

Our new conceptualization of coalition-directed voting also has implications for our understanding of strategic voting. Voters can cast a strategic vote in our model, i.e. they deviate from their most preferred party, if either they evaluate potential coalition prospects of their most preferred party rather low or because of the uncertainty about these coalition prospects. Previously, strategic voting has been explained by voters who rent out their vote to influence the coalition composition of the government coalition (e.g. [Bargsted and Kedar, 2009](#); [Meffert and Gschwend, 2010](#)), affect policy weights in the parliamentary outcome ([Kedar, 2005](#)), or help a potential coalition partner to overcome a national threshold (e.g., [Fredén, 2017](#); [Gschwend, 2007](#); [Gschwend et al., 2016](#); [Meffert and Gschwend, 2010](#)). In this perspective, strategic voting is due to the fact that voters want to signal their preference for a certain government or policy outcome and are willing to give up their vote for the most preferred party for that. The idea of our model, however, deviates from this. Strategic voting might happen simply because voters find the coalition government prospects of their preferred party rather unappealing.

Furthermore, our theory can provide insights into the effects of the pre-electoral identifiability of coalition governments at the system-level. Our decision-theoretic model builds on perceived coalition probabilities versus rational expectations. For system-level implications of our theory on party competition, one can use rational expectation and assume that the perceptions are on average correct. In this regard, coalition-inclusion probabilities might prove helpful ([Kayser et al., 2022](#)).

Finally, our paper presents clear avenues for further extension and research. Our model is based on expected utility theory, but the psychological and economic literature discusses alternative theories, such prospect theory ([Kahneman and Tversky, 1979](#)) and ambiguity aversion ([Ellsberg, 1961](#)), on how decision-makers deal with uncertainty. Some of these might turn out to be fruitful to further understanding how voters deal with the uncertainty that originates from coalition government options. As an example, prospect theory would allow for higher weights of coalitions with actually small probabilities. This might be quite sensible when voters consider and weigh unlikely coalitions, for instance, a coalition between

the right-wing populist AfD and CDU/CSU in our experiment, more strongly than the measured perceived probability would suggest.

Future model developments may incorporate voters' endogenized perceptions of post-election lotteries. Currently, our model assumes that voters' perceptions of post-election lotteries are exogenous. However, exploring the process by which these perceptions are formed could reveal crucial insights into the interplay between coalition-inclusion probabilities and the downstream electoral impact of risk-averse voters on party competition and coalition government formation. Researchers could consider integrating a simple coalition formation model in future research that mimics how voters understand the post-election bargaining process and form beliefs about it to study these implications.

Future research could also develop theoretical models and research designs to evaluate which segments of the electorate tend to be more risk-averse when faced with uncertain coalition prospects of a party. In our initial study, we found some evidence that the effects in the experiment depend on voters' prior propensity to vote for that party, but there are likely other influencing factors as well. Identifying these factors could provide valuable insights into which voters a party needs to be particularly mindful of when not sending clear coalition signals.

Although our research primarily focuses on proportional electoral systems, it also has implications for understanding the effects of uncertainty in majoritarian systems. Not all elections in such systems result in single-party governments, and even when they do, voters still face uncertainty about whether the party they support will govern or end up in opposition. Our vote choice model can be adapted to this scenario, where post-election outcomes are limited to either opposition or single-party governments. Even in this simplified model, voters must consider each party's chances of governing. The shape of the utility function is also important here, as the uncertainty about which party will secure a governing majority can vary between elections. Further research could explore the implications of this uncertainty in majoritarian systems.

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Supplementary Material:

Coalition-directed Voting under Uncertainty

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Supplementary Material

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A Mathematical Derivations

A.1 Mean-Variance Approximation

In order to infer about voters' risk preferences from observational data, we make use of the mean-variance approach originating from financial economics and mathematical finance (Markowitz, 1952). We first approximate expected utility $E[u(L_{i,j})]$ by a function of the mean of the post-election lottery, $E[L_{i,j}]$, and the variance of the post-election lottery, $Var[L_{i,j}]$. This is done by a second-order Taylor-series approximation of $u(L_{i,j})$ at the mean of the government lottery, $E[L_{i,j}]$ (Levy and Markowitz, 1979), providing us with the following expression:

$$u(L_{i,j}) \approx u(E[L_{i,j}]) + (L_{i,j} - E[L_{i,j}])u'(E[L_{i,j}]) + \frac{1}{2}(L_{i,j} - E[L_{i,j}])^2u''(E[L_{i,j}]) \quad (1)$$

Taking the expected value of this approximation directly yields the following approximation for expected utility $E[u(L_{i,j})]$:

$$E[u(L_{i,j})] \approx u(E[L_{i,j}]) + \frac{1}{2}E[(L_{i,j} - E[L_{i,j}])^2]u''(E[L_{i,j}]) \quad (2)$$

$$\approx u(E[L_{i,j}]) + \frac{1}{2}Var[L_{i,j}]u''(E[L_{i,j}]) \quad (3)$$

Taking into account that post-election lottery $L_{i,j}$ is a compound lottery of the opposition lottery $L_{i,j}^O$ and the government lottery $L_{i,j}^G$ with $L_{i,j} = \pi_{i,j}L_{i,j}^G + (1 - \pi_{i,j})L_{i,j}^O$, we get

$$E[u(L_{i,j})] \approx u(E[\pi_{i,j}L_{i,j}^G + (1 - \pi_{i,j})L_{i,j}^O]) + \frac{1}{2}Var[\pi_{i,j}L_{i,j}^G + (1 - \pi_{i,j})L_{i,j}^O]u''(E[\pi_{i,j}L_{i,j}^G + (1 - \pi_{i,j})L_{i,j}^O]) \quad (4)$$

$$\approx u(\pi_{i,j}E[L_{i,j}^G] + (1 - \pi_{i,j})E[L_{i,j}^O]) + \frac{1}{2}(\pi_{i,j}^2Var[L_{i,j}^G] + (1 - \pi_{i,j})^2Var[L_{i,j}^O] + 2\pi_{i,j}(1 - \pi_{i,j})Cov[L_{i,j}^G, L_{i,j}^O])u''(\pi_{i,j}E[L_{i,j}^G] + (1 - \pi_{i,j})E[L_{i,j}^O]) \quad (5)$$

$$\approx u(\pi_{i,j}E[L_{i,j}^G] + (1 - \pi_{i,j})E[L_{i,j}^O]) + \frac{1}{2}(\pi_{i,j}^2Var[L_{i,j}^G] + (1 - \pi_{i,j})^2Var[L_{i,j}^O])u''(\pi_{i,j}E[L_{i,j}^G] + (1 - \pi_{i,j})E[L_{i,j}^O]), \quad (6)$$

while $Cov[L_{i,j}^G, L_{i,j}^O] = 0$ because the the opposition lottery and the government lottery do not jointly vary.

Given this mean-variance approximation we can evaluate whether voter i is risk-averse, risk-neutral or risk-seeking without knowing the functional form of $u(\cdot)$ and instead considering the marginal effect of the governments lottery's variance on expected utility,

$$\frac{dE[u(L_{i,j})]}{dVar[L_{i,j}^G]} \approx \frac{1}{2}\pi_{i,j}^2u''(E[\pi_{i,j}L_{i,j}^G + (1 - \pi_{i,j})L_{i,j}^O]) = \frac{1}{2}\pi_{i,j}^2u''(E[L_{i,j}]). \quad (7)$$

If this marginal effect is negative, voter i is risk-averse, because risk-aversion implies a concave Bernoulli utility function and hence $u''(\cdot) < 0$. If this marginal effect is positive, voter i is risk-seeking, because risk-seeking implies a convex Bernoulli utility function and hence $u''(\cdot) > 0$. If this marginal effect is equal to zero, voter i is risk-neutral, because risk-neutrality implies a linear Bernoulli utility function and hence $u''(\cdot) = 0$. It is relevant to see that $\pi_{i,j}$, the perceived probability that party j governs at all, has an influence on this marginal effect. The absolute value of the marginal effect of $Var[L_{i,j}^G]$ on $E[u(L_{i,j})]$ increases with $\pi_{i,j}$. If $\pi_{i,j} = 0$, which means that voter i expects party j to end up in opposition for sure, the effect of $Var[L_{i,j}^G]$ is zero.

A.2 Mean-preserving Spreads

A.2.1 Formal Definition of Mean-preserving Spreads of a Government Lottery

Consider two hypothetical government lotteries $L_{i,j}^G$ and $L_{i,j}^{G*}$, where both government lotteries have the same expected value such that $E[L_{i,j}^G] = E[L_{i,j}^{G*}]$. Also, assume that both government lotteries have the same government payoffs and only differ in their government probabilities, i.e. $L_{i,j}^G = \{\gamma_{i,g_{j1}}, G_{i,g_{j1}}; \dots; \gamma_{i,g_{jN}}, G_{i,g_{jN}}\}$ and $L_{i,j}^{G*} = \{\gamma_{i,g_{j1}}^*, G_{i,g_{j1}}; \dots; \gamma_{i,g_{jN}}^*, G_{i,g_{jN}}\}$. Lottery $L_{i,j}^{G*}$ is called a *mean-preserving spread* of $L_{i,j}^G$ if, for all $k \in [1, N-1]$, the following inequality holds (see, e.g., Courtault et al., 2006; Mas-Colell et al., 1995, p. 197-199):

$$\sum_{m=1}^k \left(\sum_{p=1}^m \gamma_{i,g_{jp}}^* - \sum_{p=1}^m \gamma_{i,g_{jp}} \right) (G_{i,g_{jm+1}} - G_{i,g_{jm}}) \geq 0. \quad (8)$$

A.2.2 Strategy to Construct Mean-preserving Spreads of Post-Election Lottery

How can we construct post-election lotteries $L_{i,j} = \pi_{i,j} L_{i,j}^G + (1 - \pi_{i,j}) L_{i,j}^O$ and $L_{i,j}^* = \pi_{i,j}^* L_{i,j}^{G*} + (1 - \pi_{i,j}^*) L_{i,j}^{O*}$ such that $L_{i,j}^*$ is a *mean-preserving spread* of $L_{i,j}$? We employ the following strategy: $L_{i,j}^{G*}$ has to be a mean-preserving spread of $L_{i,j}^G$, while the opposition lotteries of both post-election lotteries have to be the same ($L_{i,j}^{O*} = L_{i,j}^O$) and the probability that party j enters government at all have to be the same in both post-election lotteries ($\pi_{i,j}^* = \pi_{i,j}$). Assuming that we have constructed lotteries $L_{i,j}$ and $L_{i,j}^*$ as described above, how do we know that $L_{i,j}^*$ is indeed always a *mean-preserving spread* of $L_{i,j}$? In order to show that $L_{i,j}^*$ is a mean-preserving-spread of $L_{i,j}$, we need to show that (1) $L_{i,j}^*$ and $L_{i,j}$ have the same mean and that (2) risk-averse voters prefer $L_{i,j}$ over $L_{i,j}^*$. The first part of the proof is to show that $L_{i,j}^*$ and $L_{i,j}$ have the same mean. Because the mean is linear in probabilities and $E[L_{i,j}^G] = E[L_{i,j}^{G*}]$ as mean-preserving spread, the following expression holds:

$$E[L_{i,j}] = \pi_{i,j} E[L_{i,j}^G] + (1 - \pi_{i,j}) E[L_{i,j}^O] \quad (9)$$

$$= \pi_{i,j} E[L_{i,j}^{G*}] + (1 - \pi_{i,j}) E[L_{i,j}^O] \quad (10)$$

$$= E[L_{i,j}^*]. \quad (11)$$

The second part of the proof is to show that a risk-averse voter i prefers $L_{i,j}$ over $L_{i,j}^*$, i.e. $E[u(L_{i,j})] > E[u(L_{i,j}^*)]$. Because expected utility is linear in probabilities and $E[u(L_{i,j}^G)] > E[u(L_{i,j}^{G*})]$ as mean-preserving spread of the respective government lottery, the following expression holds:

$$E[u(L_{i,j})] = \pi_{i,j} E[u(L_{i,j}^G)] + (1 - \pi_{i,j}) E[u(L_{i,j}^O)] \quad (12)$$

$$> \pi_{i,j} E[u(L_{i,j}^{G*})] + (1 - \pi_{i,j}) E[u(L_{i,j}^O)] \quad (13)$$

$$= E[u(L_{i,j}^*)] \quad (14)$$

Hence, $L_{i,j}^*$ is a mean-preserving-spread of $L_{i,j}$ if $L_{i,j}^{G*}$ is a mean-preserving-spread of $L_{i,j}^G$ and, additionally, $L_{i,j}^{O*} = L_{i,j}^O$ and $\pi_{i,j}^* = \pi_{i,j}$ holds. However, there is a condition for this to hold: We must assume that $\pi_{i,j} > 0$, i.e., voter i does not expect with certainty that party j will end up in opposition, otherwise Equation (13) does not follow from Equation (12).

