Modelling the strategic interactions in representative democracies with referendums *

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Paper prepared for presentation at the Annual Conference of the Midwest Political Science Association, Chicago, April 22-25, 2010

Abstract

There is a general understanding that direct democratic institutions can enrich representative systems. The goal of this project is to develop an appropriate statistical framework to test hypothesis regarding referendums. There is a gap between the acknowledgment of the strategic character of the interaction of government and opposition if institutions allowing for referendums are present and the statistical models. Where the formal models address the strategic nature of the phenomena, the statistical models assume conditional independence of observations. The assumed monotonic effects in common statistical models are hardly met if the actors behave strategically. Therefore, this project is based on quantal response models. Such a model allows to compare the impact of preference structures on the political behavior of actors. Under what circumstances do oppositional groups trigger a referendum? Is the likelihood of calling for a referendum a direct function of the ideological position of a bill? Are there any mitigating effects of factors not related to the preference structure? Based on Swiss data it is possible to answer questions as outlined.

* An earlier version was presented at the annual meeting of the Swiss Political Science Association (Geneva, January 7-8, 2010). Comments by Peter Selb, the participants and Jeffrey Lax are gratefully acknowledged. Data used in this paper has been made available by Frédéric Varone and Roy Gava from the “The Politics of Attention: West European politics in times of change”-project (funded by the SNSF Grant No 105511-119245) as well as by the Swiss Parlamentsdienst and Simon Hug received funding though the SNSF (Grants No 100012-108179/100012-111909).
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1 Introduction

Referendums\(^1\) have been studied under very different theoretical perspectives and from very different empirical viewpoints. Nevertheless, starting with the very early political science work by Rappard (1912, 1923) and Key and Crouch (1939) scholars became aware that the possibility of letting citizens vote on concrete policy proposals in representative democracies opens up intricate strategic interactions among different political actors. In much of the empirical research, however, these strategic interactions and up to a certain point also their consequences are black-boxed. For instance much of the recent research on the political consequences of referendum institutions relies on theoretical models that cover strategic interactions among various actors, but the proposed empirical tests do not cover the full set of strategic interactions. More problematic are studies assessing what referendums pass or under what circumstances referendums are called, as these often fail to acknowledge the strategic context and thus are more likely to present biased inferences.

Consequently, in the present paper we propose to assess empirically the strategic interactions among political actors in a representative democracy that allows for referendums. These interactions start with the proposal of a policy leading to its possible adoption in parliament and the decision to launch a referendum to finally arrive at the ultimate stage, namely the vote by citizens.\(^2\) Consequently, we focus on only one type of referendums, namely those triggered by a non-veto player (Hug and Tsebelis, 2002). At the theoretical level we rely on a model proposed by Hug (2004, 323-326) who draws on a series of previously proposed models (e.g., Romer and Rosenthal, 1978; Romer and Rosenthal, 1979; Denzau, Mackay and Weaver, 1981; Steunenberg, 1992; Gerber, 1996; Matsusaka and McCarty, 2001; Hug and Tsebelis, 2002; Kessler, 2005; Besley and Coate, 2008) to model the interaction between a government, an opposition and voters. To assess the relevance of this theoretical model we employ a quantal response model as first proposed for experimental settings by McKelvey and Palfrey (1995, 1996, 1996).

\(^1\)We employ the term referendum to cover all procedures that allow citizens to vote on policy proposals (see for instance Butler and Ranney, 1994; Lupia and Matsusaka, 2004).

\(^2\)Depending on whether the judiciary can invalidate policies adopted by citizens an additional stage might be present (e.g., Gerber, Lupia, McCubbins and Kiewiet, 2000; Miller, 2009). As this does not apply to the empirical case we discuss below, i.e. Switzerland (at the national level), we omit this last stage.
The initial empirical tests presented in this paper rely on so-called parliamentary initiatives, i.e., proposals emanating from members of parliament (MPs) of the Swiss lower house, and motions which request a proposal from the government. We find, in support of the theoretical model, that the extremeness of a proposal decreases the probability of it being passed, but increases the likelihood of a referendum being triggered. The latter decision is also affected by the costs of a referendum, as predicted by theoretical models.

In the next section we first review work on referendums both at the theoretical and empirical level. We show that while some work focusing on specific elements related to referendums, like the policy consequences, when being informed by theoretical models may offer a partial picture of how referendums work. Other studies, when not taking into account the strategic context, are likely to yield biased insights. For instance, research focusing on particular decisions in this strategic interaction, like the decision to launch a referendum or to submit a bill, is strongly affected by the strategic context induced by the presence of referendum institutions. In section three we present the simplified structure on which our empirical investigation relies. Section four explains our empirical strategy, section five provides details on the data we employ in our estimations. In section six we report our results, while section seven concludes with an outlook on future research.

2 Referendums and strategic interactions

Looking cross-nationally at referendums one needs to acknowledge that this possibility granted to citizens to decide on policies appears at the national level only as addition in representative democracies. Hence, referendums need to be understood at that level as complement to normal decision-making in representative democracies (e.g., Hug, 2009). Given this, institutions allowing for referendums open up strategic interactions among a series of political actors that are far from easy to fathom.

