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Abstract

We use a change in the voting procedures of one of the two chambers of the Swiss parliament to explore how transparency affects the voting behavior of its members. Until 2013, the Council of States (Ständerat) had voted by a show of hands. While publicly observable at the time of the vote, legislators' decisions could only be verified ex post through the time-consuming screening of online videos. In 2014, halfway through the legislative period, the chamber switched to electronic voting. Since then, the individual votes of legislators have become more transparent and observable as their votes are now recorded electronically and, in some cases, published online. Our analysis is based on individual voting behavior in all final passage votes during the 2011-2015 legislative period. In a difference-in-difference framework, the larger chamber, the National Council (Nationalrat), serves as a control group. Not only have the voting procedures of the National Council remained unchanged since 2007 but also the legislative texts on which both chambers vote are the same. This unique framework makes it possible to estimate the causal effects of voting procedures on legislators' choices. Since the voting system reform, members of the Council of States are significantly less likely to deviate from their party line. Our results reflect the increased observability of legislators' votes and the greater conformity pressure exerted by political parties, as easier monitoring enables them to enforce discipline among their members.

JEL-Codes: D720, D800, L880.

Keywords: voting, parliament, transparency, parties, party discipline, principal agent theory.

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1 Introduction

Voters elect individual politicians to represent their interests in parliament. When citizens transfer their legislative power in this way, they enter into a principal (voter)-agent (politician) relationship, which is susceptible to agency problems. While voters expect legislators to honor their electoral promises, the latter face no legal obligation to keep them.

Political parties alleviate part of the agency problem by establishing their own policy platform. Knowing that a legislator belongs to a particular party provides voters with information on the voting behavior he is likely to adopt in parliament.[1] This information shortcut is valuable to voters as it reduces the transaction costs of their electoral choice. To guarantee informative party labels and prevent brand dilution, it is in the parties' best interests to ensure voting discipline among their members (Snyder & Ting 2002). In doing so, parties act as intermediaries between voters and legislators, and thus strengthen their accountability to voters (Holcombe & Gwartney 1989). An additional advantage of unified parties is that they are more likely to push the legislative process in their preferred direction (Carey 2007; Depauw 2003).

However, parties themselves are part of the agency problem. From a legislator's perspective, parties play the role of a second principal demanding loyalty from their members. At the same time, voters may request their legislators to stand against their parties if the interest of the constituency is at stake.[2] In these cases, legislators face the pressure from two competing principals (Carey 2009).

The principals' capability to punish defectors depends crucially on the electoral system and on the visibility of their agents' behavior. In open-vote systems legislators are individually accountable to their constituencies. Voters can punish individual politicians by not reelecting them. In contrast, in close list systems voters have no power to determine the reelection of a specific legislator.

Parties adopt various "carrot-and-stick" approaches to enforce party discipline (Carey 2007; Krehbiel 1993, 2000). Usually, they have control over election lists and provide campaign support, two measures which are key to a candidate being (re-)elected. The power of parties is particularly pronounced in close list systems. Within assemblies, parties discipline their members by overseeing appointments to leadership positions and to committees and by controlling access to financial resources. Political careers heavily depend on the relationship that the legislator has with his

[1] For the sake of simplicity, we shall refer to legislators in the masculine form.

[2] For a theoretical argument on why voters should also care about their representatives' individual voting behavior rather than focusing solely on the outcomes, see Snyder and Ting (2005).

party.

Parliaments around the world differ in whether and how the voting decisions of their members are made transparent (Hug 2010; Hug, Wegmann & Wüest 2015). While some record and publicly disclose all individual voting decisions (i.e. who voted yes or no on a certain proposal), others tend not to. Recording and storing individual voting outcomes increases transparency for actors both within and outside of the legislative process.

In this paper, we analyze how vote transparency influences legislators' voting behavior in parliament. In particular, we investigate whether transparency affects the legislators' incentive to vote according to their party line. In a quasi-experimental approach we base our work on an institutional change in the Swiss parliament's voting procedure. While the National Council (Nationalrat) has voted electronically since 1994 and has published individual votes in full and online since 2007, the Council of States (Ständerat) voted by a show of hands.[3] However, in spring 2014, the latter introduced an electronic voting system. Since then, both chambers have automatically published all total and final passage votes and individual voting decisions online. Transparency of individual voting decisions has thus increased considerably in the Council of States.

Luckily, video records of the show-of-hand votes exist for the entire 2011-2015 legislative period. These allow us to recover individual votes cast in the Council of States before 2014.[4] We focus specifically on final passage votes because they are identical for both chambers and are usually decided on the same day. We collected data for the complete legislative period, resulting in a sample of almost 300 final passage votes for each of the 200 members of the National Council and 46 members of the Council of States.

As the reform took place in only one chamber of the Swiss Parliament and roughly halfway through the legislative period, it left almost all other aspects of parliamentary business unchanged. This institutional setting allows us to circumvent one of the most prevalent problems in party cohesion estimations: it is virtually impossible to disentangle whether a voting decision is due to personal ideology or pressure from interest groups simply by studying voting outcomes as these can be observationally equivalent (Krehbiel 1993, 2000; McCarty, Poole & Rosenthal 2001; Snyder & Groseclose 2000). We can safely assume that the legislators' ideology remained the same during

[3] The National Council (Lower House) is the proportional representation of the population whereas the Council of States (Upper House) represents the Swiss cantons.

[4] Another stream of literature making use of these video records analyzes how well constituencies are represented by their respective councilors (Eichenberger, Stadelmann & Portmann 2012; Hug & Martin 2011; Portmann & Stadelmann 2013; Stadelmann, Portmann & Eichenberger 2012, 2014). Bütikofer 2014 describes party line deviation and its determinants.

the legislative period and the only aspect that changed was vote visibility.

During the various debates preceding the reform, several legislators voiced concerns that they would come under increased pressure from party leaders and, to a lesser extent, from interest groups if individual votes were disclosed.[5] Supporters said that voters had the right to know how their representatives vote in parliament.[6] The debates mirror the multiple principal framework in which parties, their leaders and voters assume the role of main principals.

Since elections to the Council of States are based on an open-vote system in which candidates assume a strong role, individual accountability towards voters is institutionally given. At the same time, parties are responsible for nominations of candidates, ensuring a strong party principal as well.

Results show that when vote transparency increases, legislators are 2.9 percentage points less likely to deviate from their party's line. This is in keeping with the more efficient and effective monitoring of individual politicians by their parties, which in turn incentivizes legislators to vote with the party even if they disagree ideologically. It also suggests that legislators respond more strongly to the demands of their party principals than their constituencies. However, it is possible that both forces are at play simultaneously, and therefore our findings should be interpreted as the net effect of countervailing principals. Our results prove highly robust when subjected to various econometric specifications and tests. By running placebo tests on the preceding legislative period 2007-2011, in which no changes in vote transparency occurred, we find that election cycles do not explain our results.