A.2.3 Example of Mean-preserving Spreads of Government Lotteries

Figure SM1 shows three government lotteries. The lotteries contain three government outcomes with payoffs 2, 5, and 8. They are fixed in all three lotteries. The probabilities for the government outcomes change for the three lotteries. Comparing lottery 1 with lottery 2, the probabilities for a

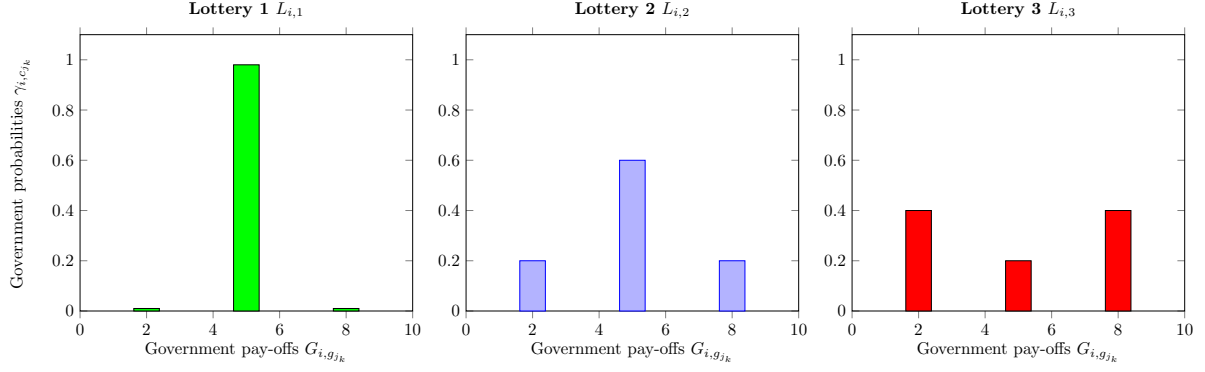


Figure SM1: Example of mean-preserving spread of Government Lottery

low and high payoff government outcomes increase while the probability for the middle government outcome consequently decreases. Moving from lottery 2 to lottery 3, the probabilities for low and high payoff government outcomes increase even further, again while the probability decreases for the middle category. This makes lottery 2 a mean-preserving spread of lottery 1, and lottery 3 of lottery 2. In the example, the way to construct the mean-preserving lotteries is to hold the expected payoffs constant, while increasing the variance of the payoffs. This permits to isolate the effect of risk preferences when deciding between the three lotteries.

B Observational Study

B.1 Survey Data

We leverage two primary and 15 different secondary data sources to provide observational evidence when testing the first observable implication we derive from our theory using the mean-variance approximation.

B.1.1 Primary Data Sources

The first self-conducted survey polled Swedish citizens during the 2018 Swedish parliamentary election campaign. The survey was fielded between June 12 and August 6, 2018, leveraging the online panel of the Laboratory of Opinion Research (LORE) at the University of Gothenburg and included responses from a total of 1,907 respondents. In this survey, respondents answered questions about the various post-electoral government options of the Swedish Social Democratic Party and the Swedish Moderate Party, including the respondents' evaluations and perceived probabilities for these government options. We fielded the second self-conducted survey during the 2020 New Zealand general election campaign. Between October 8 and October 14, 2020, we recruited 458 respondents through the Consumer Link's online panel. As part of the survey, we asked respondents about the government options the New Zealand Labour Party was likely to have after the election. Specifically, we asked respondents to state their evaluations and perceived probabilities for the government options of this party.

In New Zealand, we focus on the New Zealand Labour Party (L) for which we have data on four different government options: a single-party government of the Labour Party, a L-Green, a L-ACT and a L-NZ First coalition. In the survey data from Sweden 2018, we consider both the Swedish Social Democratic Party (SAP) and the Swedish Moderate Party (M). As for the Swedish Social Democratic Party, we have data on two different government options: a SAP-MP and a SAP-MP-L-C coalition. As for the Swedish Moderate Party, we have data on two different government options: a M-C-L-KD and a M-SD coalition.

B.1.2 Secondary Data Sources

We were happy to compile 15 different studies that include necessary measures for our analysis. For Austria, we identified several relevant components from the Austrian National Election Study (AUTNES): the AUTNES Rolling Cross Section Panel 2013 (Kritzinger, Johann, Aichholzer, Glinitzer, Glantschnigg, Oberluggauer, Thomas, Wagner, and Zeglovits, 2020), the AUTNES Pre-Panel 2013 (Kritzinger, Zeglovits, Aichholzer, Glantschnigg, Glinitzer, Johann, Thomas, and Wagner, 2020) (all in the context of the Austrian legislative election in 2013), the AUTNES Online Panel Wave 4 (Aichholzer et al., 2020), the AUTNES Multi-Mode Panel (Kritzinger et al., 2018) (all Austrian legislative election in 2017), and the AUTNES Online Panel Wave 11 (Aichholzer et al., 2020) (Austrian legislative election in 2019). For Belgium, we identified the Belgian National Election Study (BNES) of 2014 (Bol et al., 2017). For Germany, we draw on different components of the German Longitudinal Election Study (GLES): the GLES Pre-election Cross Section 2009 (GLES, 2020) (German legislative election in 2009), the GLES Pre-election Cross Section 2013 (GLES, 2020), the GLES Longterm-Online-Tracking 2013 (GLES, 2019) (all German legislative election in 2013), the GLES Longterm-Online-Tracking 2017 (GLES, 2019), GLES Panel 2016-2021, Wave 7 (GLES, 2021) (all German legislative election in 2017), the GLES Panel 2016-2021, Wave 21 (GLES, 2021) (all German legislative election in 2021). For the Netherlands, we identified the Dutch Parliamentary Election Study 2006 (CBS et al., 2007). For Spain, we use the Spanish National Election Study of 2016 (Lago et al., 2017). For Sweden, we draw on the Swedish National Election Study of 2010 (Blais et al., 2017). We only considered pre-electoral responses of individuals. If there were several waves of a panel prior to an election, we only considered the most recent one.

B.1.3 Survey Questions

This section provides an overview of the survey questions available in the different studies.

Austria: AUTNES Pre-Panel Study 2013

- Vote choice
- Coalition scalometer
 - (0) I do not prefer it at all ... (10) I very much prefer it
 - Now, I'd like to ask you a few questions about the next federal government. Using a scale from 0 to 10, please indicate to what extent you would prefer a coalition between the following parties. 0 means "I do not prefer this coalition at all" and 10 means "I very much prefer this coalition".
 - * red and green, meaning SPÖ and the Greens
 - * red and black, meaning SPÖ and ÖVP
 - * black and blue, meaning ÖVP and FPÖ
 - * red-blue, meaning SPÖ and FPÖ
- Perceived government probabilities
 - (1) very likely ... (4) very unlikely
 - How likely do you think it is that the following parties will form a coalition after the election? Very likely, fairly likely, fairly unlikely, or very unlikely?
 - * red and green, meaning SPÖ and the Greens
 - * red and black, meaning SPÖ and ÖVP
 - * black and blue, meaning ÖVP and FPÖ

* red-blue, meaning SPÖ and FPÖ

Austria: AUTNES Rolling Cross Section Panel Study 2013

- Vote choice
- Coalition scalometer
 - (0) I do not prefer it at all ... (10) I very much prefer it
 - Now, I'd like to ask you a few questions about the next federal government. Please indicate to what extent you would prefer a coalition between the following parties using a scale from 0 to 10, where 0 means "I do not prefer this coalition at all" and 10 means "I very much prefer this coalition".
 - * red-black, that is, SPÖ and ÖVP
 - * black-blue, that is, ÖVP and FPÖ
 - * red-blue, that is, SPÖ and FPÖ
 - * red-black-green, that is, SPÖ, ÖVP and the Greens
 - * black-blue and Team Stronach, that is, ÖVP, FPÖ, and Team Stronach
- Perceived government probabilities
 - (1) very likely ... (4) very unlikely
 - And now to the likelihood of coalitions, how likely do you think it is that the following parties will form a coalition after the election? Very likely, fairly likely, fairly unlikely, or very unlikely?
 - * red-black, that is, SPÖ and ÖVP
 - * black-blue, that is, ÖVP and FPÖ
 - * red-blue, that is, SPÖ and FPÖ
 - * red-black-green, that is, SPÖ, ÖVP and the Greens
 - * black-blue and Team Stronach, that is, ÖVP, FPÖ, and Team Stronach

Austria: AUTNES Multi-Mode Panel Study 2017, Wave 2

- Vote choice
- Coalition scalometer
 - (0) I do not want it at all ... (10) I want it very much
 - How much do you want a coalition between the following parties, independently of how likely they are? 0 means that you don't want this coalition at all and 10 means that you very much want this coalition.
 - * SPÖ and ÖVP
 - * ÖVP and FPÖ
 - * SPÖ and FPÖ
- Perceived government probabilities
 - (0) highly unlikely ... (10) very likely
 - How likely do you think it is that the following parties will form a coalition after the election? 0 means "highly unlikely"; 10 means "very likely".

- * SPÖ and ÖVP
- * ÖVP and FPÖ
- * SPÖ and FPÖ

- Like-dislike scale for parties not available; instead:
 - Squared distance of left-right party placement and self-placement (Wave 1)
 - Party leader rating taken as control variables

Austria: AUTNES Online Panel Study 2017-2019, Wave 4, 2017

- Vote choice
- Coalition scalometer
 - (0) I do not want it at all ... (10) I want it very much
 - On a scale from 0 to 10, how much do you want a coalition between the following parties, independently of how likely they are?
 - * SPÖ and ÖVP
 - * ÖVP and FPÖ
 - * SPÖ and FPÖ
- Perceived government probabilities
 - (0) highly unlikely ... (10) very likely
 - And now about the likelihood of coalitions. How likely do you think it is that the following parties will form a coalition after the national parliamentary election on October 15, 2017?
 - * SPÖ and ÖVP
 - * ÖVP and FPÖ
 - * SPÖ and FPÖ
- Like-dislike scale for parties not available; instead:
 - Squared distance of left-right party placement and self-placement (Wave 1)
 - Party leader rating taken as control variables

Austria: AUTNES Online Panel Study 2017-2019, Wave 11, 2019

- Vote choice
- Coalition scalometer
 - (0) I do not want it at all ... (10) I want it very much
 - On a scale from 0 to 10, how much do you want a coalition between the following parties, independently of how likely they are?
 - * ÖVP and SPÖ
 - * ÖVP and FPÖ
 - * SPÖ and FPÖ
- Perceived government probabilities

- (0) highly unlikely ... (10) very likely
- And now about the likelihood of coalitions. How likely do you think it is that the following parties will form a coalition after the national parliamentary election on September 29, 2019?
 - * ÖVP and SPÖ
 - * ÖVP and FPÖ
 - * SPÖ and FPÖ
- Like-dislike scale for parties not available; instead:
 - Squared distance of left-right party placement and self-placement (Wave 1)
 - Party leader rating taken as control variables

Belgian: Belgian National Election Study 2014

- Vote choice
- Coalition scalometer
 - (0) Do not like this coalition at all ... (10) I really like this coalition
 - Please rate each of the following coalitions that could form at the FEDERAL level of government on a scale of 0 to 10, where 0 means you don't like this coalition at all and 10 means you like it a lot.
 - * PS, SP.A, CDV, CDH, MR, Open VLD
 - * N-VA, CDV, CDH, MR, Open VLD
 - * PS, SP.A, CDV, CDH, MR, Open VLD, Ecolo, Groen
 - * CDV, CDH, PS, SP.A, Ecolo, Groen
- Perceived government probabilities
 - (0) very unlikely ... (10) very likely
 - Please rate the likelihood of each of the following coalitions forming at the FEDERAL government level on a scale of 0 to 10, where 0 means it is very unlikely and 10 means it is very likely.
 - * PS, SP.A, CDV, CDH, MR, Open VLD
 - * N-VA, CDV, CDH, MR, Open VLD
 - * PS, SP.A, CDV, CDH, MR, Open VLD, Ecolo, Groen
 - * CDV, CDH, PS, SP.A, Ecolo, Groen

Spain: Spanish National Election Study 2016

- Vote choice
- Coalition scalometer
 - (0) Strongly dislike the coalition ... (10) Strongly like the coalition
 - Please rate each of the following government agreements that could be reached after the election on a scale from 0 to 10, where 0 means you really dislike the agreement and 10 means you really like it.