Early, but unfortunately largely forgotten, work by Rappard (1912, 1923) and Key and Crouch (1939) alerted scholars that due to these strategic interactions, referendums have both direct and indirect effects. Direct effects appear when a proposal passes (resp. fails) in a referendum that would not have (resp. would
have) been accepted in the absence of referendums. Indirect effects appear when the representative institutions adopt (resp. fail) to adopt policies because of the possibility of referendum that would not have (resp. would have) been adopted if these institutions did not exist.

The importance of the strategic nature of interactions among political actors due to referendums appeared clearly with a series of game-theoretic studies (e.g., Romer and Rosenthal, 1978; Romer and Rosenthal, 1979; Denzau, Mackay and Weaver, 1981; Steunenberg, 1992; Gerber, 1996; Matsusaka and McCarty, 2001; Hug and Tsebelis, 2002; Hug, 2004; Kessler, 2005; Besley and Coate, 2008). All these studies, modelling the interactions among various political actors, highlight that to assess the effect of referendums one needs to take into account the strategic nature of these interactions.

At the empirical level, these theoretical models have mostly informed studies on the political consequences of referendums (e.g., Gerber, 1996; Kirchgässner, Feld and Savioz, 1999; Matsusaka, 2004; Hug, 2010 (forthcoming)). Hence, they relied mostly on comparative statics analyses of the theoretical models mentioned above to compare policy outcomes between units with and without referendums. Given the focus on the final policy outcome, proceeding like this is not problematic, but it implies black-boxing what has happened during the strategic interactions leading to the policy outcome.

Studies dealing at the empirical level with particular decisions, e.g., the decision to launch a referendum (e.g., Trechsel and Sciarini, 1998; Closa, 2008)\(^3\) or the decision by voters (e.g., Gamble, 1997; Frey and Goette, 1998; Donovan and Bowler, 1998), are hampered, however, when they fail to take into account the strategic context. For instance, for the latter studies Gerber and Hug (1999) show that focusing on passage rates of particular referendums cannot inform us about the policy consequences of referendums, simply because such studies neglect the strategic context.

Consequently, to understand the full implications of referendum institutions one needs on the one hand theoretically informed models and on the other hand empirical models that reflect the strategic interactions. In what follows we propose such an empirical model relying on a theoretical model covering different

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\(^3\)Finke and König’s (2009) study is a notable exception, since they adopt a quantal response model to address the question which countries decided to launch a referendum on the European Union’s constitutional treaty.
types of referendum institutions. This will allow us to assess what factors influence the decisions at the various stages of decision-making leading, possibly, to a referendum, while taking into account the strategic nature of the interactions.

3 The Structure

The assumed theoretical structure rests on a model proposed by Hug (2004, 323-326) that models the interactions among three players. The first player (henceforth proposer) decides to adopt a certain law or not to adopt it. Should the law be adopted the second player (henceforth opposition) decides whether to call for a referendum or not. If the second player does not trigger a referendum the new law becomes effective. Should player 2 trigger a referendum, the third player (henceforth people) will be asked in a referendum if she wants the new law or if she does not want it.

Player 1 in this model resembles a governmental coalition which coalesces for a specific law. The opposition (player 2) is in the Swiss case not a well-established group of parties or interest groups but rather a coalition of parties and interest groups that are opposed to a specific bill and have to decide if they want to fight it or not. Player 3 are the people. The structure of the game can be displayed as follows:

Graph 1: Underlying Formal Theoretical Model

```
Pr
  /  
/    
no action  pass new law

1

Op
  /  
 /    
|     |
|     |
no referendum  referendum

2

Pe
  /  
/    
|     |
|     |
nay  yea

3 4
```

Notes: Game tree of the theoretical model. Pr is the proposing party, Op is the opposing party, and Pe are the people. There are four possible outcomes, denoted by 1, 2, 3, and 4.
4 Empirical Strategy

Quantitative empirical testing of formal theoretical models is a distinct endeavour. On the one hand, statistical methods assume conditional independence of the observations. On the other hand, hypotheses born out of a formal model imply often strategically dependence.

Here we will only mention two of these drawbacks. First, the assumed strategic nature of the data generating process leads to statistically dependent observations. This may lead to severe selection problems which limit the power of any classic approach severely. The problem is that if the sample is generated through a selection process which is related to the explanatory variables, we will not be able to make correct inferences (Heckman, 1976, 1979). We will address this problem later in greater detail. A second potential problem is that comparative statics usually relies on some form of (generalized) linear model which in general assumes monotonic effects. This assumption does not have to hold for data generating processes that are strategic in their nature (e.g., Signorino, 1999, 286-288).

4.1 Quantal Response Equilibria

This framework was first developed to analyze experimental data (McKelvey and Palfrey, 1995, 1996, 1998). A myriad of experiments had been carried out in which participants were asked to play specific games (e.g. divide the dollar). The theoretical prediction is that everyone should play such that her actions maximize her utility. Often scholars did, however, not observe results perfectly in line with predictions based on the Nash equilibrium. This is the empirical puzzle.

On the theoretical side there had been advances made that could be summarized under the notion of bounded rationality. If an actor faces a non-rational opponent, playing the game as informed by Nash’s (1950, 1951) best response correspondence might not be the best strategy. These two motivations led McKelvey and Palfrey (1995) to develop an equilibrium refinement that allows for deviations from the strict Nash equilibrium predictions, the quantal response equilibrium.