We find strong heterogeneous effects. The disciplining effect is particularly strong in the two largest parties at either end of the ideological spectrum, the Social Democrats (SP) and the People's Party (SVP). When we look more closely at the consequences of stronger party discipline, we find no changes in legislation passage rates. Average acceptance rates remain unaffected as well, indicating that the greater vote transparency which arose only in the second half of the legislative period does not affect legislative outcomes, at least in the short run.

Few studies exist which qualitatively or quantitatively assess the effect of vote transparency on legislative voting. Most papers analyze the effect of transparency on legislative voting by comparing published and unpublished roll call votes. For Switzerland, Hug (2010) shows that party

[5] This is in contrast to the interviews by Carey 2009 where legislators in various Latin American countries indicated that party leaders are able to monitor their members well even without electronic voting or roll call votes. Potentially, this is a consequence of the weaker role that party leaders in Switzerland play.

[6] Interestingly, these arguments closely resemble the discussion in US Congress prior to the start of vote recording in the first half of the 19th century (Jenkins & Steward 2003).

cohesion differs remarkably between published and unpublished votes: it is higher for votes that are automatically published than for those which are not published or are only published on request. However, published roll call votes usually differ from unpublished ones in a number of systematic ways. They often form a specific sub-sample of all votes (e.g. roll call votes on request). Hence, most authors emphasize the selection bias between published and unpublished votes (e.g. Carrubba et al. 2006; Yordanova & Mühlböck 2015; yet cf. Hix, Noury & Roland 2014, who find that the selection bias is negligible; cf. Carrubba, Gabel and Hug (2008) and Hug (2012) for the theoretical rationale behind requests for roll call votes).

Our paper differs from these studies in two important ways. First, we exploit an important institutional change. As the reform occurred halfway through an ongoing legislative period, it allows us to identify the causal effect of greater vote transparency. Since then, all final passage votes have been published automatically without members of the Council of States having first to submit a request. Admittedly, final passage votes are a specific subset of all votes with typically high party unity in Switzerland (Hug 2010). However, they occur according to an exogenous rule in contrast to possibly endogenous requests of roll call votes. Second, we are able to analyze a change in transparency in only one chamber of a bicameral parliamentary system. This setting allows us to separate the effect of the reform from general time trends and bill-specific characteristics in legislators' voting behavior. Such an approach is clearly not feasible for similar changes in vote transparency among unicameral assemblies.

Related to our analysis is work by Stadelmann et al. (2014) who analyze the effect that the introduction of video records for the Council of States in 2006 has had on aggregate voting behavior. They conclude that the resulting rise in transparency did not change collective accountability to voters. Prior to these video records, no individual voting results were available even for research purposes, limiting the scope of the paper to identify transparency effects on aggregate voting results. Our paper, in contrast, focuses on an arguably larger and more relevant change in vote transparency and can therefore analyze the effect that this had had on disaggregate measures and individual accountability.

The remainder of the paper is structured as follows. Section 2 explains the main features of the Swiss Parliament and describes the reform of the Council of States' voting procedures. In Section 3 we describe how party cohesion depends on the electoral system and vote transparency, which in turn allows us to derive testable hypotheses. In Section 4 we explain our identification strategy. Section 5 describes our data and in Section 6 we present the results. Section 7 concludes.

2 Institutional Background

2.1 The Swiss Federal Parliament

Switzerland has a bicameral parliamentary system and elections take place every four years. Its two chambers are the Nationalrat (National Council) and the Ständerat (Council of States). The Federal Parliament lacks the typical government-opposition design. Following the parliamentary elections, seven candidates from various parties, are (re)elected by the joint assembly of both chambers to the Federal Council, or cabinet. They typically serve for several legislative periods. Seats on the Federal Council are roughly proportional to the parties' voting strength in parliament. Switzerland thus classifies as a mix between a parliamentary and presidential system (Lijphart 1999).[7]

Election to the National Council is based on proportional representation. Its 200 seats are allotted to the 26 cantons (which also make up the voting districts) according to their respective populations. Currently, there is one seat for every 37,500 citizens, but each canton has at least one seat even if its population is below that number. The largest canton, Zurich, has 35 seats in the National Council (34 during the period of our analysis), while six cantons are represented by a single member. National Council members are usually elected by proportional vote through open cantonal party lists. In cantons with only one seat, the candidate with the majority vote wins. By institutional design, especially in larger cantons, the number of seats won by a party is, by and large, an accurate reflection of the parties' relative strength.

The Council of States has 46 members who represent the cantons. 20 full cantons delegate two members each (two-member districts, TMD) and the six half-cantons each delegate one (single-member districts, SMD). In contrast to the National Council, members of the Council of States are typically elected by majority vote. Only Jura and Neuchâtel use a proportional representation system. Cantons usually have two rounds of voting, whereby the number of votes each citizen has equals the number of seats available, i.e. one or two. In most cases, the first round takes place on the same day as the National Council elections. Winning an absolute majority in this round guarantees the first seat. In the second round, which takes place three to five weeks later, the remaining seat(s) are allocated to the candidate(s) who won the most votes (cf. Dardanelli (2005) or Linder and Lutz (2002) for a more detailed presentation). In the 2011 election, between 2 and 13 candidates were running in TMDs, and 1 to 4 in SMDs.

Table 1 summarizes some of the major characteristics and differences between the two chambers.

[7] Kriesi and Trechsel (2008) provide an excellent introduction to the Swiss political system to which we refer the interested reader for further information.

Table 1: Comparison of chambers

	National Council	Council of States
No. of seats	200	46
Distribution of seats	1 seat per 37,500 inhabitants, min. 1 seat per canton	2 seats per canton, 1 seat per half canton
Election procedure	mostly proportional vote	mostly majority vote
Parties / groups	14 parties 7 party groups	7 parties 7 party groups
Party composition	79% share of 4 big parties	93.5% share of 4 big parties
Debates	Regulated floor time (5-20 min)	Unlimited floor time
Transparency	Individual votes recorded and partly published since 1994, full online publication since 2007	Video records since 2006, individual votes recorded and partly published since 2014

Switzerland's party landscape is dominated by four large parties: the Social Democrats (SP), the Christian Democrats (CVP), the Free Democrats (FDP), and the People's Party (SVP). They make up 93.5% and 79% of all seats in the Council of States and National Council respectively. Three smaller parties - the Greens (GPS), the Green Liberals (glp), and the Conservative Democrats (BDP) - are represented in both chambers as well. Additionally, several smaller parties have seats in the National Council but not in the Council of States. This is of little surprise given that majoritarian systems pose important barriers to the election of small parties (Cox 1997). Few members are independent and thus with no party affiliation. All legislators are members of one of the seven party groups, which correspond to the seven largest parties.

Recent decades have seen the steady rise of the SVP at the expense of the other right-wing but more liberal-leaning CVP and FDP (Kriesi et al. 2005). This has led to a move away by the SVP from consensual decision-making towards a more defined opposition role.