- * PP with PSOE
- * PP with Ciudadanos
- * PSOE with Unidos Podemos
- * PSOE with Ciudadanos
- * Unidos Podemos with Ciudadanos
- Perceived government probabilities
 - (0) very unlikely ... (10) very likely
 - Now we would like to ask you about the likelihood of coalitions forming the government. In your opinion, how likely is it that the following coalitions will form the government after the election, where 0 means very unlikely and 10 means very likely?
 - * PP with PSOE
 - * PP with Ciudadanos
 - * PSOE with Unidos Podemos
 - * PSOE with Ciudadanos
 - * Unidos Podemos with Ciudadanos

Germany: GLES Longterm-Online-Tracking 2013

- Vote choice
- Coalition scalometer
 - (1) -5 not desirable at all ... (11) +5 very desirable
 - Now some questions about the possible composition of the next federal government after the federal election on September 22, 2013. Regardless of how likely you think such a coalition is, how desirable do you personally think the following coalition governments are?
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-Yellow coalition (CDU/CSU and FDP)
 - * Red-Green coalition (SPD and GREENS)
 - * Jamaica coalition (CDU/CSU, FDP and GREENS)
 - * Traffic light coalition (SPD, FDP, GREENS)
 - * Black-Green coalition (CDU/CSU and GREENS)
 - * Red-Red-Green coalition (SPD, DIE LINKE, GREENS)
- Perceived government probabilities
 - (1) 1 very unlikely ... (11) 11 very likely
 - And now to the prospects of success for possible government coalitions. How likely do you think it is that the governing coalition after the next federal election will consist of the following parties?
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-Yellow coalition (CDU/CSU and FDP)
 - * Red-Green coalition (SPD and GREENS)
 - * Jamaica coalition (CDU/CSU, FDP and GREENS)

- * Traffic light coalition (SPD, FDP, GREENS)
- * Black-Green coalition (CDU/CSU and GREENS)
- * Red-Red-Green coalition (SPD, DIE LINKE, GREENS)

Germany: GLES Longterm-Online-Tracking 2017

- Vote choice
- Coalition scalometer
 - (1) -5 not desirable at all ... (11) +5 very desirable
 - Now a question about the possible composition of the federal government. Regardless of how likely you think such a coalition is, how desirable do you personally think the following coalition governments are?
 - * Black-Yellow coalition (CDU/CSU and FDP)
 - * Red-Green coalition (SPD and GREENS)
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-Green coalition (CDU/CSU and GREENS)
 - * Traffic light coalition (SPD, FDP, GREENS)
 - * Jamaica coalition (CDU/CSU, FDP and GREENS)
 - * Red-Red-Green coalition (SPD, DIE LINKE, GREENS)
- Perceived government probabilities
 - (1) 1 very unlikely ... (11) 11 very likely
 - And now to the prospects of success for possible government coalitions. How likely do you think it is that the future governing coalition will consist of the following parties?
 - * Grand coalition (CDU/CSU and SPD)
 - * Red-Red-Green coalition (SPD, DIE LINKE, GREENS)
 - * Black-Green coalition (CDU/CSU and GREENS)
 - * Jamaica coalition (CDU/CSU, FDP and GREENS)
 - * Black-Yellow coalition (CDU/CSU and FDP)

Germany: GLES Cross Section (Pre-Election) 2009

- Vote choice
- Coalition scalometer
 - (1) -5 not desirable at all ... (11) +5 very desirable
 - Now I would like to ask some questions about the possible composition of the federal government. How desirable are the following possible governing coalitions for you personally, regardless of how likely the respective coalition is in your opinion?
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-yellow coalition (CDU/CSU and FDP)
 - * Red-green coalition (SPD and GREENS)
 - * Red-yellow coalition (SPD and FDP)

- * Black-green coalition (CDU/CSU and GREENS)
- * Traffic light coalition (SPD, FDP and GREENS)
- * Jamaica coalition (CDU/CSU, FDP and GREENS)
- * Red-red-green coalition (SPD, DIE LINKE and GREENS)
- Perceived government probabilities
 - (1) very likely ... (4) very unlikely
 - Regardless of the actual majorities after the federal election, how likely do you think it is that the following political parties would be willing to join a coalition with each other?
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-yellow coalition (CDU/CSU and FDP)
 - * Red-green coalition (SPD and GREENS)
 - * Traffic light coalition (SPD, FDP and GREENS)
 - * Jamaica coalition (CDU/CSU, FDP and GREENS)
 - * Red-red-green coalition (SPD, DIE LINKE and GREENS)

Germany: GLES Cross Section (Pre-Election) 2013

- Vote choice
- Coalition scalometer
 - (1) -5 not desirable at all ... (11) +5 very desirable
 - Now I would like to ask a question about the possible composition of the federal government after the next federal election. How desirable are the following possible governing coalitions for you personally, regardless of how likely the respective coalition is in your opinion?
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-yellow coalition (CDU/CSU and FDP)
 - * Red-green coalition (SPD and GREENS)
 - * Black-green coalition (CDU/CSU and GREENS)
 - * Traffic light coalition (SPD, FDP and GREENS)
 - * Red-red-green coalition (SPD, GREENS and DIE LINKE)
- Perceived government probabilities
 - (1) very unlikely ... (11) very likely
 - And now we would like to ask you about the prospects of success for the different coalition possibilities. How likely do you think it is that the following political parties would be willing to join a coalition with each other?
 - * Black-yellow coalition (CDU/CSU and FDP)
 - * Red-green coalition (SPD and GREENS)
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-green coalition (CDU/CSU and GREENS)
 - * Traffic light coalition (SPD, FDP and GREENS)

- * Red-red-green coalition (SPD, GREENS and DIE LINKE)

Germany: GLES Panel 2016-2021, 2017, Wave 7

- Vote choice
- Coalition scalometer
 - (1) -5 not desirable at all ... (11) +5 very desirable
 - Regardless of how likely the respective coalition is, how desirable are the following coalition governments for you personally?
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-yellow coalition (CDU/CSU and FDP)
 - * Red-green coalition (SPD and GREENS)
 - * Black-green coalition (CDU/CSU and GREENS)
 - * Traffic-light-coalition (SPD, FDP and GREENS)
 - * Jamaica coalition (CDU/CSU, FDP and GREENS)
 - * Red-red-green coalition (SPD, DIE LINKE and GREENS)
- Perceived government probabilities
 - (1) definitely not ... (5) definitely
 - Imagine that the following parties had a majority in the Bundestag after the 2017 federal election. Do you think that these parties would then be willing to enter into a coalition with each other?
 - * Grand coalition (CDU/CSU and SPD)
 - * Black-yellow coalition (CDU/CSU and FDP)
 - * Red-green coalition (SPD and GREENS)
 - * Black-green coalition (CDU/CSU and GREENS)
 - * Traffic-light-coalition (SPD, FDP and GREENS)
 - * Jamaica coalition (CDU/CSU, FDP and GREENS)
 - * Red-red-green coalition (SPD, DIE LINKE and GREENS)

Germany: GLES Panel 2016-2021, 2021, Wave 17 (Pre-Release)

- Vote choice
- Coalition scalometer
 - (1) -5 not desirable at all ... (11) +5 very desirable
 - Regardless of which coalition governs and how likely the following coalitions are at the moment, how desirable are these coalition governments at the federal level for you personally?
 - * Coalition of CDU/CSU and SPD
 - * Coalition of CDU/CSU and GREENS
 - * Coalition of GREENS, SPD and FDP
 - * Coalition of CDU/CSU, GREENS and FDP

- * Coalition of GREENS, SPD and DIE LINKE
- Perceived government probabilities
 - (1) definitely not ... (5) definitely
 - Imagine that the following parties had a majority in the Bundestag after the 2017 federal election. Do you think that these parties would then be willing to enter into a coalition with each other?
 - * Coalition of CDU/CSU and SPD
 - * Coalition of CDU/CSU and GREENS
 - * Coalition of GREENS, SPD and FDP
 - * Coalition of CDU/CSU, GREENS and FDP
 - * Coalition of GREENS, SPD and DIE LINKE

Netherlands: Dutch Parliamentary Election Study 2006

- Vote choice
- Coalition scalometer
 - (1) very undesirable ... (7) very desirable
 - And now I would like to ask you something about the future government. Could you tell me to what extent you think it is desirable or undesirable that parties will form the government together?
 - * CDA and VVD
 - * CDA and PvdA
 - * PvdA, SP and GroenLinks
 - * PvdA and VVD
- Perceived government probabilities
 - (1) very unlikely ... (10) very likely
 - Now I would also like to ask you how probable or improbable it is according to you that the mentioned parties will form a new government after the elections.
 - * CDA and VVD
 - * CDA and PvdA
 - * PvdA, SP and GroenLinks
 - * PvdA and VVD

Sweden: Swedish National Election Study 2010

- Vote choice
- Coalition scalometer
 - (0) strongly dislike ... (10) strongly like
 - Please rate each of the following government coalitions that could be formed after the election on a scale from 0 to 10, where 0 means you really dislike the coalition and 10 means you really like it

- * M, FP, C and KD
- * S, MP and V
- * M, FP, C, KD and MP
- * S, MP, V and C
- Perceived government probabilities
 - (0) not likely at all ... (10) very likely
 - How likely is it that the following parties will form a government after the election, where 0 means very unlikely and 10 means very likely?
 - * M, FP, C and KD
 - * S, MP and V
 - * M, FP, C, KD and MP
 - * S, MP, V and C

Self-Conducted Surveys: Sweden 2018

- Propensity to vote
 - How likely is it that you will vote for the following parties?
 - (1) Not likely at all ... (7) Very likely
 - * Left Party
 - * Swedish Social Democratic Party
 - * Swedish Social Democratic Party
 - * Center Party
 - * The Liberals
 - * Christian Democrats
 - * Moderate Party
 - * Sweden Democrats party
- Coalition scalometer
 - What do you think of the following coalitions?
 - (1) strongly dislike ... (7) strongly like
 - * Red-Green Coalition (Social Democrats and Green Party)
 - * The Alliance (Moderates, Center Party, the Liberals and the Christian Democrats)
 - * Center Coalition (Social Democrats, Green Party, Center)
 - * Right-wing Coalition (Moderates and the Sweden Democrats)
- Perceived government probabilities
 - (0) not likely at all ... (10) very likely
 - Suppose that the Swedish Social Democratic Party is part of the next government. Which coalition government is the party likely to be part of?
 - * Red-Green Coalition (Social Democrats and Green Party)
 - * Center Coalition (Social Democrats, Green Party, Center Party and the Liberals)

- Suppose that the Swedish Social Democratic Party is part of the next government. Which coalition government is the party likely to be part of?
 - * The Alliance (Moderates, Center Party, the Liberals and the Christian Democrats)
 - * Right-wing Coalition (Moderates and the Sweden Democrats)

Self-Conducted Surveys: New Zealand 2020

- Propensity to vote
 - As you might know, an election is coming up this week. How likely is it that you would vote for the following parties?
 - (1) Not likely at all ... (7) Very likely
 - * Labour
 - * National
 - * Green
 - * Center Party
 - * ACT
 - * NZ First
- Coalition scalometer
 - What do you think of the following governments?
 - (1) strongly dislike ... (7) strongly like
 - * Single-party government Labour
 - * Coalition government Labour - Green
 - * Coalition government Labour - ACT
 - * Coalition government Labour - NZ First
- Perceived government probabilities
 - (0) not likely at all ... (7) very likely
 - Suppose Labour is part of the next government. Which government is the party likely to be part of?
 - * Single-party government Labour
 - * Coalition government Labour - Green
 - * Coalition government Labour - ACT
 - * Coalition government Labour - NZ First

B.2 Survey Data Evidence

Figure SM2 provides an overview of the estimates in all survey studies. The estimate report on the coefficient estimates for government lottery variance originating from the linear regressions of *propensities to vote* on perceived government lottery variance (squares as point estimates) and of the linear regressions of *vote choice* on perceived government lottery variance (diamonds as point estimates). All models control among others for the perceived government lottery mean. At the bottom, the figure also reports on the results of the meta-analysis using the established inverse variance weighting. The following subsections provide the regression tables for all models.