The traditional prediction is, that a player will always pick action $a$ over
action $b$ if the utility of $a$ is greater than the utility of $b$ ($U_a \geq U_b$). McKelvey and Palfrey (1995) instead predict that if $U_a \geq U_b$, the player has a higher likelihood of choosing $a$ than $b$. Note that since the data stems from experimental research in McKelvey and Palfrey’s (1995) work, the utility or, more precisely, the payoff is known to the analyst. The probability is a function of the difference of the two utilities. The quantal response equilibrium (QRE) allows for players making mistakes, players misperceiving the incentives and for not completely rational behavior. As one would expect, this model is to a far greater extent able to account for experimental results (McKelvey and Palfrey, 1998).

McKelvey and Palfrey (1995, 1996, 1998) assume that players make small mistakes more often than large mistakes. Depending on the assumption of the error, one can derive a solution concept, which resembles common econometric models (random utility models). If a player can choose among two actions ($a$, $b$) and makes mistakes resembling a standard logistic function, the player’s probability of choosing $a$ is $(1 + e^{\lambda(-U_a + U_b)})^{-1}$. This is the logit quantal response model.4

Graph 2: Two Different Equilibria

Notes: The $y$-axis displays the predicted probability of a player choosing action $a$. The $x$-axis displays the utility for a player from action $a$. The different curves in the right plot represent different error variances.

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4The strategic element enters when one assumes an extensive form game. In such a situation, player 1 moves first and then player 2 moves. Player 1 will take player 2’s expected actions into account. This means, that player one’s utility from picking action $a$ will be a function of player two’s probability to choose $A$ or $B$. In the above expression, $U_a$ is then the expected utility which will be a function of the probability of player two choosing $A$ and the probability of choosing $B$. 
The graph above shows the difference of the two equilibrium predictions. The left plot is the classic Nash equilibrium prediction where the player chooses \( a \) with certainty or does not choose \( a \). The right plot shows the predictions of the LQRE where the probability of choosing \( a \) is a smooth function which increases in \( U(a) \). Each curve represents a different size of error on the part of the decision maker. The steepest curve (dashed dark purple line) is for a situation in which the error is small compared to the utility.\(^5\)

**Observational Data and LQRE**

Signorino (1999) used this framework to analyze formal theories of international relations and thereby first employed it to analyze observational data. Contrary to experimental settings where the payoffs are known (since the experimenter assigns, e.g., a monetary incentive) we do not observe the utility of a player. Rather, the utility is assumed to be a function of observed variables, and the contribution to the utility function has to be estimated.

Signorino (1999, 2003) showed how appropriate statistical models can be derived to test formal theoretical models. This approach allows scholars to test if certain variables contribute to an actor’s utility or not. This is similar to any decision model and follows closely the random utility framework. The big contribution of Signorino (1999, 2003) lies in the way he provides tools for analysts to incorporate the strategic data generating process. This direct approach is well suited to test the empirical implications of theoretical models.

Building on Signorino’s (1999, 2003) work we derive a specific statistical model to test whether certain variables contribute to the utility of the players in our formal model. In the next section we will derive a statistical model that is customized for the formal model we laid out in part three.

### 4.2 The Empirical Model

In part three we presented the formal model that is the foundation of this paper. A party or a group of parties decides to propose a new law. If the law is adopted the opponents decide whether to trigger a referendum and if so, the people eventually decide whether the proposed law is enacted or not.

\(^5\)In the QRE this corresponds to a high \( \lambda \) which is a high degree of rationality. \( \lambda \) is in experimental settings the parameter which researchers seek to estimate.
There are three actors, the proposing coalition (Pr), the opposition (Op), and the people (Pe). We assume that these players will choose the action that yields the highest utility to them. Hence, the opposers will choose to trigger a referendum if the true utility ($U^*$) of this is higher than from not triggering a referendum. Formally, this means that $U^*_{Op}(\text{no referendum}) < U^*_{Op}(\text{referendum})$.

The decision of each player is either 0 (proposing no law; not calling for a referendum; saying no to the law) or 1 (proposing new law; calling for a referendum; saying yes to the law):

$$y_{Pr} = \begin{cases} 0 & \text{if } U^*_{Pr}(\text{no action}) \geq U^*_{Pr}(\text{new law}) \\ 1 & \text{if } U^*_{Pr}(\text{no action}) < U^*_{Pr}(\text{new law}) \end{cases}$$

$$y_{Op} = \begin{cases} 0 & \text{if } U^*_{Op}(\text{no referendum}) \geq U^*_{Op}(\text{referendum}) \\ 1 & \text{if } U^*_{Op}(\text{no referendum}) < U^*_{Op}(\text{referendum}) \end{cases}$$

$$y_{Pe} = \begin{cases} 0 & \text{if } U^*_{Pe}(\text{vote no}) \geq U^*_{Pe}(\text{vote yes}) \\ 1 & \text{if } U^*_{Pe}(\text{vote no}) < U^*_{Pe}(\text{vote yes}) \end{cases}$$

An observation where $y_{Pr} = 1$, $y_{Op} = 1$, and $y_{Pe} = 0$ is a case in which a new law was introduced, the opposing group(s) called for a referendum, and the people eventually rejected the new law. This corresponds to outcome 3 in the game tree (see graph 1). Since we will employ variables in the empirical part, which are observed by all players, we assume that the random part enters through actors who err. This assumption implies that the errors, the difference in the observed and the true utility, are only due to errors of the player who is taking a action. This corresponds with the notion of agent error.\(^6\) This is a sensible assumption in this legislative application as the explanatory variables are known to all actors and we do not think that there is any relevant source of variation which we can not measure and model.\(^7\)

4.2.1 Deriving the Likelihood Function

The probability that the people will vote yes on a new law is $q$ and since there are only two possible actions, the probability of a no vote is $1 - q$. We will assume

\(^6\)A comprehensive account for the choice of the error structure and its consequences is presented by Signorino (2003, 322).