Compared to other countries, the role of Swiss parties is relatively weak and their financial resources are rather limited (Kriesi & Trechsel 2008). Likewise, party leaders are also less important figures.

In both chambers, legislators sit in blocks with their own party. The individual seats are fixed for the entire legislative period. Exceptions are the chamber presidents who, during their year in office, occupy a designated seat.

When a new piece of legislation enters the parliamentary deliberation process, legislators vote on detailed amendments, and on the entire piece of legislation at the end of a round of deliberation

("total vote"). A final passage vote takes place if the two chambers agree on a final proposal. Otherwise, the bill is rejected. Final passage votes are the focus of our research since the legislative text is identical for both chambers and voting takes place on the same day. Both chambers have equal legislative power, and bills only become federal legislation if passed by both (Art. 81, ParlA).[8] Legislation is adopted by the majority of the members voting yes or no in both chambers respectively.

Bills can be classified as either government bills or parliamentary initiatives. As the name suggests, the former are initiated by the federal government (Federal Council), whereas the latter are proposed by individual legislators, parties or organs of parliament. Popular initiatives proposing constitutional amendments are a special case because they can be put forward by any eligible Swiss citizen provided that they have collected 100,000 signatures within 18 months. All constitutional changes are subject to mandatory popular votes. Most non-constitutional legislation can be challenged in a popular vote (referendum) if either 50,000 signatures or eight cantons demand it within 100 days.

2.2 Transparency Reform in the Council of States

While the National Council has been voting electronically since 1994 (publishing all individual votes online since 2007), the Council of States voted by a show of hands until the end of 2013. The president would ask in turn which members accepted, rejected or abstained. Two assigned members of the house acted as vote counters. Name lists with individual voting decisions were only published following a request by at least 10 members. Despite this theoretical possibility, roll call votes rarely occurred. During the 2007-2011 legislative period, there were no roll call votes and in the previous period (2003-2007) only a single one took place (on a proposal to introduce electronic voting).

The Council of States resisted several attempts to introduce electronic voting and to increase vote transparency. In 2011 a parliamentary initiative was submitted by legislator This Jenny from the Swiss People's Party (SVP), demanding (once again) the introduction of electronic voting and the (partial) publication of individual voting records. Although the majority of the competent parliamentary commission recommended that the initiative should be rejected, in June 2012 the Council of States narrowly accepted the proposal with 22 votes for, 21 votes against and 1 absten-

[8] Votes on business that affect only one of the two chambers are an exception because only the chamber concerned votes.

tion. The parliamentary commission was then asked to draft a bill. However, in the final vote held at the end of November 2012 it was rejected with 25 votes against and 20 votes for.

A few days later Politnetz, an independent organization which analyzes legislative behavior and which had started to film the votes in the Council of States, detected a counting error. In the official result of a bill on import restrictions for snakeskin, the bill was rejected with 19 to 18 votes, with the chamber president casting the decisive vote. In contrast, Politnetz video records showed a result of 19 to 17 in favor of the bill, excluding the president's vote. This alleged counting error received huge media attention. As a result, the vote on the snakeskin bill was held again, and the Council of States decided to revisit its decision on the electronic voting bill.

In March 2013, the transparency bill was debated again and accepted in the final vote (March 22) by 28 votes to 14.[9] The final version called for the introduction of an electronic voting system and partial vote transparency. It stipulates the online publication in pdf format of name lists after all final passage votes, total votes and other votes the publication of which is subject to a request by at least 10 legislators. The bill was enacted in early March 2014 after the installation of the electronic voting equipment.

Figure 1 shows the number of articles on vote transparency in the Council of States which appeared in national and major local newspapers between March 2012 and May 2014. The line represents the number of articles per day, while the bars aggregate the articles per month. Media attention matches the various stages in the reform process. The focus on counting errors at the end of 2012 is highly visible.

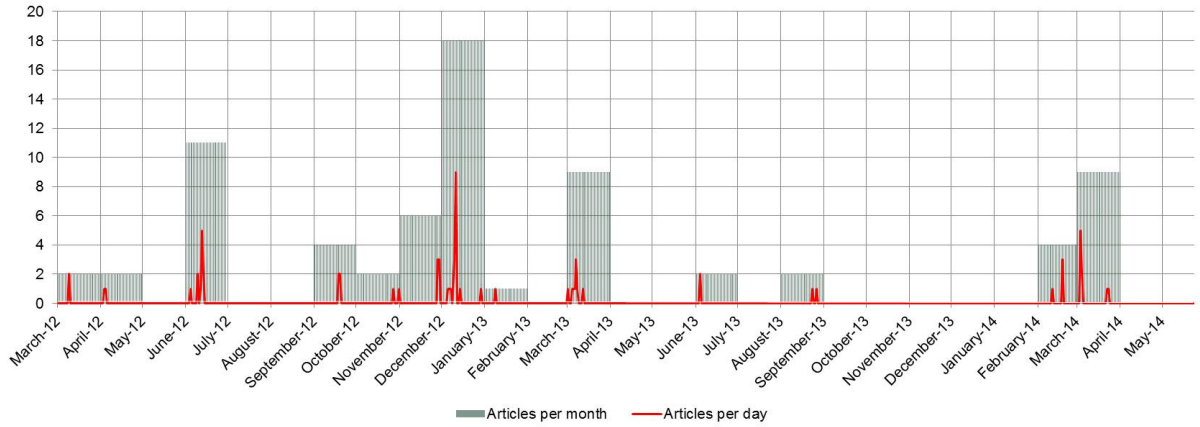
Even before the introduction of electronic voting in March 2014, voting in the Council of States was not secret. All parliamentary debates including votes are public and video records have been available on the Parliament's homepage since 2006. Anyone interested in the voting behavior of an individual legislator could either attend the debates in person[10] or watch the videos online. However, this is both very time-consuming and laborious. Given that the camera moves quickly through the room during the show of hands and that the resolution is low, finding out how an individual legislator voted is an arduous and long-drawn-out process.

The publication of name lists for the final passage votes therefore constitutes a substantial increase in vote transparency as well as an improvement in traceability.

Technically, the electronic voting system comprises three buttons for "yes", "no", and "abstain"

[9] The bill only had to pass the Council of States and not the National Council as it concerned the former alone.
[10] There is a restricted number of places for visitors during parliamentary debates and votes.

FIG. 1: Newspaper coverage



Note: Daily and monthly numbers of newspaper articles in major Swiss newspapers.

highlighted in different colors and fitted to each legislator's seat. During a vote, a mark appears on a central board immediately after one of the buttons has been pressed. Legislators can revise their decision within a set timeframe of several seconds. Just like the show-of-hands method, the electronic voting system also makes it possible to observe the sequence in which the votes are cast. Thus, the internal visibility of individual voting behavior is relatively unaffected by the reform.