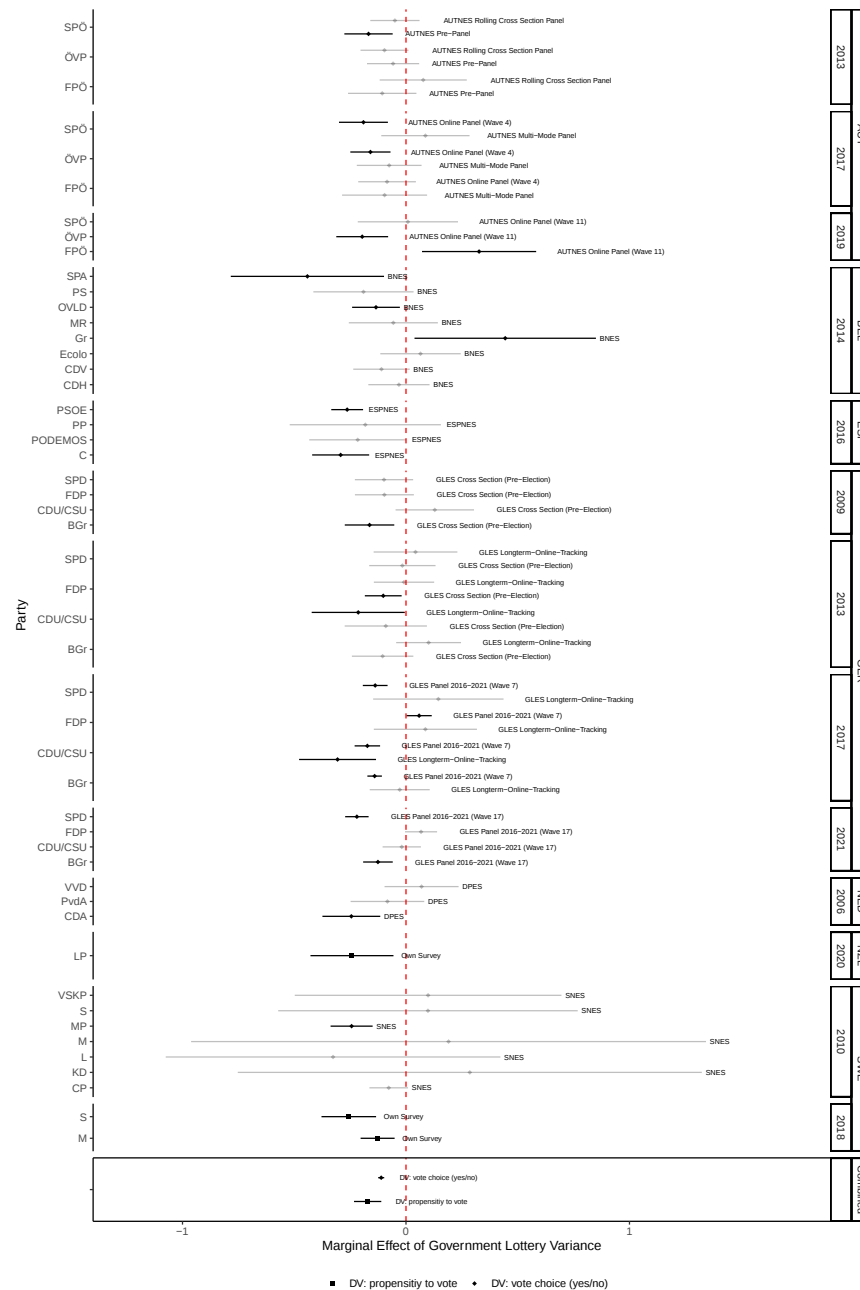


Figure SM2: Overview of observational evidence

Note: The estimate report on the coefficient estimates for government lottery variance originating from the linear regressions of *propensities to vote* on perceived government lottery variance (squares as point estimates) and of the linear regressions of *vote choice* on perceived government lottery variance (diamonds as point estimates). 95% confidence intervals are displayed. Full regression tables are reported in B.2.1.

B.2.1 Regression Tables

	<i>Dependent variable: Vote for</i>		
	SPÖ	ÖVP	FPÖ
	(1)	(2)	(3)
Government Lottery Variance	−0.168*** (0.055)	−0.058 (0.060)	−0.106* (0.078)
Government Lottery Mean	0.080 (0.053)	0.035 (0.045)	0.169*** (0.047)
Rating Party SPÖ	0.103*** (0.004)		
Rating Party ÖVP		0.096*** (0.004)	
Rating Party FPÖ			0.075*** (0.004)
Constant	−0.361** (0.149)	−0.170 (0.133)	−0.368*** (0.078)
Controls (Age, Education, Gender)	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	1,105	1,159	1,109
R ²	0.448	0.430	0.515
Adjusted R ²	0.439	0.422	0.507

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

Table SM1: Linear regressions of vote choice on perceived government lottery variance and mean (AUTNES Pre-Panel Study 2013).

	<i>Dependent variable: Vote for</i>		
	SPÖ	ÖVP	FPÖ
	(1)	(2)	(3)
Government Lottery Variance	−0.050 (0.056)	−0.096* (0.055)	0.077 (0.099)
Government Lottery Mean	0.022 (0.052)	0.007 (0.054)	0.006 (0.053)
Rating Party SPÖ	0.119*** (0.003)		
Rating Party ÖVP		0.117*** (0.004)	
Rating Party FPÖ			0.084*** (0.004)
Constant	−0.115 (0.161)	−0.310 (0.263)	−0.220*** (0.075)
Controls (Age, Education, Gender)	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	1,233	1,199	1,228
R ²	0.548	0.453	0.543
Adjusted R ²	0.542	0.445	0.536

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

Table SM2: Linear regressions of vote choice on perceived government lottery variance and mean (AUTNES Rolling Cross Section Panel Study 2013).

	<i>Dependent variable: Vote for</i>		
	SPÖ	ÖVP	FPÖ
	(1)	(2)	(3)
Government Lottery Variance	0.087 (0.101)	−0.075 (0.074)	−0.096 (0.097)
Government Lottery Mean	0.118*** (0.044)	0.157*** (0.040)	0.040 (0.037)
Distance Party SPÖ	−0.001** (0.001)		
Rating Lead. SPÖ	0.061*** (0.004)		
Distance Party ÖVP		0.001** (0.001)	
Rating Lead. ÖVP		0.080*** (0.004)	
Distance Party FPÖ			0.0005 (0.0003)
Rating Lead. FPÖ			0.072*** (0.004)
Constant	0.029 (0.131)	−0.357*** (0.110)	0.097 (0.076)
Controls (Age, Education, Gender)	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	1,144	1,137	1,145
R ²	0.230	0.422	0.471
Adjusted R ²	0.219	0.414	0.463

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

Table SM3: Linear regressions of vote choice on perceived government lottery variance and mean (AUTNES Multi-Mode Panel Study 2017, Wave 2)

	<i>Dependent variable: Vote for</i>		
	SPÖ	ÖVP	FPÖ
	(1)	(2)	(3)
Government Lottery Variance	−0.190*** (0.056)	−0.159*** (0.046)	−0.085 (0.066)
Government Lottery Mean	0.224*** (0.034)	0.003 (0.029)	0.074** (0.033)
Distance Party SPÖ	−0.0001 (0.0003)		
Rating Lead. SPÖ	0.061*** (0.003)		
Distance Party ÖVP		−0.001*** (0.0003)	
Rating Lead. ÖVP		0.061*** (0.003)	
Distance Party FPÖ			−0.001*** (0.0003)
Rating Lead. FPÖ			0.080*** (0.003)
Constant	−0.296*** (0.086)	−0.178 (0.124)	0.006 (0.107)
Controls (Age, Education, Gender)	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	1,710	1,720	1,733
R ²	0.369	0.306	0.552
Adjusted R ²	0.363	0.299	0.547

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

Table SM4: Linear regressions of vote choice on perceived government lottery variance and mean (AUTNES Online Panel Study 2017-2019, wave 4, 2017)

	<i>Dependent variable: Vote for</i>		
	SPÖ (1)	ÖVP (2)	FPÖ (3)
Government Lottery Variance	0.008 (0.080)	−0.196*** (0.056)	0.327** (0.128)
Government Lottery Mean	0.242*** (0.038)	−0.119*** (0.030)	0.352*** (0.036)
Distance Party SPÖ	0.0004 (0.0005)		
Rating Lead. SPÖ	0.054*** (0.003)		
Distance Party ÖVP		−0.0005 (0.001)	
Rating Lead. ÖVP		0.084*** (0.003)	
Distance Party FPÖ			0.001*** (0.0004)
Rating Lead. FPÖ			0.047*** (0.004)
Constant	−0.264** (0.113)	−0.160 (0.120)	−0.119 (0.109)
Controls (Age, Education, Gender)	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	1,151	1,155	1,162
R ²	0.345	0.458	0.475
Adjusted R ²	0.335	0.450	0.467

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

Table SM5: Linear regressions of vote choice on perceived government lottery variance and mean (AUTNES Online Panel Study 2017-2019, wave 11, 2019)

	<i>Dependent variable: Vote for</i>							
	PS (1)	SP.A (2)	CD&V (3)	CDH (4)	MR (5)	OpenVLD (6)	Ecolo (7)	Groen (8)
Government Lottery Variance	−0.190* (0.114)	−0.441** (0.175)	−0.110* (0.064)	−0.032 (0.070)	−0.057 (0.102)	−0.134** (0.055)	0.065 (0.092)	0.444** (0.207)
Government Lottery Mean	−0.054 (0.044)	−0.030 (0.051)	0.016 (0.037)	−0.114*** (0.036)	−0.093** (0.044)	−0.011 (0.039)	−0.022 (0.033)	0.014 (0.032)
Rating Party PS	0.085*** (0.004)							
Rating Party SP.A		0.078*** (0.006)						
Rating Party CD&V			0.066*** (0.005)					
Rating Party CDH				0.051*** (0.005)				
Rating Party MR					0.096*** (0.003)			
Rating Party OpenVLD						0.059*** (0.005)		
Rating Party Ecolo							0.041*** (0.004)	
Rating Party Groen								0.028*** (0.004)
Constant	−0.278 (0.188)	0.085 (0.105)	−0.293*** (0.072)	−0.092 (0.092)	−0.153 (0.134)	−0.179* (0.091)	−0.099* (0.055)	−0.058 (0.053)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	935	685	687	926	930	689	939	687
R ²	0.377	0.335	0.222	0.170	0.418	0.215	0.186	0.158
Adjusted R ²	0.369	0.324	0.209	0.159	0.410	0.201	0.175	0.143

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

Table SM6: Linear regressions of vote choice on perceived government lottery variance and mean (Belgian National Election Study 2014)

	<i>Dependent variable: Vote for</i>			
	PP	PSOE	Podemos	Ciudadanos
	(1)	(2)	(3)	(4)
Government Lottery Variance	−0.182 (0.173)	−0.263*** (0.036)	−0.216* (0.111)	−0.292*** (0.065)
Government Lottery Mean	−0.114*** (0.042)	−0.072*** (0.025)	−0.061 (0.044)	−0.027 (0.033)
Rating Party PP	0.098*** (0.004)			
Rating Party PSOE		0.078*** (0.003)		
Rating Party Podemos			0.085*** (0.004)	
Rating Party Ciudadanos				0.063*** (0.004)
Constant	−0.033 (0.040)	−0.126** (0.055)	0.116* (0.062)	−0.020 (0.054)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes
Observations	1,700	1,695	1,682	1,685
R ²	0.590	0.366	0.432	0.278
Adjusted R ²	0.587	0.362	0.428	0.274

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

Table SM7: Linear regressions of vote on perceived government lottery variance and mean (Spanish National Election Study 2016)

	<i>Dependent variable: Vote for</i>			
	Union	SPD	FDP	Greens
	(1)	(2)	(3)	(4)
Government Lottery Variance	−0.214** (0.106)	0.043 (0.096)	−0.009 (0.069)	0.101 (0.074)
Government Lottery Mean	0.254*** (0.056)	0.189*** (0.050)	0.059** (0.027)	0.057 (0.047)
Rating Party Union	0.077*** (0.005)			
Rating Party SPD		0.073*** (0.005)		
Rating Party FDP			0.019*** (0.004)	
Rating Party Greens				0.042*** (0.004)
Constant	−0.652*** (0.091)	−0.286** (0.131)	0.050 (0.181)	−0.016 (0.234)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes
Observations	775	812	798	783
R ²	0.380	0.259	0.121	0.202
Adjusted R ²	0.369	0.247	0.106	0.189

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

Table SM8: Linear regressions of vote choice on perceived government lottery variance and mean (GLES Longterm-Online-Tracking 2013).

	<i>Dependent variable: Vote for</i>			
	Union	SPD	FDP	Greens
	(1)	(2)	(3)	(4)
Government Lottery Variance	−0.306*** (0.088)	0.145 (0.149)	0.087 (0.118)	−0.028 (0.069)
Government Lottery Mean	0.167*** (0.056)	−0.080* (0.045)	0.102*** (0.035)	0.001 (0.036)
Rating Party Union	0.080*** (0.005)			
Rating Party SPD		0.062*** (0.005)		
Rating Party FDP			0.045*** (0.004)	
Rating Party Greens				0.040*** (0.004)
Constant	−0.157 (0.228)	−0.211*** (0.069)	−0.372*** (0.071)	−0.191*** (0.066)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes
Observations	893	905	903	902
R ²	0.339	0.194	0.233	0.182
Adjusted R ²	0.330	0.183	0.221	0.170

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

Table SM9: Linear regressions of vote choice on perceived government lottery variance and mean (GLES Longterm-Online-Tracking 2017).

	<i>Dependent variable: Vote for</i>			
	Union	SPD	FDP	Greens
	(1)	(2)	(3)	(4)
Government Lottery Variance	0.129 (0.090)	−0.098 (0.067)	−0.097 (0.067)	−0.163*** (0.057)
Government Lottery Mean	0.083 (0.059)	0.120** (0.057)	0.024 (0.051)	0.023 (0.051)
Rating Party Union	0.103*** (0.004)			
Rating Party SPD		0.088*** (0.004)		
Rating Party FDP			0.051*** (0.004)	
Rating Party Greens				0.058*** (0.004)
Constant	−0.080 (0.068)	−0.445*** (0.095)	−0.347*** (0.057)	−0.202*** (0.067)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes
Observations	1,294	1,306	1,311	1,293
R ²	0.437	0.296	0.170	0.233
Adjusted R ²	0.433	0.290	0.163	0.227

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

Table SM10: Linear regressions of vote choice on perceived government lottery variance and mean (GLES Cross Section (Pre-Election) 2009).