\(^7\)This assumption is less relevant than one expects. It can be shown that alternative specifications of the source of error lead eventually identical statistical results (see Signorino, 2003).
that errors are normally distributed, and therefore the probability can be defined as:

\[
q = \Phi[U_{Pe}(y) - U_{Pe}(n)]
\]  

(1)

where \(\Phi[\cdot]\) denotes the cumulative standard normal distribution. The utility to the people from accepting a new law is \(U_{Pe}(y)\), and the utility from rejecting the law is \(U_{Pe}(n)\). We do not observe the true utility \(U^{*}_{Pe}\) but only \(U_{Pe}\). Further, we assume that the error has a normal distribution. So far, this is nothing else than an ordinary probit model.

The opposition will trigger a referendum if they expect higher utility than if they accept the new law. The expected utility of the opposition is a function of their expectation of the people’s action. The expected utility that the opposition obtains from triggering a referendum \((r)\) is:

\[
E[U_{Op}(r)] = q \cdot U_{Op}(r|y) + (1 - q) \cdot U_{Op}(r|n)
\]

(2)

The inclusion of the people’s actions makes this a strategic interaction. In the same way the expected utility of accepting a new law – not triggering a referendum – is:

\[
E[U_{Op}(nr)] = q \cdot U_{Op}(nr|y) + (1 - q) \cdot U_{Op}(nr|n)
\]

(3)

It is now possible to make a statement about the probability of observing a referendum \((p)\) - the probability that the opposition will trigger a referendum:

\[
p = \Phi\left\{ \left( q \cdot U_{Op}(r|y) + (1 - q) \cdot U_{Op}(r|n) \right) \\
- \left( q \cdot U_{Op}(nr|y) + (1 - q) \cdot U_{Op}(nr|n) \right) \right\}
\]

(4)

In a final step we can make a statement about the probability that the proposing party introduces a new law. The proposing coalition will introduce a new law if it expects a higher utility from this action than from not proposing a new law. The expected utility of proposing a new law is:

\[
E[U_{Pr}(nl)] = p \cdot q \cdot U_{Pr}(nl|r, y) + p \cdot (1 - q) \cdot U_{Pr}(nl|r, n) \\
+ (1 - p) U_{Pr}(nl|nr, \cdot)
\]

(5)

Note, that by assuming that the error has a standard normal distribution, we have also assumed that its variance is 1. This assumption is necessary, because otherwise the parameters would not be identified.
We denote the probability that a new law is proposed by $g$. This probability can be expressed as a function of $p$, $q$, $U_{Pr}(|nr, \cdot|)$, $U_{Pr}(|r, y|)$, and $U_{Pr}(|r, n|)$. The utility of not proposing a new law is the utility obtained from the status quo. In terms of expected utilities one can determine that

$$g = \Phi \left[ E[U_{Pr}(nl)] - E[U_{Pr}(sq)] \right]$$  \hspace{1cm} (6)

Since the expected utilities of $Pr$ are a function of $p$ and $q$, and since these two probabilities are functions of $E[O_{Op}]$ and $U_{Pe}$, the decision to propose a law or not is based on the entire game tree. Since we will eventually parameterize the utility functions and use data to estimate the utility, we can write:

$$g = f(x_{Pr}, p, q)$$  \hspace{1cm} (7)

As $p$ and $q$ are also based on utilities that we will parametrize, we can express $g$ as a function of $x_{Pr}$, $x_{Op}$, $x_{Pe}$, $\beta_{Pr}$, $\beta_{Op}$, and $\beta_{Pe}$.

We first defined the three different actions that lead to the four possible outcomes ($y_{Pr}$, $y_{Op}$, $y_{Pe}$). In a second step we derived the probabilities of the individual actions as a function of utilities and expected utilities. In the final step, we parameterize the utility as in any other random utility model. The difference in the people’s utility ($U_{Pe}(y) - U_{Pe}(n)$) will be parametrized with $x_{Pe} \beta_{Pe}$. Note, that the parameters $\beta_{Pe}$ are not only determined by the data of the last node, but by the entire dataset. This point will prove to be crucial later. The same derivation can be carried out for the other two probabilities leading to similar insights.

It is now a simple matter of defining the likelihood function and the log-likelihood for this statistical model as follows:

$$\mathcal{L} = \prod_{i=1}^{n} \left[ 1 - g \right]^{(1 - y_{Pr})} \times \left[ g \cdot (1 - p) \right]^{y_{Pr}(1 - y_{Op})} \times$$

$$\times \left[ g \cdot p \cdot (1 - q) \right]^{y_{Pr} y_{Op} (1 - y_{Pe})} \times \left[ g \cdot p \cdot q \right]^{y_{Pr} y_{Op} y_{Pe}}$$  \hspace{1cm} (8)

$$\ell \ell = \sum_{i=1}^{n} (1 - y_{Pr}) \ln[1 - g] + y_{Pr} (1 - y_{Op}) \ln[g \cdot (1 - p)] +$$

$$+ y_{Pr} y_{Op} (1 - y_{Pe}) \ln[g \cdot p \cdot (1 - q)] + y_{Pr} y_{Op} y_{Pe} \ln[g \cdot p \cdot q]$$  \hspace{1cm} (9)
We denoted which part of the likelihood corresponds to which outcome in the game tree to show the close connection of the statistical model and the formal model. Equation 9 can be maximized and thereby the probabilities are estimated. By estimating the probabilities one also estimate the relative utilities. This allows to identify which variables contribute to the relative utilities. Technically, we can now estimate the coefficients $\beta_{Pr}$, $\beta_{Op}$, and $\beta_{Pe}$. This allows us to make statements whether observed variables contribute to the utility of a specific actor or not.