3 Theory and Hypotheses

3.1 Theory

Citizens assign power to individual politicians to represent their interests in parliament. This connection establishes a principal-agent relationship between legislators and their constituencies. Voters as constitutional principals wish to have their preferred policies implemented (Besley 2006). Yet, politicians face no legal obligations to keep their campaign promises. This type of moral hazard constitutes the core of the agency problem.

As major players in the political process, parties help alleviate this problem by proposing policy platforms and monitoring their members to ensure that they stick to the party line. In this way, party names serve as informative labels for voters who can rely on substantive shortcuts when deciding whom to elect (e.g., Ashworth & De Mesquita 2008; Snyder & Groseclose 2000; Snyder & Ting 2002; Tullock 1967). To prevent dilution of their brand, it is in the parties' interests to call

their members to order and ensure they vote along party lines (Holcombe & Gwartney 1989).[11]

In contrast, the literature documents voters' preference for legislative individualism over purely obedient party members. They expect *their* representatives to break party discipline if it is in their constituency's best interest. It is commonly assumed that voters care about the quality, i.e. the valence and expertise, of their agents (Besley 2005). This argument is borne out by examples from Latin America: when given the choice between preference voting for an individual or selecting a party list when both options are available, an overwhelming share of voters opted for the former (Morgan, Espinal & Seligson 2006; Shugart, Moreno & Fajardo 2006).[12]

Both parties and voters have the means to influence legislators' votes. To ensure cohesive voting in keeping with the party line, parties use election-related rewards and punishments, as well as internal legislature processes (e.g. Carey 2007, Krehbiel 1993, 2000). For example, parties are responsible for selecting members and putting forward suitable candidates for election. During legislative periods, they have the power to assign positions on committees or within the party itself (Cox & McCubbins 2007). They also control the resources needed to fund electoral campaigns or to support their members' political initiatives. Party principals are therefore crucial to an individual legislator's political career (Aldrich 1995).

If voters do not see their desired policies implemented, they can punish their agents by not reelecting them. The question remains whether voters base their reelection decisions on legislative voting records. In their study on voting in the US Congress, Canes-Wrone, Brady and Cogan (2002) found that House members are punished by their constituencies if they support their party too strongly. Party support is measured by having an extremely conservative voting record if the legislator is a Republican or an extremely liberal one if the legislator is a Democrat. The findings of Canes-Wrone, Brady and Cogan (2002) indicate that vote shares and reelection probabilities of extreme politicians decrease regardless of whether they hold a safe or marginal seat.[13]

The individual legislator thus faces the demands of two potentially competing principals (Carey 2009; Hix 2002). Which of the two is relatively more important to the legislator depends on the institutional setup (Carey & Soberg 1995). Democratic political systems throughout the world differ in terms of their institutional characteristics and are acknowledged to impact political outcomes

[11] A theoretical stream of the literature models party discipline as equilibrium outcomes depending on factors such as ideological heterogeneity and group size (e.g., Ashworth & De Mesquita 2008).

[12] Carey (2009) compiled evidence from studies conducted in Latin America on voters' demands to have legislators with a certain degree of individualism.

[13] Cf. Canes-Wrone, Brady and Cogan (2002) for a more complete account of the literature on the electoral link between roll calls and voting.

(e.g. Persson & Tabellini 2000). They are based on diverse voting rules and vary with respect to the national assembly's internal organization. Voters tend to be important principals in open-list electoral systems, which allow citizens to voice their preferences by selecting individual politicians. Parties gain more importance in closed-list systems and when the parties are responsible for drawing up electoral lists and ranking the candidates who appear on them (Galasso & Nannicini 2015). The electoral system therefore dictates whether voters and parties have the capacity to act on their desire to punish or reward their agents. In open-list systems, as in Switzerland for example, voters can punish individual politicians much more easily than voters in closed-list systems.

The principals' ability to punish or reward their agents also hinges on the observability of the agents' actions (Carey 2009; Hug, Wegmann & Wüst 2015). Transparency of individual voting behavior is another decisive institutional element that determines the relative importance of principals.[14] In general, parties have the advantage of being political insiders and benefit from the close access they have to their members (Carey 2009). Voters, as outside actors, rely more heavily on media coverage of parliamentary debates.

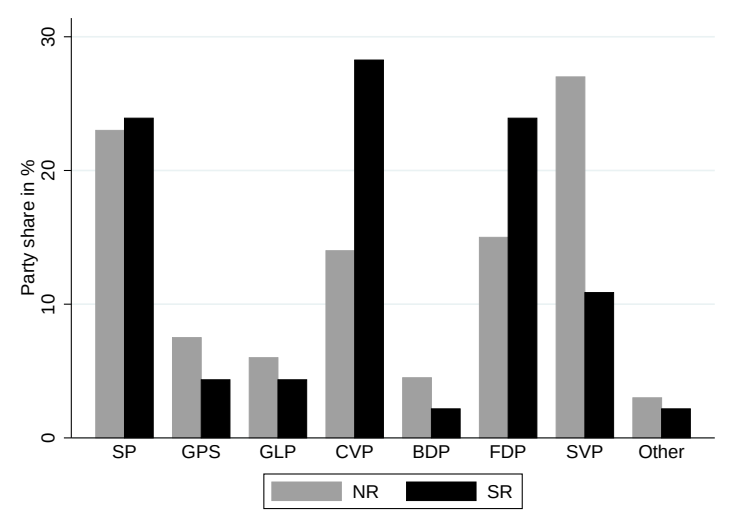
Today, transparency has become a buzz word in almost all walks of life, be it executive compensation, central bank discussions or politics. In legislative voting, there is a general tendency towards greater transparency. This trend is underpinned by the theoretical argument that transparency strengthens the accountability of politicians to their constituencies because additional information about the agent's actions increases the benefits of the principal (Holmström 1979). In contrast, Prat (2005, 2006) and Fox (2007) show that transparency of the agent's decisions can be detrimental to the principal if the former then disregards private information to mimic "good" agents. In parliamentary debates on transparent voting, increased accountability to voters is typically cited by supporters, while those against cite the fear of pressure from parties or interest groups.

3.2 Hypotheses

We use the above theoretical arguments to derive testable hypotheses. We distinguish between who is responsible for nominating candidates, whether voters elect individuals or parties, and what dependencies arise during the legislative period. Moreover, we describe how the change in the voting mechanism has affected transparency.

[14] Across countries variation in legislative transparency is high. Hug (2010) reviews transparency and reports that, out of 92 parliaments surveyed, 23 do not publish any votes, 20 publish all votes, 43 publish specific votes, and 28 publish requested roll call votes.

FIG. 2: Party shares in % by chamber



Note: Share of seats by party and chamber after the 2011 election. NR stands for *Nationalrat (National Council) and SR for* Ständerat (Council of States). Source: Swiss Statistical Office, National Council Election Statistics 2011.

In a large majority of elections, cantonal parties nominate candidates for the Council of States. In rare cases, independent candidates also stand. While the procedures differ across cantons and parties, the latter decide on who should run for office in a party meeting/convention a few months before the election. The parties' nomination power creates a strong principal role. The fact that each canton has a minimum of one seat and a maximum of two seats in the Council of States limits the number of parties nominating candidates. However, given that Swiss parties are too small to win the election without the support of other voters, parties select and put forward candidates with personal and political traits that appeal to the wider electorate.