	<i>Dependent variable: Vote for</i>			
	Union	SPD	FDP	Greens
	(1)	(2)	(3)	(4)
Government Lottery Variance	−0.090 (0.094)	−0.016 (0.076)	−0.102** (0.042)	−0.105 (0.070)
Government Lottery Mean	0.190*** (0.045)	0.156*** (0.047)	0.078*** (0.019)	0.115*** (0.033)
Rating Party UNION	0.099*** (0.004)			
Rating Party SPD		0.096*** (0.005)		
Rating Party FDP			0.020*** (0.003)	
Rating Party GREENS				0.044*** (0.004)
Constant	−0.492*** (0.092)	−0.362*** (0.103)	−0.113** (0.052)	0.033 (0.074)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes
Observations	1,205	1,209	1,223	1,207
R ²	0.496	0.300	0.109	0.221
Adjusted R ²	0.492	0.294	0.101	0.213

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

Table SM11: Linear regressions of vote choice on perceived government lottery variance and mean (GLES Cross Section (Pre-Election) 2013).

	<i>Dependent variable: Vote for</i>			
	Union	SPD	FDP	Greens
	(1)	(2)	(3)	(4)
Government Lottery Variance	−0.173*** (0.029)	−0.138*** (0.028)	0.059** (0.029)	−0.140*** (0.017)
Government Lottery Mean	0.197*** (0.024)	0.130*** (0.023)	0.044** (0.020)	0.018 (0.019)
Rating Party UNION	0.070*** (0.002)			
Rating Party SPD		0.063*** (0.002)		
Rating Party FDP			0.042*** (0.002)	
Rating Party GRUENE				0.036*** (0.002)
Constant	−0.167*** (0.056)	−0.372*** (0.049)	−0.088* (0.051)	−0.039 (0.032)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes
Observations	6,653	6,649	6,651	6,507
R ²	0.348	0.257	0.183	0.156
Adjusted R ²	0.347	0.256	0.182	0.154

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

Table SM12: Linear regressions of vote choice on perceived government lottery variance and mean (GLES Panel 2016-2021, wave 7 (2017)).

	<i>Dependent variable: Vote for</i>			
	Union	SPD	FDP	Greens
	(1)	(2)	(3)	(4)
Government Lottery Variance	−0.019 (0.044)	−0.220*** (0.027)	0.067* (0.037)	−0.125*** (0.034)
Government Lottery Mean	−0.043 (0.028)	0.008 (0.025)	−0.111*** (0.017)	−0.124*** (0.030)
Rating Party UNION	0.083*** (0.002)			
Rating Party SPD		0.063*** (0.002)		
Rating Party FDP			0.050*** (0.002)	
Rating Party GRUENE				0.075*** (0.002)
Constant	−0.088 (0.073)	−0.236*** (0.081)	−0.134*** (0.034)	−0.004 (0.062)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes
Observations	4,638	4,630	4,646	4,588
R ²	0.337	0.238	0.211	0.342
Adjusted R ²	0.336	0.237	0.210	0.341

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

Table SM13: Linear regressions of vote choice on perceived government lottery variance and mean (GLES Panel 2021, Wave 17 (Pre-Release)).

	<i>Dependent variable: Vote for</i>		
	PvdA	CDA	VVD
	(1)	(2)	(3)
Government Lottery Variance	−0.083 (0.083)	−0.245*** (0.066)	0.070 (0.085)
Government Lottery Mean	0.238*** (0.040)	0.171*** (0.041)	0.140*** (0.032)
Rating Party PvdA	0.087*** (0.006)		
Rating Party CDA		0.098*** (0.005)	
Rating Party VVD			0.068*** (0.005)
Constant	−0.337*** (0.074)	−0.565*** (0.063)	−0.276*** (0.055)
Controls (Age, Education, Gender)	Yes	Yes	Yes
Observations	1,262	1,301	1,287
R ²	0.299	0.323	0.269
Adjusted R ²	0.294	0.318	0.264

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

Table SM14: Linear regressions of vote choice on perceived government lottery variance and mean (Dutch Parliamentary Election Study 2006)

	<i>Dependent variable: Vote for</i>						
	M	FP	C	KD	S	MP	V
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Government Lottery Variance	0.190 (0.588)	−0.326 (0.382)	−0.077* (0.044)	0.286 (0.530)	0.098 (0.342)	−0.243*** (0.048)	0.099 (0.304)
Government Lottery Mean	−0.296*** (0.072)	−0.105*** (0.034)	−0.063*** (0.022)	−0.103*** (0.022)	−0.097** (0.045)	−0.224*** (0.040)	−0.207*** (0.050)
Rating Party M	0.109*** (0.008)						
Rating Party FP		0.056*** (0.006)					
Rating Party C			0.040*** (0.005)				
Rating Party KD				0.042*** (0.005)			
Rating Party S					0.089*** (0.006)		
Rating Party MP						0.071*** (0.005)	
Rating Party V							0.076*** (0.007)
Constant	−0.051 (0.045)	−0.030 (0.041)	−0.011 (0.030)	−0.242*** (0.039)	0.265*** (0.054)	−0.247*** (0.054)	−0.060 (0.052)
Controls (Age, Education, Gender)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	935	938	936	933	938	931	938
R ²	0.414	0.203	0.143	0.182	0.405	0.279	0.341
Adjusted R ²	0.407	0.193	0.132	0.172	0.397	0.269	0.332

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

Table SM15: Linear regressions of vote choice on perceived government lottery variance and mean (The 2010 Internet Campaign Panel, Sweden)

	<i>Dependent variable: Propensity to vote for</i>		
	Moderates (Sweden 2018)	SAP (Sweden 2018)	Labour (NZ 2020)
Government Lottery Variance	−0.127*** (0.039)	−0.256*** (0.062)	−0.242** (0.095)
Government Lottery Mean	0.163*** (0.023)	0.157*** (0.023)	0.428*** (0.062)
Rating Party Moderates	0.142*** (0.004)		
Rating Party SAP		0.155*** (0.004)	
Rating Party NZ			0.130*** (0.010)
Constant	−0.168** (0.081)	−0.164* (0.084)	−0.260 (0.169)
Controls (Age, Education, Gender)	Yes	Yes	Yes
Observations	1,736	1,734	453
R ²	0.698	0.695	0.724
Adjusted R ²	0.695	0.692	0.714

Table SM16: Linear regressions of propensities to vote on perceived government lottery variance and mean (Own surveys conducted in New Zealand and Sweden).

	<i>Dependent Variable</i>	
	Propensity to vote	Vote choice (yes/no)
Government Lottery Variance	−0.111*** (0.007)	−0.172*** (0.031)
N (Studies)	3	61

Table SM17: Meta-analysis estimates based on inverse variance weighting (Rice et al., 2018) from models for all survey data sources (see single studies' tables).

B.2.2 Robustness Check: Party Identification

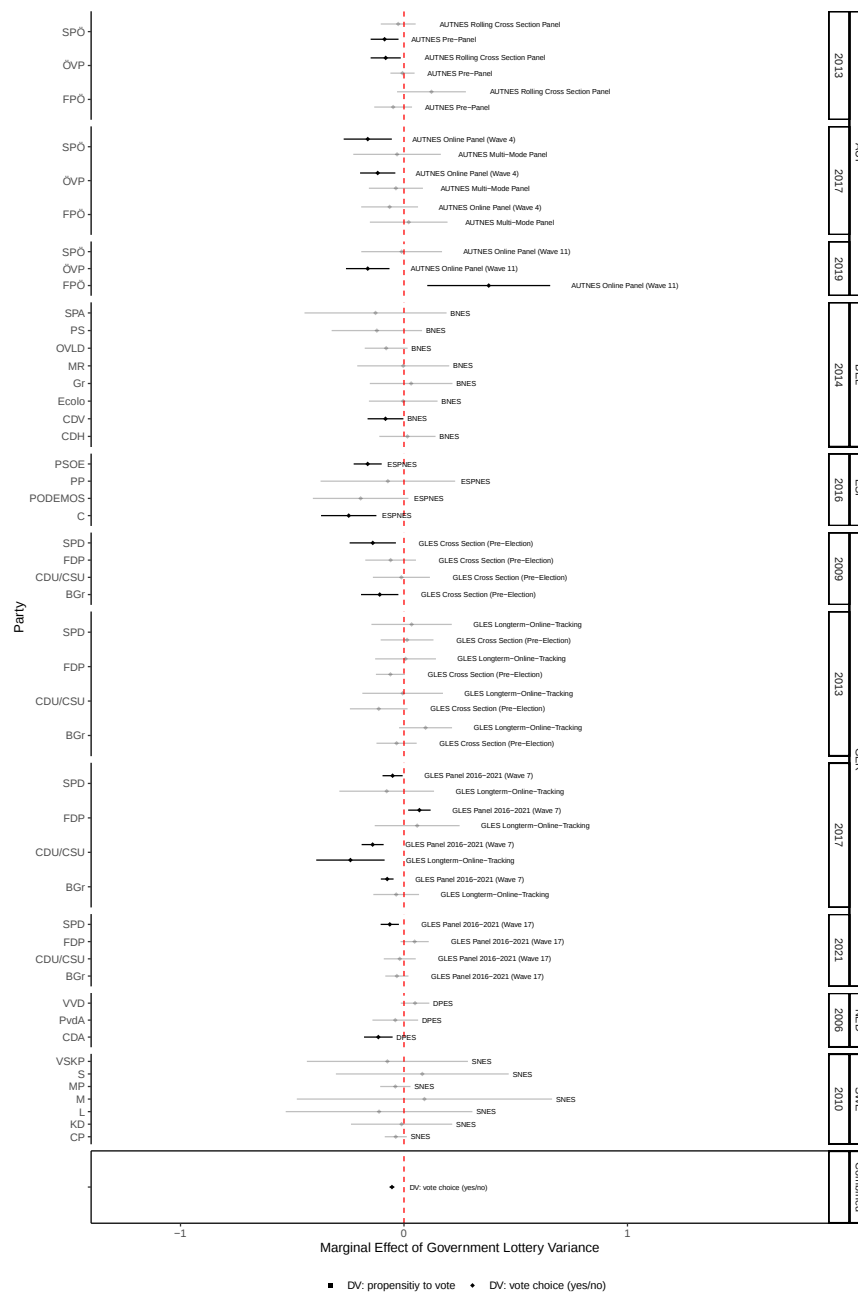


Figure SM3: Robustness check (PID): Overview of observational evidence

Note: The estimate report on the coefficient estimates for government lottery variance originating from the linear regressions of *vote choice* on perceived government lottery variance. 95% confidence intervals are displayed.

In our specification, we considered partisanship to be an “unmoved mover” that structurally precedes our other controls, such as party rating scores. Hence, we argued that it is sufficient to control for variables that are structurally closer to the outcome, as any variation in vote choice induced by partisanship would also influence party ratings and thus be accounted for.

However, as partisanship may directly affect vote choice beyond party evaluation we conducted a robustness check by adding partisan identification as a control variable in our analysis. This variable was available in all studies where the dependent variable was vote choice (yes/no) while it was not available for studies where the dependent variable was the propensity to vote. The results

of this robustness check show that including this variable does not make a material difference in our findings. The weighted average of the estimates derived from the linear probability models is still negative and significantly different from zero at conventional levels (Table SM18). This again indicates that uncertainty about a party's coalition prospects significantly reduces the likelihood of voters supporting that party. More specifically, in 16 of the models, we find evidence that voters are risk-averse, with significantly negative regression coefficients for government lottery variance (Figure SM3).

<i>Dependent Variable</i>	
Vote choice (yes/no)	
Government Lottery Variance	-0.054*** (0.005)
N (Studies)	61

Table SM18: Robustness check (PID): Meta-analysis estimates based on inverse variance weighting (Rice et al., 2018) from models for survey data sources.

C Experimental Study

C.1 Ethical Considerations

The ethic committee of our institution reviewed our research design and sees no legal or ethical objections. Our research also complies with GDPR requirements and the relevant ethical regulations, as documented in the Principles and Guidance for Human Subjects Research approved by the APSA Council. The risks to participants were assessed to be minimal or non-existent. The study involved participants answering questions related to their political preferences and basic demographic information, and the data collected was anonymized, further minimizing risks. The experimental manipulation only resulted in individualized questions, posing no significant risks to participants. In the following, we discuss some additional considerations. Participant recruitment: In partnership with the online survey firm RespondI, panelists were invited to participate in a study on the German federal election. Participation was voluntary. The survey design and programming were implemented on our end. The access panel provider and its local partners compensate their participants with their standard rates of cash transfers or platform-specific currencies for voluntary participation. Informed Consent: At the beginning of the survey, we obtained voluntary and informed consent from participants. We explain the research project, study purpose, the risk and benefits and described direct contact details to inquire further information. Deception: The research design does not use any form of deception. The questionnaire outlines the hypothetical nature ("Imagine that ...") of the question under experimental variation. Harm and impact: The research design has no conceivable harmful impact on the participants. The manipulation six hypothetical individualized questions that do not have follow-up consequences or lead to risks for participants. Confidentiality: The identities of research participants are kept confidential. Contacting details are kept with the survey firm. The anonymized response data is stored with the researchers. The anonymized data will be shared with the research community.