### 4.2.2 A Short Note on Selection

As claimed in section 4.1 models of this category that rely on the full information likelihood function rather than focussing on one single decision maker, can take selection into account. Since the decisions of all three actors are estimated simultaneously, and their expected utilities depend on the predicted probabilities of other actors’ actions further down the game tree, we account for selection (Signorino and Yilmaz, 2003).

This might seem very close to classic selection models as proposed by Heckman (1976, 1979). A selection model in the Heckman vein would, however, actually be different. Note, that we do not assume that actor $Pr$ knows *ex ante* if $Op$ will trigger a referendum or not. A classic Heckman selection model would have to make this simplifying assumption. To the contrary, the models based on QRE allow us to incorporate the uncertainty of the future for the players. Instead of making the assumption that the outcome is known *ex ante*, we incorporate this uncertainty by relying on *expected utility*, whereas the expected utility is a function of the probabilities of the other players taking particular actions.

Contrary to Heckman selection models, however, we assume that the errors are uncorrelated. In the classic Heckman model, one estimates a parameter (often denoted $\rho$) which is the correlation between the errors of the selection and outcome equation.\footnote{Signorino (2002) provides an extensive overview of different models and works out nicely where their assumptions depart.} We do not have such an element. Practically, we assume that the errors committed by the players are uncorrelated.
5 Data

In this first preliminary step we decided to focus on parliamentary initiatives (parlamentarische Initiativen) and motions from the 45th legislative period (1995-1999). Parliamentary initiatives lead to bills elaborated without government intervention and are adopted by the two chambers, while motions, if adopted by both chambers, request from the government a proposal. The motivation for using these two types of proposals is that as a consequence we can model the first decision node, namely whether a law is proposed or not. Based on an expert survey Sciarini (2007) finds that at least a quarter of all bills adopted in the Swiss parliament have been initiated directly (parliamentary initiatives) or indirectly (motions) by parliament. We limit our analysis to the 45th legislative period, because only in this period did parliament adopt bills initiated through motions or parliamentary initiatives that were challenged in a referendum and subsequently rejected by voters. We use as starting point Sciarini and Nicolet’s (2005) database of all bills adopted between 1995 and 1999 subject to a non-required referendum. We selected those for which we could identify in the message submitted by the government, that it addressed a particular motion adopted by parliament. In addition, we also included in our dataset all motions which were rejected by parliament. Finally, we added all parliamentary initiatives voted upon between 1995 and 1999. For this (and other variables discussed below) we used a dataset containing roll call votes from the lower house for a period from December 3rd 1996 to October 6th 2005 (45th, 46th, and part of the 47th legislative period) (see Hug, 2010, for a discussion of these data).

Among the parliamentary initiatives (PI) we had to exclude 9 cases. If the lower chamber (Nationalrat) accepted a PI, but the upper chamber (Ständerat) 10

10Due to data limitations (see for instance Bütikofer and Hug 2010) we will largely neglect the bicameral structure of the Swiss parliament.

11Another strategy for generating information on a sufficient number of aborted legislative proposals is to consider the projects for which the government elicits positions in a consultation phase (Vernehmlassung). As the available data is not standardized, such an endeavor would, however, be very cumbersome.

12In our coding of motions based on reports from the government we noted a larger share of bills having their source in parliament, namely approximately 50%. The remaining bills stemming from government almost always pass, though often considerably amended by parliament, demonstrating that government carefully selects which proposals to submit.

13We excluded, however, all motions that passed but for which we could not clearly identify what bill addressed the issue raised.
did not start debate (Nichteintreten) there is no law. This is, however, due to an exogenous factor, and therefore we do not include such cases in the database to test the formal theoretical model. Three cases are excluded for this reason.

In some cases other laws that were enacted in the meantime accomplished what the PI was supposed to achieve. Often the committee then reported to the floor and proposed to cancel the PI. We excluded those cases, since there is no law following directly from the PI, but this is again due to an exogenous cause. We did that only for those cases in which the entire committee agreed upon the fact, that another law satisfies the initial intension. This led to the exclusion of six cases.

We then coded based on the reports (available from Curia Vista) the outcome, i.e. a PI/motion was accepted and led to a law or it was rejected and no new law was enacted.

Finally, if a new law was enacted based on a motion or a parliamentary initiative we coded whether a referendum was triggered or not and what the final ballot decision was. The main explanatory element in the theoretical model is the ideological position of a law proposal. We therefore coded an ideological measure that indicates how far away a proposal is from the mean position of the parliament. Furthermore, based on the verbatim records (Amtliches Bulletin – Wortprotokoll) and the committee reports we identified the opposers.