Switzerland has an open-vote system with multiple voting rounds, giving voters a certain leeway to elect individual candidates rather than parties alone (Carey & Soberg 1995). For the Council of States, the names of the candidates only have to be written on the ballot sheet, while the nominating party appears nowhere. In Council of States elections, parties are less important actors than individual candidates, as borne out by the marked differences in vote shares between the two chambers. Figure 2 shows the aggregate party seat shares in percent by party and by chamber after the 2011 elections. The left bar shows the shares in the National Council (NR) and the right bar the Council of States (SR). With the exception of the SP, the shares differ remarkably between the chambers. The political right (SVP) enjoys the highest popular support in the National Council,

but fails to win an equivalent representation in the Council of States. In contrast, the centrist parties CVP and FDP are more strongly represented in the Council of States. These differences are not due simply to the differences between proportional and majoritarian voting systems: in 2011, the strongest party in the National Council did not win a seat in the Council of States in seven cantons even though they had a candidate in the race.[15] This tentative analysis provides support for the argument that individual legislators tend to be important drivers in the elections to the Council of States. Individual accountability towards voters is a consequence.

The voting procedures in the Council of States are classified according to voting mode and visibility before and after 2014. Pre-2014, all votes took place by a show of hands. Despite the legal possibility of roll call votes on request, with very few exceptions only aggregate voting results were published and individual voting records were not provided by parliament. However, as explained above, video records of all sessions exist, making it possible to check ex post how individual legislators voted. External transparency of individual voting records was thus partly achieved, but at a high cost.

With respect to internal transparency, parties have an advantage over voters in terms of monitoring capacity (Carey 2009). As insiders in the political process, they generally have easier access to individual voting information. With only 46 members in total, and at most 13 legislators per party, the costs of monitoring should be relatively low, even without individual voting records. However, final voting sessions in both chambers take place simultaneously. With the exception of the SP, all party leaders were members of the National Council during our sample period. Therefore, it is not clear whether parties actually have enough resources to keep their members in check.

The Council of States has voted electronically since spring 2014 and video records are published on the parliament's website. The major change, though, is that all total and final passage votes are now automatically published online and can be downloaded free-of-charge in pdf format.

So, how is the information transmitted to the principals? To find voting records online, one has to be familiar with the parliamentary website. Beginning with the main homepage parlament.ch, the shortest way to the pdf is a six-step process. While gaining expertise in downloading and processing voting records might be beneficial for party professionals, it is unlikely that large numbers of voters would be willing to incur the cost of such actions. The media play a crucial role in the dissemination of information about individual voting records. Organizations like Politnetz accumulate voting

[15] These cantons were Zürich, Bern, Zug, Solothurn, Basel-Landschaft, St.Gallen and Aargau. In Uri, Nidwalden, Glarus and Graubünden the strongest party there did not put forward a candidate for the Council of States.

records from final passage votes and convert them into interactive, colorful graphics which it then posts online. They are accessed by politically interested citizens and often used in media coverage. Tellingly, until the end of 2013 Politnetz distributed only information on votes in the National Council. Since the introduction of electronic records in the Council of States, these votes appear on the website as well. Thanks to organizations like Politnetz, recorded votes are now easily accessible and readily available to the public.

In sum, voting sessions before 2014 were characterized by costly transparency both towards voters and parties. Recorded electronic voting increased the observability of individual decisions in final passage votes for actors both within and outside of parliamentary proceedings. Though a certain degree of transparency existed before the publication of electronic voting records and parties have access to insider information, the monitoring costs incurred by parties markedly decreased. The literature agrees that voting cohesion is in the parties' best interest, and this principal deploys an array of instruments to discipline its members. If individual voting decisions become more observable for parties, we expect an increase in party cohesion as legislators will deviate less often from the party line:

Hypothesis 1 (Parties as principals) *When individual vote transparency increases, so too does the legislators' accountability to their parties. Consequently, legislators deviate less often from the party line.*

In the Swiss electoral system of open-list voting, the individual politician is accountable to his electorate. Voters typically want representatives who are unconstrained by party lines insofar as this benefits the constituency. Legislators concerned with their reelection prospect may therefore vote against their parties' platforms (Mayhew 1974). This leads to the following hypothesis regarding transparency and voters:

Hypothesis 2 (Voters as principals) *When individual vote transparency increases, so too does the legislators' accountability to their constituencies. Consequently, legislators deviate more often from the party line.*

Below we describe the empirical framework which explains how we test our two hypotheses.

4 Estimation Strategy

Our goal is to estimate the relationship between vote transparency measured as the introduction of recorded voting and the probability of deviating from the party line. Comparisons of pre- and post-

recorded voting might suffer from the fact that bills could systematically differ over time. The ideal experiment would be to have two identical chambers, both of which would vote electronically. While in one chamber votes would always be published, the second one would initially not publish the records but switch to published voting afterwards. Comparing differences between both chambers with and without vote transparency would identify the effect in question.

Though our empirical framework deviates from the ideal world in two ways, we argue that we can nevertheless identify a causal effect. The Council of States is our treatment group and the National Council is the control group. The first deviation from the perfect experiment is that the chambers differ in terms of size, party representation and election procedures, which are known to affect party unity. Since these differences are time-invariant, they most likely only affect the level difference in party line deviation between the chambers.

Nevertheless, the National Council is a good control group for several reasons. As we restrict our analysis to final passage votes only, this guarantees that both chambers of parliament vote on exactly the same measure and the same legislative text. Furthermore, all votes in both chambers take place simultaneously - usually the last day of the session. In the period we studied, there was only one exception to this rule, with one chamber voting on the following day. It is highly unlikely that additional information or discussions influence the voting behavior of the chamber which votes second.

The second deviation comes from the fact that the Council of States not only changed its guidelines on the publication of voting records but also its vote-casting mechanism (from a show of hands to an electronic system). Arguably, this change potentially affects the internal visibility of voting behavior. Under the show-of-hands system, legislators sitting in the front row had a restricted view of how the other councilors were voting, while everyone else could clearly monitor proceedings. In contrast, the electronic voting system means that all individual votes are immediately and universally visible on a large board. However, we have anecdotal evidence that legislators still find it difficult to track the decisions of their colleagues. Generally speaking, vote-casting is very swift and the voting decisions appear as circles on a seating chart. Time is then required to identify who voted and in which way.

We check whether the change in the voting mechanism also played a role by using the seating arrangements in the chamber. As we show in the results section, the change in voting procedure seems to have had a negligible pure effect.

4.1 Empirical specification

Previous research on party discipline is typically based on aggregate measures like the Rice Index (Rice 1928) or the Agreement Index, which also takes into account abstentions (Hix, Noury & Roland 2005). In contrast, our analysis makes use of individual legislator voting data. This helps us overcome problems related to the definition of party discipline, and makes it possible to control for individual characteristics that potentially influence voting behavior.