C.2 Calculations for Vignettes

In the second vignette, we calculated the probabilities for the lowest rated coalition, $\gamma_{i,low}^{(2)}$, for the medium rated coalition, $\gamma_{i,med}^{(2)}$, and for the highest rated coalition, $\gamma_{i,high}^{(2)}$, according to the following formulas: $\gamma_{i,low}^{(2)} = \frac{G_{i,med} - G_{i,high}}{G_{i,low} - G_{i,high}} \frac{1}{2}$, $\gamma_{i,high}^{(2)} = \frac{\gamma_{i,low}^{(2)} (G_{i,low} - G_{i,med})}{G_{i,med} - G_{i,high}}$, and $\gamma_{i,med}^{(2)} = 1 - (\gamma_{i,low}^{(2)} + \gamma_{i,high}^{(2)})$. $G_{i,low}$, $G_{i,med}$, and $G_{i,high}$ are the evaluations of the lowest rated, medium rated, and highest rated

coalitions, respectively. These probabilities ensured that the government lottery displayed in the second vignette is a mean-preserving spread of the government lottery displayed in the first vignette. In the third vignette, we calculated the probabilities for the lowest rated coalition, $\gamma_{i,low}^{(3)}$, for the medium rated coalition, $\gamma_{i,med}^{(3)}$, and for the highest rated coalition, $\gamma_{i,high}^{(3)}$, according to the following formulas: $\gamma_{i,low}^{(3)} = \frac{G_{i,med}-G_{i,high}}{G_{i,low}-G_{i,high}} \frac{99}{100}$, $\gamma_{i,high}^{(3)} = \frac{\gamma_{i,low}^{(3)}(G_{i,low}-G_{i,med})}{G_{i,med}-G_{i,high}}$, and $\gamma_{i,med}^{(3)} = 1 - (\gamma_{i,low}^{(3)} + \gamma_{i,high}^{(3)})$. $G_{i,low}$, $G_{i,med}$, and $G_{i,high}$ are the evaluations of the lowest rated, medium rated, and highest rated coalitions, respectively. These probabilities ensured that the government lottery displayed in the third vignette is a mean-preserving spread of both the government lottery displayed in the second vignette and the one shown in the first vignette.

C.3 German Federal Elections 2021

In this section, we provide more detail on the case of the German Federal Elections of 2021. The German federal election held on September 26, 2021, was a pivotal moment in the country's political landscape, marking the end of Angela Merkel's tenure as Chancellor. Merkel's decision to retire from politics added a significant layer of uncertainty to the election, as it was the first time in 16 years that the CDU/CSU bloc did not have her as its leading candidate.

The election determined the composition of the 20th German Bundestag, with a voter turnout of 76.6%, slightly higher than in 2017. The results revealed a significant shift in the political landscape: The Social Democratic Party (SPD) emerged as the strongest party with 25.7% of the vote, marking a notable comeback given that at the beginning of the year the SPD polled around 15%. In contrast, the CDU/CSU bloc faced a historic defeat, securing only 24.1%, its worst result ever. Which was a major disappointment, with polls as high as 36% at the beginning of the year. The Greens achieved their best result to date, with 14.8%, while the Free Democratic Party (FDP) slightly increased its share to 11.5%, reinforcing its role in coalition talks. The Alternative for Germany (AfD) saw a slight decline to 10.3% but maintained strong regional support, and The Left Party (Die Linke) fell below the 5% threshold but it did not apply as the party won three electoral districts.

Figure SM4 shows the ideological placement of major German political parties in the 2021 federal election using the RILE Index from the Manifesto Project (Volkens et al., 2021). From left to right, the parties are positioned on a spectrum based on their manifesto content, with Die Linke on the far left, followed by SPD, Greens, FDP, CDU/CSU, and AfD on the far right. Lower RILE scores indicate more left-leaning platforms, while higher scores reflect more right-leaning platforms. The figure provides a clear visual representation of the parties' ideological stances during the election.

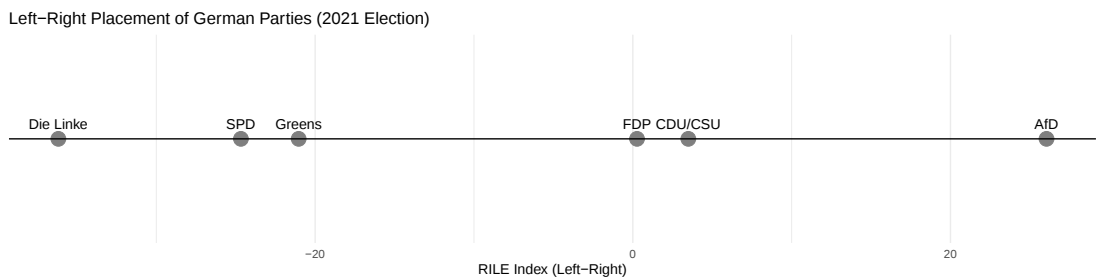


Figure SM4: Left-Right Placement of German Parties in the 2021 Federal Election based on the RILE Index from the Manifesto Project. This figure shows the ideological positioning of the major German parties in the 2021 election. The short names of the parties are as follows: SPD (Social Democratic Party), CDU/CSU (Christian Democratic Union/Christian Social Union), Greens (Bündnis 90/Die Grünen), FDP (Free Democratic Party), AfD (Alternative for Germany), and Die Linke (The Left). The RILE index positions parties on a left-right spectrum, with lower scores indicating left-leaning platforms and higher scores reflecting right-leaning platforms.

These election results and left-right positioning led to challenging coalition negotiations, ultimately resulting in the formation of the "traffic light" coalition between the SPD, Greens, and FDP, highlighting the evolving dynamics in German coalition government politics. These outcomes were not necessarily foreseeable. Other coalition government options discussed during the campaign, such as the Left-coalition (SPD-Greens-Linke), a CDU/CSU-Green coalition, or the so-called Jamaica coalition (CDU/CSU-Green-FDP), either did not achieve the necessary majority or were politically less appealing given the SPD's position as the largest party. A fallback option could have been a grand coalition together with CDU/CSU, this time led by SPD's chancellor Olaf Scholz. However, the traffic light coalition ultimately formed, presenting a progressive government with Scholz as Chancellor. Any coalition involving the right-wing AfD was ruled out during the campaign and had a low chance of being realized.

Election Year	Coalition Government	Parties Involved
1961	CDU/CSU-FDP	CDU/CSU, FDP
1965	CDU/CSU-FDP	CDU/CSU, FDP
1969	SPD-FDP	SPD, FDP
1972	SPD-FDP	SPD, FDP
1976	SPD-FDP	SPD, FDP
1980	SPD-FDP	SPD, FDP
1983	CDU/CSU-FDP	CDU/CSU, FDP
1987	CDU/CSU-FDP	CDU/CSU, FDP
1990	CDU/CSU-FDP	CDU/CSU, FDP
1994	CDU/CSU-FDP	CDU/CSU, FDP
1998	SPD-Greens	SPD, Greens
2002	SPD-Greens	SPD, Greens
2005	Grand Coalition	CDU/CSU, SPD
2009	CDU/CSU-FDP	CDU/CSU, FDP
2013	Grand Coalition	CDU/CSU, SPD
2017	Grand Coalition	CDU/CSU, SPD
2021	Traffic Light Coalition (Ampel)	SPD, Greens, FDP

Table SM19: Coalition Governments in Germany Since 1961

These coalition considerations mark the 2021 election as a case with new potential and increased uncertainty about party coalition outlooks. As Table SM19 shows, German coalition politics has predominantly featured traditional bloc constellations between the conservatives and the liberals, the social democrats and the greens, or grand coalitions between the conservatives and the social democrats. Given the party fragmentation, these have not been feasible, and the parties need to look for new constellations.

C.4 Quotas

var	n	prop
Gender		
Male	775	0.49
Female	798	0.51
Divers	4	0.00
Age		
Age 18 - 29	304	0.19
Age 30 - 39	274	0.17
Age 40 - 49	251	0.16
Age 50 - 59	322	0.20
Age 60 - 75	404	0.26
Age > 75	22	0.01

var	n	prop
Region		
Baden-Württemberg	170	0.11
Bayern	212	0.13
Berlin	80	0.05
Brandenburg	43	0.03
Bremen	15	0.01
Hamburg	44	0.03
Hessen	124	0.08
Mecklenburg-Vorpommern	33	0.02
Niedersachsen	150	0.10
Nordrhein-Westfalen	345	0.22
Rheinland-Pfalz	87	0.06
Saarland	17	0.01
Sachsen	108	0.07
Sachsen-Anhalt	51	0.03
Schleswig-Holstein	59	0.04
Thüringen	37	0.02

Table SM20: Distribution of respondents by gender and age (left) and by region (right). The tables show the number of respondents (n) and their proportion ($prop$) in each category.

C.5 Additional Results

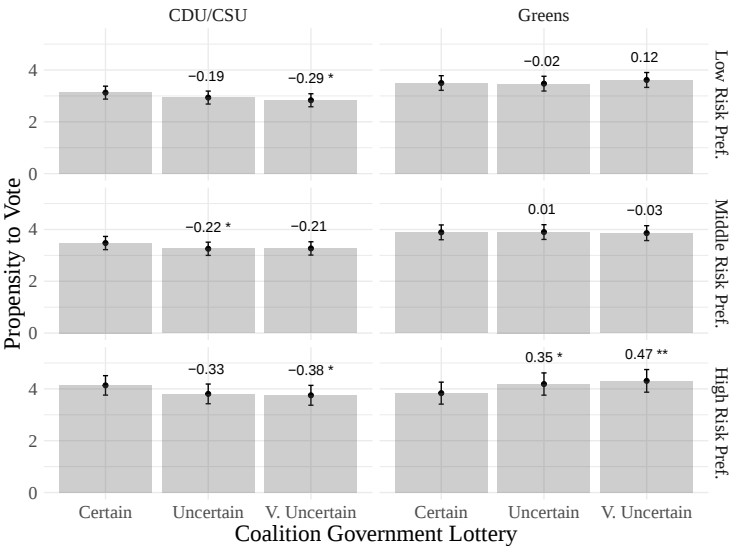


Figure SM5: Average propensity to vote for the CDU/CSU and the Green Party for the different scenarios conditional on risk preferences of candidate. The values show treatment effects of the uncertain and very uncertain condition compared to the certain condition, alongside their p-value. Regression Table [SM22](#).

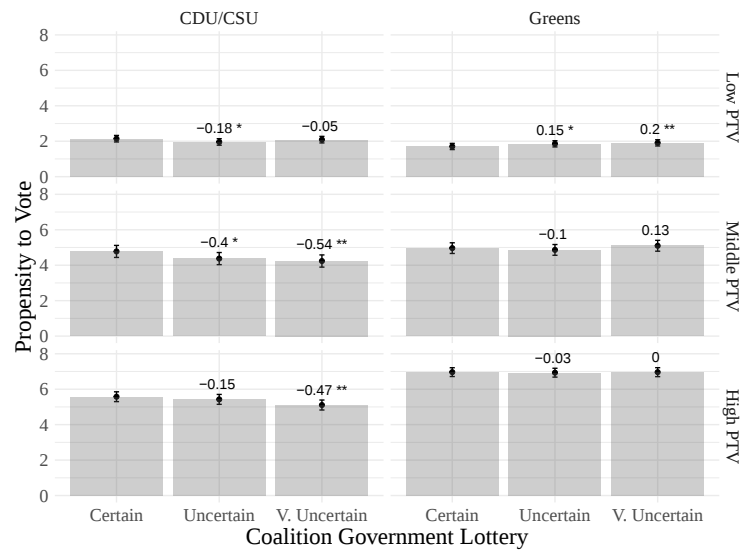


Figure SM6: Average propensity to vote for the CDU/CSU and the Green Party for the different scenarios and conditional on propensity to vote (PTV) for party, with 95% confidence intervals (Regression Table SM23). The values show treatment effects of the uncertain and very uncertain condition compared to the certain condition, alongside their p-value.

C.6 Regression Tables

	PTV CDU/CSU			PTV Greens		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Uncertain Coal. Lottery	-0.23*** (0.07)	-0.22** (0.08)	-0.23*** (0.07)	0.05 (0.05)	0.05 (0.07)	0.05 (0.05)
Very Uncertain Coal. Lottery	-0.27*** (0.08)	-0.25** (0.09)	-0.27*** (0.08)	0.12 (0.06)	0.13 (0.07)	0.11 (0.06)
Respondent Fixed Effects	X			X		
Scenario Fixed Effects				X		
N	4086	4086	4086	3682	3682	3682

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table SM21: Results from experimental study. Treatment effects of the uncertain and very uncertain condition compared to the certain condition on the propensity to vote (PTV) for the CDU/CSU and the Green Party for different model specifications. Standard errors in parentheses, alongside their p-value.