In this first step we also limited the number of players and rely only on the five largest parties; GPS (green/environmental party), SPS (social-democrats), CVP (christian-democrats), FDP (liberals), and SVP (agrarians/right-wing) and code all remaining MPs into a residual category. For any PI or motion we can determine which parties proposed it and which parties opposed it. We have an ideological measure allowing us to identify how extreme a PI or a motion is. We measure the distance from the average position of all MPs in a two-dimensional policy space. In the appendix we present a fuller account of coding and operationalization rules. Our current dataset is appropriate to illustrate the applicability of the derived statistical model, but is at the same time quite limited. First and foremost, we do not have very many observations. We currently have 254 observations that we can use.
Graph 3: Frequencies of proposed PIs and Motions

Notes: The Graph shows the number of presented PIs by parties. The dark shaded area represents the number of times a party introduced a PI together with another party. The light shaded areas represent the number of times a party introduced a PI without another party.

Given that the desirable properties of MLE are asymptotic, the results should be treated with the necessary caution.\footnote{Note, however, that we carried out Monte-Carlo simulations, which suggested adequate properties of our estimations in various contexts.} A drawback from the limited dataset is that we do not have many cases in which the people actually voted on a new law in a referendum (10 out of 254). We will be able to overcome this shortcoming with additional data (46th and 47th legislative period).

6 Preliminary Results

In this section we present preliminary results. For the first actor, the proposer (Pr), we use five binary variables indicating which party introduced a PI or motion (GPS, SPS, FDP, SVP, CVP). We use the members of the peripheral parties as the baseline category. Furthermore, we included a measure of ideological distance to the floor mean voter. For the utility of the first player at node 4 we included an additional constant which is a nuisance parameter. For the second player, the opposer (Op), we included a measure of how far away in the future the next election is and one of ideological distance. In addition we also included a variable indicating how many other signature campaigns are taking place at that time and the vote margin. The latter is used as a proxy for the strength of the support. The larger this value, the more MPs voted for a PI or motion. If this
signals that a referendum campaign would face stark resistance by the supporting parties, we expect it to exercise a negative effect on the probability to trigger a referendum (see also Trechsel and Sciarini, 1998). Because this measure is only available for votes which reached the second node, we use the modified zero-order regression idea.\footnote{The basic idea is that one imputes the missing values and also includes an additional variable which indicates which observations have an imputed value (Correct Factor). This rests on the assumption the all missing values are equal what can be argued here. For further explanations see Greene (2003: 60) and Maddala (1977: 202-204).}

Finally, for the last player, the people (Pe), we include a variable indicating if the law can be attributed to the economic policy field or not.

Table 1 reports the strategic model (Model 4) as well as the three partial models which only focus on one node of the game tree (Model 1, 2, and 3). The model is based on a data set with 254 observations. The variable distance is part of the proposer’s utility but also of the opposer’s utility. The more extreme a PI or motion is, the less likely is it to be successfully introduced. We only find a significant impact for the adoption but not for the decision to trigger a referendum or not. Note, that a naive model not taking into account the strategic nature, would misleadingly indicate that the more extreme a bill is, the more likely its successful introduction is.

The party indicators that are included as a part of the proposer’s (Pr) utility give an insight on the chances of parliamentary initiatives. The baseline category are the peripheral parties, which are the most successful factions in terms of successfully introducing legislation through a parliamentary initiative. The GPS does not significantly differ in their ability to introduce PIs or motions successfully. The other three center and right parties fair significantly worse and are much less successful than the peripheral parties.

The variable time to election was introduced to see if there is any cycle due to the electoral calendar. We do not find any significant impact of this variable on the likelihood to launch a referendum.

Another variable which could influence the relative costs of triggering a referendum is Signature Campaigns. This variable indicates the number of ongoing campaigns collecting signatures for an initiative or referendum. There is no significant effect of this variable.

Finally, we also included a measure indicating the vote margin on the final
Table 1: Estimation Results

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.50</td>
<td>-2.97*</td>
<td>1.15*</td>
<td>-0.42</td>
</tr>
<tr>
<td>(0.34)</td>
<td>(1.33)</td>
<td>(0.57)</td>
<td>(0.95)</td>
<td></td>
</tr>
<tr>
<td>GPS</td>
<td>-0.82</td>
<td>-0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.71)</td>
<td>(0.69)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>-1.58***</td>
<td>-1.44***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.47)</td>
<td>(0.49)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDP</td>
<td>-2.31***</td>
<td>-2.31***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.39)</td>
<td>(0.43)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SVP</td>
<td>-2.03***</td>
<td>-2.01***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.41)</td>
<td>(0.50)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVP</td>
<td>-0.97**</td>
<td>-1.87***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.33)</td>
<td>(0.42)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Ideological Distance</td>
<td>4.42***</td>
<td>-6.47***</td>
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<tr>
<td>(0.79)</td>
<td>(1.46)</td>
<td></td>
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<tr>
<td>Time to Election</td>
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<td>0.01</td>
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<td>(0.02)</td>
<td>(0.01)</td>
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<tr>
<td>Signature Campaigns</td>
<td>0.05</td>
<td>-0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.04)</td>
<td>(0.01)</td>
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<tr>
<td>Ideological Distance</td>
<td>-0.79</td>
<td>-0.77</td>
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<td>(1.76)</td>
<td>(0.81)</td>
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<tr>
<td>Vote Margin</td>
<td>1.39</td>
<td>0.85**</td>
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<tr>
<td>(1.02)</td>
<td>(0.42)</td>
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<td></td>
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<tr>
<td>Correct. Factor</td>
<td>2.65**</td>
<td>-0.08</td>
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<tr>
<td>(0.98)</td>
<td>(0.25)</td>
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<td>Economy</td>
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<tr>
<td>(N)</td>
<td>254</td>
<td>66</td>
<td>10</td>
<td>254</td>
</tr>
<tr>
<td>AIC</td>
<td>160.68</td>
<td>55.04</td>
<td>12.80</td>
<td></td>
</tr>
<tr>
<td>BIC</td>
<td>259.73</td>
<td>107.60</td>
<td>15.22</td>
<td></td>
</tr>
<tr>
<td>log L</td>
<td>-52.34</td>
<td>-3.52</td>
<td>1.60</td>
<td>-94.49</td>
</tr>
</tbody>
</table>