$Partyline_{ip}$ is defined as whatever the majority of party members from party p votes for in vote i. The party line can be *Yes*, *No* or *Abstain*. This definition is similar to the one applied in most of the related literature, in which it is defined according to the majority of party members (e.g. Bütikofer 2014; Willumsen & Öhberg 2013). For robustness, we show that using party lines with more conservative cutoffs 50, 67, 80, 90% does not affect our results.

We calculate the party line for each vote and each party according to voting outcomes in the National Council. There are several reasons why we adopt this approach. First, such a definition is unaffected by the transparency reform. Second, all votes from the National Council are electronically recorded and therefore accurate. Third, the relatively large number of party members ranging from 9 to 54 allows a meaningful definition of party majority. In Switzerland, parties rarely issue official voting recommendations to its members of parliament. And even if they do, the recommendation is not made public. An alternative way to define party line is to take the vote cast by the party leader as used by Levitt (1996). We employ this definition as a robustness check. In Switzerland, though, party leaders play a less important role than their counterparts in most other countries.

Our definition of party line - whatever the majority of party members votes for - is a very conservative measure since an average of 95.4% of party members select the same voting option. The lowest party majority amounts to 36.5%. The fifth percentile of party majority is 70.0%, confirming that most party lines are backed by a solid majority.

Our dependent variable $Deviate_{ij}$ takes on value 1 if legislator j deviates from his party's p line in vote i.[16] The case in which the party line is Yes and the member votes *No*, for example, clearly constitutes a vote against his own party. The classification of abstention is less straightforward. Again, suppose the party line is *Yes*. While abstaining is at odds with the party line, it is less confrontational than voting no (Carey 2007). Also, in Switzerland the relative measure to pass legislation is a majority of all yes and no votes. Thus, voting no is more likely than abstention

[16] To reduce notation, we shall omit the p subscript here as each j in vote i uniquely identifies a party membership.

to swing the vote in the direction that the party does not want. If the party line is either yes or no and the legislator abstains, we therefore do not classify it as deviating from the party line. We provide evidence that treating abstention as a deviation does not change our results qualitatively.[17]

Formally, let $Vote_{ij} = \{Yes, No, Abstain\}$ be the vote of legislator j. Then

$$Deviate_{ij} = \begin{cases} 0 & if\ Vote_{ij} = Partyline_{ip} \vee (Vote_{ij} = abstain \wedge Partyline_{ip} \neq abstain) \\ 1 & else \end{cases}$$

We define the group variable CoS_{ij} which takes on value 1 if the legislator is a member of the Council of States and thus in the treatment group. It takes on value 0 for the control group, the National Council. The treatment variable $Transparency_{ij}$ is 1 for votes with electronic, published voting, and 0 for unpublished voting. The effect of interest is the average treatment effect on the treated (ATET), i.e. the expected change in deviation from the party line when transparency switches from 0 to 1.

4.2 Identification

The ATET is identified by coefficient β_1 in the following estimation equation (e.g., Imbens & Wooldridge 2009; Lechner 2010):

$$Deviate_{ij} = \alpha + \beta_1 CoS_{ij} \times Transparency_{ij} + \beta_2 CoS_{ij} + \beta_3 Transparency_{ij} + \epsilon_{ij} \tag{1}$$

One of the main identifying assumptions for DiD is the common trend assumption: in the absence of treatment, deviation from the party line in the treated group (Council of States) and the control group (National Council) would have been exactly the same as before the treatment.

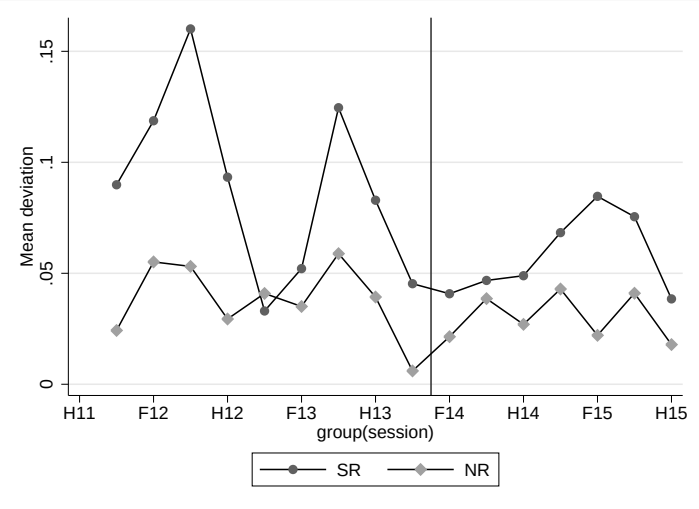
Assumption 1 (Common trend) *If electronic voting had not been introduced in the Council of States, the difference in party line deviation between both chambers would have remained the same.*

We take a closer look at the pre-treatment period to gather evidence that party line deviations evolved similarly in both chambers before the Council of States introduced electronic voting. In Figure 3 we plot the mean deviation from the party line by chamber and per session. This comparison is conducted for the seven largest parties which are represented in both chambers.[18] The graph delivers interesting insights. First, mean deviations in both chambers displayed a strong

[17] Willumsen and Öhbergs' (2013) findings indicate that party deviation and abstention are not driven by the same factors, and therefore should be analyzed separately. This supports our definition.

[18] Recall, there are more parties in the National Council, some with very few members.

FIG. 3: Mean deviation from party line by chamber



Note: Mean deviation from party line per session and chamber over time (12/2011-11/2015).

parallel movement prior to the introduction of electronic voting (session F14, marked as a solid vertical line). It provides evidence of the validity of the common trend assumption. Second, the difference between chambers before and after the reform seems to narrow considerably. This points to a closing cleavage in party line deviation between the chambers. Interestingly, the difference between the chambers collapses in the winter session of 2012. It coincides with the highest level of media attention due to counting errors that occurred during debates held prior to the introduction of electronic voting (cf. Section 2).

The timing of the reform, roughly halfway through the legislative period 12/2011 to 11/2015, facilitates the identification of our main effect. We have a sufficient number of observations before and after the change in voting procedures. A further assumption concerns the relationship between electronic voting in the Council of States and voting behavior in the National Council. It closely resembles the stable unit of treatment value assumption (Rubin 1977).

Assumption 2 (Stable preferences in the National Council) *Legislators in the National Council are not affected by the change in the Council of States' voting procedures.*

In other words, the influence of voters and parties (as principals) in the National Council is assumed not to change with increased vote transparency in the Council of States. In theory, with lower monitoring costs in the Council of States, the principals could shift resources to step up vote monitoring in the National Council. However, this is unlikely to be the case since the

National Council guarantees full vote transparency due to the fact that all votes have been recorded electronically and published since 1994, and that voting procedures have remained unchanged since 2007.

For an analysis of vote transparency, we require a final assumption.