	PTV CDU/CSU	PTV Greens
	Model 1	Model 1
Uncertain Coal. Lottery	−0.19 (0.10)	−0.02 (0.08)
Very Uncertain Coal. Lottery	−0.29* (0.12)	0.12 (0.09)
Middle Risk Preferences	0.35* (0.18)	0.39 (0.21)
High Risk Preferences	1.01*** (0.24)	0.34 (0.26)
Uncertain X Middle Risk Pref.	−0.03 (0.15)	0.04 (0.12)
V. Uncertain X Middle Risk Pref.	0.09 (0.17)	−0.15 (0.13)
Uncertain X High Risk Pref.	−0.14 (0.20)	0.38* (0.17)
V. Uncertain X High Risk Pref.	−0.09 (0.23)	0.36 (0.19)
N	3940	3549

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table SM22: Results from experimental study conditional on general risk preferences. Treatment effects of the uncertain and very uncertain condition, conditional on general risk preferences, on the propensity to vote (PTV) for the CDU/CSU and the Green Party. Standard errors in parentheses, alongside their p-value.

	PTV DU/CSU	PTV Greens
	Model 1	Model 1
Uncertain Coal. Lottery	−0.18* (0.08)	0.15* (0.07)
Very Uncertain Coal. Lottery	−0.05 (0.09)	0.20** (0.08)
Middle PTV Party	2.64*** (0.17)	3.26*** (0.17)
High PTV Party	3.43*** (0.18)	5.26*** (0.16)
Uncertain X High PTV Party	0.03 (0.18)	−0.18 (0.14)
V. Uncertain X High PTV Party	−0.41* (0.20)	−0.21 (0.15)
N	4031	3631

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table SM23: Results from experimental study conditional on prior propensity to vote for the party. Treatment effects of the uncertain and very uncertain condition, conditional on prior propensity to vote (PTV) for the party, on the propensity to vote for the CDU/CSU and the Green Party. Standard errors in parentheses, alongside their p-value.

C.7 Credibility of the Vignettes

In the pretest, a majority indicated no difficulties in understanding the vignettes. Only 7 out of 506 respondents indicated that they had difficulties understanding or believing the experimental vignettes (“Ich weiss es nicht”, “einige unwahrscheinlichen Szenarien dabei”, “weiß nicht”, “Es ist schwierig die jeweiligen politischen Absichten nachzuvollziehen, wenn eine Koalition zwischen den genannten Parteien bestehen würde”, “Ich habe echt zu wenig Ahnung. Ich habe aus dem Bauch raus entschieden”, “Nein, aber es sind teilweise schwachsinnige Konstellationen die es so niemals geben wird.”, “Generell für mich scgwer zu verstehhen”).

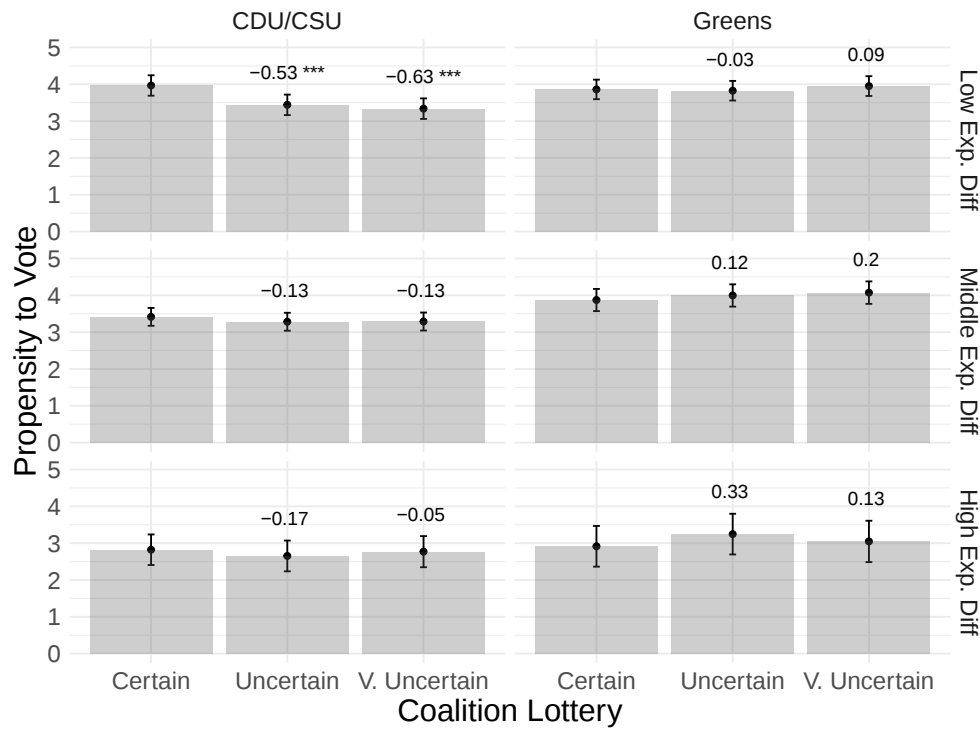


Figure SM7: Propensity to vote for the CDU/CSU and the Green Party for the different scenarios and conditional on pre-treatment coalition expectations. Regression Table [SM24](#).

We further study if the effects are particularly pronounced, when the vignettes do not strongly differ from the respondents' prior coalition expectation. Strong deviations of the probabilities in the vignette and respondent's prior expectation could alter the vignette non-credible. The difference in expectations was measured as the euclidean distance between the vector of pre-treatment expectations and the vector of expectations shown in the vignette. Figure [SM7](#) confirms that the effects are particular strong among respondents for which the vignette probabilities do not differ to heavily from the prior expectations.

	PTV CDU/CSU	PTV Greens
	Model 1	Model 1
Uncertain Coal. Lottery	−0.53** (0.20)	−0.03 (0.19)
Very Uncertain Coal. Lottery	−0.63** (0.20)	0.09 (0.19)
Middle Exp. Diff.	−0.55** (0.19)	0.01 (0.20)
High Exp. Diff.	−1.15*** (0.25)	−0.94** (0.31)
Uncertain X Middle Exp. Diff.	0.39 (0.27)	0.16 (0.29)
V. Uncertain X Middle Exp. Diff.	0.50 (0.27)	0.11 (0.29)
Uncertain X High Exp. Diff.	0.36 (0.36)	0.37 (0.44)
V. Uncertain X High Exp. Diff.	0.58 (0.36)	0.04 (0.45)
N	3702	3359

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table SM24: Results from experimental study conditional on difference in expectations in the coalition likelihoods. Treatment effects of the uncertain and very uncertain condition, conditional on difference in expectations in the coalition likelihoods, on the propensity to vote (PTV) for the CDU/CSU and the Green Party. Standard errors in parentheses, alongside their p-value.

C.8 Robustness Check: Excluding AfD Vignettes

	PTV CDU/CSU		
	Model 1	Model 2	Model 3
Uncertain Coal. Lottery	−0.44* (0.17)	−0.41 (0.21)	−0.41* (0.17)
Very Uncertain Coal. Lottery	−0.21 (0.19)	−0.18 (0.23)	−0.18 (0.19)
Respondent Fixed Effects		X	
Scenario Fixed Effects			X
N	547	547	547

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table SM25: Results from experimental study, when excluding AfD vignettes. Treatment effects of the uncertain and very uncertain condition compared to the certain condition on the propensity to vote (PTV) for the CDU/CSU for different model specifications. Standard errors in parentheses, alongside their p-value.

These model results are based on only those experimental subjects who did not receive a vignette in which the AfD appeared in the least favorite government scenario. Also, only experimental subjects with a low expectation difference (see section above) were considered, as we expect the effects to be most pronounced for this group.

C.9 The Pre-Analysis Plan

Preregistration plan for:

Coalition-Directed Voting and Risk Preferences Coalition Vignette Experiment

[Study Information](#)

[Design Plan](#)

[Sampling Plan](#)

[Variables](#)

[Analysis Plan](#)

[Other](#)

Study Information

1. Title

Coalition-Directed Voting and Risk Preferences - Coalition Vignette Experiment

2. Authors

3. Description

We field a survey for studying the role of risk preferences in coalition-directed voting decisions. The survey contains two within-subject experiments that allow us to test the hypothesis that voters are on average risk averse when it comes to coalition-directed voting. Moreover, the experiment allows us to investigate whether individual general preferences towards risks matter for coalition-directed voting.

4. Hypotheses

Hypothesis 1 (Average Voter is Risk Averse): On average, voters are more likely to vote for a party if the variance of the party-specific coalition lottery is lower compared to a scenario in which this variance is higher, holding constant the mean of the party-specific coalition lottery.

Hypothesis 2 Risk Preferences (Risk Averse): Voters who are less willing to accept risks are more likely to vote for a party if the variance of the party-specific coalition lottery is lower compared to a scenario in which this variance is higher, holding constant the mean of the party-specific coalition lottery.

Hypothesis 3 Risk Preferences (Risk Seeking): Voters who are more willing to accept risks are more likely to vote for a party if the variance of the party-specific coalition lottery is higher compared to a scenario in which this variance is lower, holding constant the mean of the party-specific coalition lottery.

Hypothesis 4 Risk Aversion Conditional on Propensity to Vote for Party: Voters who have some propensity to vote for a party are more likely to vote for that party if the variance of the party-specific coalition lottery is lower compared to a scenario in which this variance is higher, holding constant the mean of the party-specific coalition lottery. For voters who have very low propensity to vote for the party the variance of the party-specific coalition lottery does not affect the propensity to vote for the party.

Design Plan

5. Study type

We devise two within-subject experiments fielded in Germany.

6. Blinding

No blinding is involved in this study.

7. Study design

We use a within-subject vignette design. Respondents see three vignette questions with individually calculated coalition likelihoods once for the CDU/CSU and once for the Greens. After each vignette, respondents report their propensity to vote for the respective party. The individual coalition likelihoods for the parties are calculated based on respondents' reported ratings for the coalitions and are calculated to be mean spread preserving with increasing variance in the party-specific coalition lottery. This means that the expectation is held constant, while we present increasing variance in the party-specific coalition lotteries. We label the three scenarios, as certain, uncertain, and very uncertain as the variance is sequentially increasing. This study design allows us to estimate the effect of increasing party-specific coalition lotteries on the propensity to vote and hold the mean payoff of the party-specific coalition lotteries constant.

8. Randomization

-

Sampling Plan

9. Existing data

No previously existing data will be analysed.

10. Data collection procedures

Participants will be recruited from online access panels administered by Respondi. No incentives other than the participation incentives provided by Respondi will be given. Participants must be eligible to vote in the 2021 German federal election and must consent to data collection. Panelists will be sampled according to quotas of gender, age and education.

11. Sample size

The sample will consist of 1500 respondents.

Variables

We measure socio-demographic characteristics, specifically age, state of residence, gender, education, eligibility to vote in the 2021 German federal election, left-right placement of parties, left-right self-placement, political interest, political knowledge and risk preferences.

Variable	Question	Scale
Age	Geben Sie bitte Ihr Alter an.	18-29; 30-39; 40-49; 50-59; 60-75; 76+
State of residence	In welchem Bundesland haben Sie Ihren Hauptwohnsitz?	Baden-Württemberg; Bayern; Berlin; Brandenburg; Bremen; Hamburg; Hessen; Mecklenburg-Vorpommern; Niedersachsen; Nordrhein-Westfalen; Rheinland-Pfalz; Saarland, Sachsen; Sachsen-Anhalt; Schleswig-Holstein; Thüringen
Gender	Geben Sie bitte Ihr Geschlecht an.	Männlich; weiblich; divers
Education	Welchen höchsten allgemeinbildenden Schulabschluss haben Sie?	Schule beendet ohne Abschluss; Hauptschulabschluss, Volksschulabschluss, Abschluss der polytechnischen Oberschule 8. oder 9. Klasse; Realschulabschluss, Mittlere Reife, Fachschulreife oder Abschluss der polytechnischen Oberschule 10. Klasse; Fachhochschulreife (Abschluss einer Fachoberschule etc.); Abitur bzw. erweiterte Oberschule mit

		Abschluss 12. Klasse (Hochschulreife); Anderen Schulabschluss, und zwar ____; Bin noch Schüler
Eligibility to vote in the 2021 German federal election	Sind Sie für die deutsche Bundestagswahl 2021 wahlberechtigt?	Ja; nein; weiß nicht
Left-right placement of parties	In der Politik reden die Leute häufig von "links" und "rechts". Wo würden Sie die folgenden Parteien einordnen? ● CDU/CSU ● Bündnis 90/Grüne ● SPD ● FDP ● AfD ● Linke	0 - Links 10 - Rechts
Left-right self-placement	Wo würden Sie sich selbst einordnen?	0 - Links 10 - Rechts
Political interest	Einmal ganz allgemein gesprochen: Wie stark interessieren Sie sich für Politik?	Sehr stark; stark; mittelmäßig; weniger stark; überhaupt nicht
Political Knowledge 1	Bei der Bundestagswahl haben Sie zwei Stimmen, eine Erststimme und eine Zweitstimme. Welche der beiden Stimmen ist ausschlaggebend für die Sitzverteilung im Bundestag?	Die Erststimme; die Zweitstimme; beide sind gleich wichtig; das ist abhängig von den Bestimmungen des jeweiligen Bundeslandes; weiß nicht
Political Knowledge 2	Wer ist der/die Bundesminister/in für Familie, Senioren, Frauen und Jugend?	Alexander Dobrindt; Franziska Giffey; Christine Lambrecht; Helge Braun; weiß nicht
Political Knowledge 3	Bei Bundestagswahlen entscheiden sich die Wähler/innen häufig anhand der	CDU/CSU; FDP; Bündnis 90/Die Grünen;

	Positionen, die die Parteien zu verschiedenen Fragen einnehmen. Anlässlich der Bundestagswahl 2017 äußerten die Parteien ihre Positionen zu verschiedenen Themen und Problemen. Welche der folgenden Parteien sprach sich 2017 gegen eine Erhöhung des Spitzensteuersatzes aus?	Linke; weiß nicht
Risk Preferences	Nun kommen wir zu einem anderen Thema. Wie schätzen Sie sich persönlich ein? Sind Sie im Allgemeinen ein risikobereiter Mensch oder versuchen Sie, Risiken zu vermeiden?	0 - Gar nicht risikobereit 10 - Sehr risikobereit

12. Experiment 1: Manipulation and outcome measure

Respondents are successively shown seven screens containing hypothetical coalition formation scenarios for the CDU/CSU.