Standard errors in parentheses, *p < .05; **p < .01; ***p < .001

**Note:** We do not report the additional constants which were estimated.

vote. The effect is positive and significant which means that the higher the vote margin is, the less likely a referendum is (note, that since this variable is modelled at outcome 2, its sign can be misleading).

These preliminary results suggest that the variables suggested by theoretical models, i.e., the spatial location of a proposal and the costs of a referendum, play
a crucial role to understand the strategic interactions due to referendums. These preliminary results also show the relevance to incorporate the strategic nature into a statistical model.

7 Concluding Remarks

Starting from the incompatibility between assumptions used in game-theoretical models and those employed in empirical tests of these same models, we demonstrate how an adequate model can be derived to test the implications of a theoretical model in a more integrative way. Taking strategic interdependence of the data serious allows scholars to derive fine-tuned empirical tests and thus generates new insights. The empirical strategy has, however, to account for the dependence of the observational data. This dependence problem can be overcome once the strategic nature is incorporated in the statistical model, as we did for the strategic interaction among three players in a representative democracy with referendums.

Our initial empirical results based on PIs and motions voted upon in the lower house of the Swiss parliament suggest the fruitfulness of our approach. Even though the specification of our empirical model is so far still quite limited, we found some interesting results. Obviously, the results are limited given that we have among our PIs and motions only a small set that resulted in a referendum vote.
8 Appendix: Data

8.1 Parliamentary Initiatives and Motions 1995-1999

8.1.1 Database

As mentioned in section five, we excluded 27 cases due to three specific reasons. Table A.1 shows which PIs were excluded. The exact legislative history of these PIs can be accessed online. The URL is http://www.parlament.ch/D/Suche/Seiten/geschaefte.aspx?gesch_id=YYYY04XX where YYYY04XX corresponds to the PIs bill id.

Table A.1: Table of Excluded Parliamentary Initiatives (PIs)

<table>
<thead>
<tr>
<th>Upper House</th>
<th>Another Law fulfills the Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>19950410</td>
<td>19960404</td>
</tr>
<tr>
<td>19960461</td>
<td>19960412</td>
</tr>
<tr>
<td>19970420</td>
<td>19970407</td>
</tr>
<tr>
<td>-</td>
<td>19980443</td>
</tr>
<tr>
<td>-</td>
<td>19980448</td>
</tr>
<tr>
<td>-</td>
<td>19980455</td>
</tr>
</tbody>
</table>

Notes: The numbers correspond to specific bills. The first four digits (YYYY) reveal the year a PI was submitted, the sixth digit is always four because they are all PIs. The last two digits are identifiers (XX).

8.1.2 Variables

- **Outcome** This variable can take on four different values (1, 2, 3, or 4). 1 = PI/motion was rejected; 2 = PI/motion was accepted and led to a law; 3 = PI/motion was accepted and led to a law, law was defeated in a referenda; 4 = PI/motion was accepted, led to a law, a referendum was held, law was accepted by the people. We first determined if a PI/motion was accepted or not. Based on the raw data set we can code if the Nationalrat adopts a law provoked by a PI/motion. In a second step we crosschecked with a list of all enacted laws which were prone to an optional referenda. Such a list is online available for 1991-2000: http://www.admin.ch/ch/d/pore/vr/vor_2_2_6_1_1991.html and for 2001-2009: http://www.admin.ch/ch/d/pore/vr/vor_2_2_6_1_2001.html.

- **Ideological Distance** We measured ideological distance as the absolute value of the distance to the spatial mean of the parliament. The ideal points were estimated based on roll-call votes from the 47th legislature, Bayesian ideal point estimation was used (Clinton, Jackman and Rivers, 2004)
Notes: The x-axis displays the first dimension which corresponds to economic liberalism. The y-axis is the second dimension and corresponds to cultural liberalism. The black triangle denotes the barycenter based on the individual ideal points. The displayed results are taken from Leemann (2008).

The ideological position of a PI/motion is measured by taking a weighted average of the yea-votes a PI/motion receives. If all Social Democrats and all green MPs vote for a PI/motion, but no other MP, we locate the PI/motion exactly in between the position of the Social Democrats and the Greens. If only half of the members of the Green Party support it, we weight the Green ideal point by $\frac{1}{2}$ and the Social Democrat’s ideal point by 1.