Assumption 3 (Ideology) *Changes in transparency do not affect the legislators' ideological positions.*

Our analysis is based on votes from a single legislative period (2011-2015). It is unlikely that major ideological shifts would have occurred within this relatively short period of time. Thanks to our DiD setting this assumption allows us to circumvent the problem that by observing votes it is virtually impossible to say whether it was the result of perfect agent and principal alignment, or that the legislator was pressured by his principal (Krehbiel 1993, 2000; McCarty, Poole & Rosenthal 2001; Snyder & Groseclose 2000).[19] We only observe a discontinuous change in transparency under preferences that can be assumed to be fixed.

Expectations regarding the coefficient of interest β_1 are the following. If Hypothesis 1 was true and transparency enhanced the monitoring capacity of parties, we should expect less deviation from the party line, i.e. $\beta_1 < 0$. If, according to Hypothesis 2, voters benefited from transparency, deviation from the party line should increase such that $\beta_1 > 0$. DiD would allow us to identify the net effect of counteracting forces from competing principals. We cannot distinguish whether recorded electronic voting increases transparency for both principals or only one. DiD estimation makes it possible to identify which of the two principals gains relatively more from greater vote transparency.

5 Data

Our analysis is based on the legislative period starting in December 2011 and ending in November 2015. In total, our data set encompasses 299 final passage votes with around 68,000 individual legislator decisions from both chambers.

Aggregate voting results for both chambers are retrieved from the parliamentary homepage, Curia Vista. For the National Council and, since 2014 for the Council of States, individual voting data are available in pdf format on the parliamentary website (Amtliches Bulletin). Until summer 2014, the data for the National Council were taken from smartmonitor, a project that collects

[19] In the Appendix we provide an illustrative example clarifying the need for Assumption 3.

all individual votes in a database. For the remaining ones, we hand-collected the data from the parliamentary homepage.

Before 2014 individual voting data in the Council of States were available via video recordings made by the Swiss Broadcasting Corporation (SRG SSR). All videos can be watched online via links on the parliamentary homepage, which also contains an archive of the verbatim minutes (Amtliches Bulletin). We hand-collected individual voting decisions by watching the videos of the relevant final passage votes. For the period prior to electronic voting, around 86.2% of the legislators' votes are directly visible. Several factors contribute to non-visible decisions: a camera that is too slow to capture all legislators, vote counters not actively raising their hands but simply adding their votes to the result,[20] or legislators sitting in the far corners of the chamber. However, once we know the aggregate results, we are able to infer another 10.8% of individual votes such that only 3.1% of decisions remain unknown.

Inferring individual votes is straightforward if decisions are unanimous and we observe all abstentions.[21] In general, if legislators are observed twice during a vote, the third can be inferred. In some cases all unobserved legislators can be assigned to one response if, for example, we know from the aggregate that all yes and no votes are correctly observed. The remaining missing decisions must, therefore, be abstentions.

Comparing the observed voting decisions (excluding those which are inferred) with the official results reveals seven counting errors. In these cases, we correct the official aggregate voting results. Our procedure therefore relies on the assumption that official aggregate results are reported correctly on average and counting errors occur randomly.

Our data is a panel with repeated observations for the same legislators by vote. The panel is unbalanced for a number of reasons. In the case of voluntary or forced departures, new politicians replace the outgoing legislators. In the Council of States and the National Council there were three and 26 changes, respectively. The causes are: election to the Federal Council (1), change of chambers (1), death (3), and resignation (24). Absences during sessions are a further cause of the unbalanced panel. Moreover, with the exception of tie-breaks, chamber presidents typically do not vote in final passage votes during their one year in office. This is why we exclude their voting records during that time.

[20] Vote counters are elected members of the Council of State. They first count the votes of all members voting by show of hands. Afterwards they add their own votes to the result. But they do not actively show their hands such that their votes are not explicitly visible on video.

[21] In our data, only unanimously accepted votes exist. There are no votes in which all legislators reject the bill.

The rich empirical setting allows us to use various individual and bill-related control variables. At the individual level, we control for the bivariate variables *Female*, marital status *Married*, military rank of an *Officer*, and a *Doctorate*.[22] Older legislators might react differently than their younger colleagues, which is why we also control for *Birthyear*. Arguably, politicians serving their first term in parliament face different reelection considerations than their more experienced colleagues. We therefore control for *Freshman* if the December 2011 election was the legislator's first successful election, or he replaced an outgoing legislator after 2011.[23] We also counted the number of *Interest groups* each legislator officially declares and control for its log.

At bill level, we collected contextual information about each bill and final passage vote. More complex bills can have more than one final passage vote. We retrieved information on the type of bill (*Government bill*, *Parliamentary initiative*, *Popular initiative*, *Counterproposal*), type of legislation (*Law*, *Enactment*), and which of the two chambers debated the bill first, referred to as *First Council*. By collecting information on the date and time of the final passage vote, we know which chamber was the first voter. When information on the time was unavailable for the Council of States, it was inferred from the time stamps shown on the videos.

Data sources for all variables are documented in the Appendix.

6 Results

All regressions are based on observations from members of the seven parties represented in both chambers. Observations from small parties are dropped because they cannot be compared across chambers. We first report the baseline results on party line deviation, and show that our findings are robust. We then focus on party-level effects. Finally, we analyze the consequences of party cohesion on aggregate voting results and the adoption of legislation.

6.1 Party line deviation

6.1.1 Main Results

Baseline results on party line deviation are reported in Table 2. In column (1) we run a standard least squares regression with independent standard errors and no control variables. We find a

[22] Marital status information is provided on a voluntary basis by legislators. We code unavailable information as unmarried.

[23] Legislators who entered parliament as replacements during the 12/2007-11/2011 legislature and were subsequently elected are coded as serving their first term in the 12/2011-11/2015 legislature.

negative and significant effect of electronic voting on the probability of a legislator deviating from the party line. After the reform, legislators in the Council of States are 2.9 percentage points less likely to vote against the party line. Like the previous description of pre-treatment trends, the pre-reform level of party line deviation is higher in the Council of States than in the National Council.

The remaining four specifications differ by assumptions regarding the standard error: (2) robust standard errors, (3) clustered according to bill, (4) clustered according to legislator, (5) two-way clustered according to bill and legislator. The two-way clustering produces the largest standard error which is why we use this conservative specification throughout all subsequent estimations. Another reason is that it also takes into account that there is a correlation between the decisions of individual legislators and voting behavior on specific bills.

The effect is large in economic terms. Comparing the average deviations in the two chambers before and after the reform, we find that in the Council of States deviations dropped from 9.85% to 5.71%. In the National Council we observe initially fewer deviations than in the Council of States (4.02%) and a decrease to 2.92% after the reform. This decline reflects differences in the type of bills that were debated before and after the reform. Deducting the difference which is not caused by the reform (4.02%-2.92%) from the initial 9.85% observed in the Council of States, the results suggest electronic voting led to a drop in party line deviation in an order of magnitude of one third.