Screen 1:

Nach der Bundestagswahl wird es wahrscheinlich eine Koalitionsregierung geben. Im Folgenden würden wir gerne Ihre Meinung zu verschiedenen Koalitionsregierungen der **CDU/CSU** erfahren.

Unabhängig vom Ergebnis der Bundestagswahl, für wie wünschenswert halten Sie persönlich die folgenden Koalitionsregierungen?

- CDU/CSU + SPD
- CDU/CSU + Bündnis 90/Grüne
- CDU/CSU + FDP
- CDU/CSU + AfD
- CDU/CSU + Bündnis 90/Grüne + FDP
- CDU/CSU + SPD + FDP
- CDU/CSU + FDP + AfD

[-5 - Überhaupt nicht wünschenswert, ... , +5 - Sehr wünschenswert]

Screen 2:

Als nächstes möchten wir Sie gerne zu Ihrer Einschätzung über die möglichen Koalitionsregierungen der CDU/CSU befragen.

Angenommen, die CDU/CSU ist Teil der nächsten Regierung. An welcher Koalitionsregierung wird die CDU/CSU wahrscheinlich beteiligt sein?

- CDU/CSU + SPD
- CDU/CSU + Bündnis 90/Grüne
- CDU/CSU + FDP
- CDU/CSU + AfD
- CDU/CSU + Bündnis 90/Grüne + FDP
- CDU/CSU + SPD + FDP
- CDU/CSU + FDP + AfD

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Screen 3:

Wie wahrscheinlich ist es, dass Sie die CDU/CSU bei der Bundestagswahl 2021 wählen werden?

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Screen 4:

Im Folgenden stellen wir Ihnen drei verschiedene Situationen vor. Wir werden Sie jedes Mal fragen, wie wahrscheinlich es ist, dass Sie für die CDU/CSU stimmen würden.

Die verschiedenen Situationen geben Wahrscheinlichkeiten an, dass die CDU/CSU in bestimmte Regierungen eintritt.

- 0% für eine Koalition bedeutet, dass die CDU/CSU ganz sicher nicht in dieser Konstellation enden wird.
- 100% für eine Koalition bedeutet, dass die CDU/CSU sicher in dieser Konstellation enden wird, vorausgesetzt die CDU/CSU regiert überhaupt.
- Wenn zwei Koalitionen etwa eine 50%-ige Wahrscheinlichkeit aufweisen, treten beide Konstellationen gleich wahrscheinlich ein.

Screen 5:

Stellen Sie sich vor, die CDU/CSU sagt, dass sie **nach der Wahl nur in eine Koalition** *[Coalition with medium rating]* **eintreten wird** und sie alle anderen Koalitionen ausschließt. Daraus würde sich folgende Wahrscheinlichkeit ergeben, dass die CDU/CSU diese Koalition bilden könnte:

● Koalitionsregierung **[Coalition with medium rating]**: 100%

Wie wahrscheinlich ist es, dass Sie in dieser Situation die CDU/CSU bei der Bundestagswahl 2021 **wählen** würden?

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Screen 6:

Stellen Sie sich nun vor, die CDU/CSU **würde nicht klar sagen, in welche Koalition sie nach der Wahl eintreten möchte**. Daraus würden sich folgende Wahrscheinlichkeiten ergeben, dass die CDU/CSU unterschiedliche Koalitionsregierungen bilden könnte:

- Koalitionsregierung **[Coalition with high rating]**: **[Probability 1]**%
- Koalitionsregierung **[Coalition with medium rating]**: **[Probability 2]**%
- Koalitionsregierung **[Coalition with low rating]**: **[Probability 3]**%

Wie wahrscheinlich ist es, dass Sie in dieser Situation die CDU/CSU bei der Bundestagswahl 2021 **wählen** würden?

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Screen 7:

Stellen Sie sich nun eine andere Situation vor, in der die CDU/CSU **ebenfalls nicht klar sagt, in welche Koalition sie nach der Wahl eintreten möchte**. Daraus würden sich folgende Wahrscheinlichkeiten ergeben, dass die CDU/CSU unterschiedliche Koalitionsregierungen bilden könnte.

- Koalitionsregierung **[Coalition with high rating]**: **[Probability 4]**%
- Koalitionsregierung **[Coalition with medium rating]**: **[Probability 5]**%
- Koalitionsregierung **[Coalition with low rating]**: **[Probability 6]**%

Wie wahrscheinlich ist es, dass Sie in dieser Situation CDU/CSU bei der Bundestagswahl 2021 **wählen** würden?

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

13. Experiment 2: Manipulation and outcome measure

Respondents are successively shown seven screens containing hypothetical coalition formation scenarios for the Greens.

Screen 1:

Darüber hinaus möchten wir sie auch noch zu Ihrer Einschätzung über die möglichen Koalitionsregierungen von **Bündnis 90/Die Grünen** befragen.

Unabhängig vom Ergebnis der Bundestagswahl, für wie wünschenswert halten Sie persönlich die folgenden Koalitionsregierungen?

- CDU/CSU + Bündnis 90/Grüne
- Bündnis 90/Grüne + SPD
- Bündnis 90/Grüne + SPD + FDP
- Bündnis 90/Grüne + SPD + Linke
- CDU/CSU + Bündnis 90/Grüne + FDP

[-5 - Überhaupt nicht wünschenswert, ... , +5 - Sehr wünschenswert]

Screen 2:

Angenommen, Bündnis 90/Die Grünen sind Teil der nächsten Regierung. An welcher Koalitionsregierung werden Bündnis 90/Die Grünen wahrscheinlich beteiligt sein?

- CDU/CSU + Bündnis 90/Grüne
- Bündnis 90/Grüne + SPD
- Bündnis 90/Grüne + SPD + FDP
- Bündnis 90/Grüne + SPD + Linke
- CDU/CSU + Bündnis 90/Grüne + FDP

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Screen 3:

Wie wahrscheinlich ist es, dass Sie Bündnis 90/Die Grünen bei der Bundestagswahl 2021 wählen werden?

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Screen 4:

Im Folgenden stellen wir Ihnen erneut drei verschiedene Situationen vor - diesmal geht es um Bündnis 90/Die Grünen. Wir werden Sie jedes Mal fragen, wie wahrscheinlich es ist, dass Sie für Bündnis 90/Die Grünen stimmen würden.

Screen 5:

Stellen Sie sich vor, Bündnis 90/Die Grünen sagen, dass sie **nach der Wahl nur in eine Koalition** *[Coalition with medium rating]* **eintreten werden** und sie alle anderen Koalitionen ausschließen. Daraus würde sich folgende Wahrscheinlichkeit ergeben, dass

Bündnis 90/Die Grünen diese Koalition bilden könnten:

- Koalitionsregierung *[Coalition with medium rating]*: 100%

Wie wahrscheinlich ist es, dass Sie in dieser Situation Bündnis 90/Die Grünen bei der Bundestagswahl 2021 **wählen** würden?

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Screen 6:

Stellen Sie sich nun vor, Bündnis 90/Die Grünen **würden nicht klar sagen, in welche Koalitionsregierung sie nach der Wahl eintreten möchten**. Daraus würden sich folgende Wahrscheinlichkeiten ergeben, dass Bündnis 90/Die Grünen unterschiedliche Koalitionsregierungen bilden könnten:

- Koalitionsregierung *[Coalition with high rating]*: *[Probability 1]*%
- Koalitionsregierung *[Coalition with medium rating]*: *[Probability 2]*%
- Koalitionsregierung *[Coalition with low rating]*: *[Probability 3]*%

Wie wahrscheinlich ist es, dass Sie in dieser Situation Bündnis 90/Die Grünen bei der Bundestagswahl 2021 **wählen** würden?

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Screen 7:

Stellen Sie sich nun eine andere Situation vor, in der Bündnis 90/Die Grünen **ebenfalls nicht klar sagen, in welche Koalition sie nach der Wahl eintreten möchten**. Daraus würden sich folgende Wahrscheinlichkeiten ergeben, dass Bündnis 90/Die Grünen unterschiedliche Koalitionsregierungen bilden könnten:

- Koalitionsregierung *[Coalition with high rating]*: *[Probability 4]*%
- Koalitionsregierung *[Coalition with medium rating]*: *[Probability 5]*%
- Koalitionsregierung *[Coalition with low rating]*: *[Probability 6]*%

Wie wahrscheinlich ist es, dass Sie in dieser Situation Bündnis 90/Die Grünen bei der Bundestagswahl 2021 **wählen** würden?

[0 - Sehr unwahrscheinlich, ... , 10 - Sehr wahrscheinlich]

Analysis Plan

14. Statistical models

We use different linear regression model specifications to evaluate the hypothesis. The dependent variable in all cases is the propensity to vote for the CDU/CSU or the Greens. We reshape the data-set to long-format such that we observe three vignette propensities to vote for the parties under each scenario and respondent.

To evaluate Hypothesis 1 we estimate a regression model with the uncertain and very uncertain scenario as a dummy independent variable. The baseline is a certain scenario. For all models, we cluster standard errors on the respondent level. We would expect that the propensity to support the parties is lower in the uncertain and very uncertain scenario compared to the certain scenario. The very uncertain scenario should further result in lower propensity to vote for the parties compared to the uncertain scenario. We present two additional model results. First, we present a respondent fixed-effects model. Second, we report on models that include dummy variables for the lowest, medium and highest coalition presented to respondents. In total there are three models for each of the two parties.

We further explore the conditional effect of the treatments using interaction effects. To evaluate hypotheses 2 and 3 we present results from linear regression models in which we interact the effect of the uncertain and very uncertain scenario with the risk preference of the respondents. We split the risk preference scale into three equally sized parts and include the dummy variables in our regression model. We again calculate clustered standard errors but do not include fixed effects. For hypothesis 2 we expect a positive effect of an uncertain and very uncertain scenario among the respondents in the lowest risk preference group. For hypothesis 3 we expect a negative effect of an uncertain and very uncertain scenario among the respondents in the lowest risk preference group.

Hypothesis 4 calls for an interaction between the scenarios and the baseline propensity to vote (asked before the vignettes). We again split the baseline propensity to vote into three equally sized parts and include the dummy variables in the model specification. According to the hypothesis, we would expect no effect for the group with the lowest propensity to vote for the parties but positive effects for the middle and high propensity to vote group.

15. Transformations

-

16. Inference criteria

We will rely on classical frequentist statistical inference and the conventional $p < .05$ cut off for statistical significance. All tests will be two-tailed.

17. Data exclusion

We will listwise delete respondent observations who did not answer questions about the propensities to vote or the risk preferences.

18. Missing data

We will rely on model specific listwise deletion of observations with missing variable values.

19. Exploratory analysis

We will conduct explanatory analysis for heterogeneous effects, based on political knowledge, political left-right self-positioning, and the different coalitions constellations presented to respondents. For this we interact the scenarios with the variables. As we do not have clear expectations we pre-register these analyses steps as exploratory.

C.10 Comments on the Pre-Analysis Plan

The Pre-Analysis Plan does not include power analysis calculations, which we inadvertently omitted. We determined that a sample size of 1,052 respondents would be required for our within-subject design to detect a small effect size (Cohen's $d = 0.1$) with 90% power at an alpha level of 0.05. Given the availability of additional funding, we chose to sample slightly more respondents ($n = 1,500$) to ensure robustness in our results.

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