Formally, we denote the ideal point of the parties as $\theta_i$, where $i \in \{GPS, SPS, CVP, FDP, SVP\}$. Note, $\theta_i$ is a vector with two elements denoting the ideal point’s x-coordinate and y-coordinate. The degree of approval of a certain party is $A_i$, where this is nothing else than the number of yea votes divided by the number of all votes. The ideological position of a the $j^{th}$ PI/motion $- \delta_j -$ is then:

$$\delta_j = \frac{\sum_i \theta_i \cdot A_i}{\sum_i A_i}$$ (10)

Squaring the two elements of $\delta_j$ and tacking the square root of the sum gives the distance of the $j^{th}$ PI/motion to the mean ideological point in the policy space. The larger the distance, the more extreme a PI/motion. For any given PI/motion there are several votes. The content of a PI changes during the voting process due to the possibility of amendments. We therefore took the final vote (Gesamtabstimmung or Schlussabstimmung).

- **Proposer** Those PI/motion which were submitted by a single MP are identified as PI/motion from the MP’s party. In those cases in which the PI was submitted by an entire committee, we read the committee reports to see who motivated the committee to become active.
In some cases a committee became active because of a previously submitted PI. In these cases we used the party of the initial PI's submitter. Such a case is e.g. Parlamentarische Initiative - Bundesgesetz über die Mehrwertsteuer. Ausnahmen von der Steuerpflicht im Bildungsbereich (WAK-N) which was proposed by the Kommission für Wirtschaft und Abgaben des Nationalrates in March 2001. Closely reading the report reveals that earlier a similar PI was submitted by Alexander Tschäppät (SP, Social Democrat) in October 2000. After Tschäppät submitted his PI, the committee saw the need for further consultations which took place. Subsequently the committee drafted its own PI and submitted it to the floor while Tschäppät withdrew his original PI. We coded the committee’s PI as coming from the SP.16

In those cases where the report or the verbatim record (Amtliches Bulletin – Wortprotokoll) revealed the names of the opposers or proposers within a committee we used these MPs to assign the PI to a party or group of parties.17

In those cases in which neither of the two above described coding rules could be used we employ a proxy. We use the committee’s president’s party as proxy for which party proposed the PI. If the PI is coming from the president of either chamber (Büro des Nationalrates/Ständerates) we treat the president’s office as if it is a committee. If both president’s offices submit a PI together, we relied on the president of the lower chamber (Nationalrat).

- **Opposer**
  To determine the opposing groups and code which party or which parties are against a law, we use the following rule. If 75% of a partisan faction vote against a law, we assign them the role as opposer.

- **Party Groups** We have the following major groups coded as parties:
  - **GPS:** Green Party. We include members of the Christian Social Party (CSP) into this category since they form a parliamentary faction since 1999. We also include the Socialist Green Alternative (SGA) to the GPS.
  - **SP:** Social Democratic Party.
  - **CVP:** Christian Democratic Party. The Green Liberal Party (GLP) is included in this group.
  - **FDP:** Free Democratic Party. We also include members of the Liberal Party (LPS) to this faction.
  - **SVP:** Swiss People’s Party. We also include members of the The Ticino League (Lega) to this faction.
  - **Others left:** PdA, LdU, AdG.
  - **Others right:** EVP, EDU, SD, FPS.
  - **Others:** Freie Liste Bern.
    Note, that we take the three last groups and put them into one single category. Although these groups are ideologically distinct there relative influence in the parliamentary negotiations is very limited.

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17 Often the committee minority is mentioned name by name. In these cases we have information on which parties rejected the PI and we code the remaining parties as proposers.
○ **Time till next election** We measured how many months elapse from the final (Schlussabstimmung or Gesamtabstimmung) vote till the next federal elections. We also have a binary indicator which takes on the value 1 if the final vote took place less than 18 months before the next federal elections.

○ **Number of Signature Collections** Collecting signatures is a costly action. The costs increase if there are several groups that collect signatures simultaneously. It is sometimes necessary to attain a permit to collect signatures (depends on municipality). Municipalities and cities grant licenses only to a limited amount of groups. Given that already many groups are collecting signatures, a new group is forced to go to less frequented areas and thereby needs more resources to collect the same amount of signatures. We coded for any point in time the number of initiative and referendum committees which were collecting signatures.

○ **Vote Margin** We coded for every PI/motion for which we had a final vote, the vote margin is $|\#\text{yes} - \#\text{no}|$. A value of 1 indicates that an unanimous vote was casted. A value of 0.5 means that 75% casted a yea (or nay) vote while 25% voted nay (or yea). The vote margin informs about the parliamentary strength of the proposing and supporting groups. For a fuller account see Sciarini and Trechsel 1998.


○ **Identifier** Almost any relevant parliamentary action is recorded. This systematic archiving assigns every PI or bill a specific number which identifies it. The eight digit identifier displays the year (first four digits) and the specific kind (PI, motion, ...) and the last two digits are just case-specific identifiers. An identifier could be 19910411, where we see that it takes place in 1991, the 04 shows that it was a PI, and the 11 is identifying among other PIs in 1991. Any such number can be used to access further online documentation. The URL is the same and only the last eight digits have to be altered, for the example in 1991 the URL is [www.parlament.ch/D/Suche/Seiten/geschaefte.aspx?gesch_id=19910411](http://www.parlament.ch/D/Suche/Seiten/geschaefte.aspx?gesch_id=19910411).

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18This led recently to parliamentary action (question time) whether such restrictions are covered by federal law or not (see [http://www.parlament.ch/d/suche/seiten/geschaefte.aspx?gesch_id=20063649](http://www.parlament.ch/d/suche/seiten/geschaefte.aspx?gesch_id=20063649)).
References