The results are highly robust to various checks as reported in Table 3. The sample contains

Table 2: Probability of party line deviation

	(1)	(2)	(3)	(4)	(5)
VARIABLES	OLS	Robust	Bill cluster	MP cluster	Bill & MP cluster
SR * reform	-0.029***	-0.029***	-0.029***	-0.029***	-0.029**
	(0.004)	(0.005)	(0.011)	(0.010)	(0.014)
SR	0.058***	0.058***	0.058***	0.058***	0.058***
	(0.003)	(0.004)	(0.008)	(0.014)	(0.016)
Reform	-0.011***	-0.011***	-0.011*	-0.011***	-0.011*
	(0.002)	(0.002)	(0.006)	(0.002)	(0.006)
Constant	0.042***	0.042***	0.042***	0.042***	0.042***
	(0.001)	(0.001)	(0.004)	(0.003)	(0.005)
Observations	68,102	68,102	68,102	68,102	68,102
Adjusted R-squared	0.009	0.009	0.009	0.009	0.009

Note: *** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares regressions. Dependent variable is 1 if the legislator deviated from the party line (abstention is not defined as deviation). Specifications (1)-(5) differ regarding assumptions about the standard error.

97% of pre-reform observations in the Council of States. 86% rely on video observations while the rest has been inferred from the aggregate voting results. Observability is crucial when evaluating the effects of vote transparency. Legislators sitting in the corners of the chamber as well as vote counters are potentially less affected by the increase in transparency due to their reduced visibility on videos. We thus rerun the regression only with votes that have been observed on video (column (1)). The size and significance of the effect remain the same.

In column (2) we drop legislators who have more than 10 missing observations to avoid a systematically unbalanced panel. The most likely reason for missing observations is that the legislator was a vote counter, or he was sitting in the corner and possibly not picked up by the camera. Obviously there are no missing observations with electronic voting. This notwithstanding, the presidents of the parliamentary chambers usually do not vote, so we exclude them from our study for the duration of their term of office. Moreover, legislators missing a complete voting session accumulate more than 10 missing votes. The size of the effect decreases to -2.6 percentage points.

In column (3) we drop the legislator behind the electronic voting initiative, This Jenny. A notorious deviator from his party's line (SVP) he had to step down on health grounds before electronic voting was introduced. As suggested by a smaller effect of -2.2 percentage points, his replacement was more loyal to the party.

Table 3: Probability of party line deviation - Robustness

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Observed	Missing	Jenny	Old bills	Timetrend
SR * reform	-0.029**	-0.026*	-0.022*	-0.028*	-0.029**
	(0.014)	(0.014)	(0.011)	(0.016)	(0.014)
SR	0.058***	0.053***	0.051***	0.058***	0.058***
	(0.016)	(0.016)	(0.014)	(0.016)	(0.016)
Reform	-0.011*	-0.011*	-0.011*	-0.011	-0.005
	(0.006)	(0.006)	(0.006)	(0.008)	(0.012)
Timetrend					-0.003
					(0.006)
Constant	0.042***	0.042***	0.042***	0.042***	0.046***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.011)
Observations	67,334	66,874	67,957	56,447	68,102
Adjusted R-squared	0.008	0.008	0.007	0.010	0.009

Note: *** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares regressions. Standard errors in parentheses, two-way clustered at bill and legislator level. Dependent variable is 1 if the legislator deviated from the party line (abstention is not defined as deviation). (1) Based only on observed votes. (2) Excluding legislators with over 25 missed votes. (3) Excluding This Jenny. (4) only bills initiated before 2014. (5) With linear year timetrend.

In column (4) we restrict the votes to bills drafted before 2013. One concern is that electronic voting not only affects voting in the final votes but on preceding votes as well. In this case, bills drafted after the reform would systematically differ from older ones. In our favor, electronic votes are only published for total and final passage votes but not for votes which were cast at the beginning of the legislative process. This reduces the likelihood of differences between old and more recent bills. The significance decreases slightly, which might be a consequence of dropping many post-reform observations.

In Tables 4 and 5 we control for a number of individual and bill-level variables respectively, which possibly have an impact on pre-treatment trends. The main effect remains highly robust to the inclusion of controls. It varies only slightly between -0.028 and -0.033. Some of the variables significantly affect the probability of party line deviation. At individual level, being a man, German-speaking, an officer in the Swiss army, and serving at least a second term is associated with a higher probability of defection from the party platform. No significant effect was found for marital status, higher academic qualifications, the number of interest groups and support for electronic voting. At bill level, we find that voting is more divided for enactments and when the party recommended rejecting the bill as compared to the party lines "yes" and "abstain".

As mentioned earlier, seating arrangements in the chamber might play a role with regard to internal vote visibility, which in turn could affect the probability of deviation. The councilors are spread relatively evenly across the rows. Comparing the mean deviation from the party line prior to the reform reveals that councilors sitting in the front row are most likely to deviate (15.3%), whereas the last row deviates least (5.8%). The observability of the voting decisions of councilors sitting in the front rows does not seem to prevent them from voting against their parties. Since the reform, the means by row decrease but the ranking is preserved. This evidence points to an absence of change in internal vote visibility. It is much more likely that party effects play a role. For example, all SVP members sit in the front, while CVP and FDP councilors sit further back.

Table 4: Controls at individual level

VARIABLES	(1) Female	(2) German	(3) Married	(4) Officer	(5) Doctor	(6) First term	(7) Interest	(8) Electronic	(9) All
SR * reform	-0.030**	-0.029**	-0.029**	-0.030**	-0.029**	-0.029**	-0.029**	-0.033**	-0.033**
	(0.014)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.013)
SR	0.057***	0.058***	0.058***	0.055***	0.058***	0.055***	0.058***	0.065**	0.062**
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.026)	(0.026)
Reform	-0.011*	-0.011*	-0.011*	-0.011*	-0.011*	-0.010	-0.011*	-0.011*	-0.010
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Female	-0.019***								-0.016***
	(0.005)								(0.005)
German		0.011**							0.012**
		(0.005)							(0.006)
Married			-0.001						-0.004
			(0.006)						(0.005)
Officer				0.021**					0.019*
				(0.009)					(0.010)
Doctor					-0.002				-0.009
					(0.008)				(0.008)
First term						-0.016***			-0.022***
						(0.006)			(0.006)
Interest groups							-0.001		-0.005
							(0.003)		(0.004)
Support electronic								-0.005	-0.011
								(0.027)	(0.026)
Constant	0.047***	0.034***	0.042***	0.038***	0.042***	0.048***	0.044***	0.042***	0.055***
	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.008)	(0.005)	(0.010)
Observations	68,102	68,102	68,102	68,102	68,102	68,102	68,102	66,855	66,855
Adjusted R-squared	0.011	0.010	0.009	0.011	0.009	0.011	0.009	0.010	0.015

Note: *** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares regressions. Standard errors in parentheses, two-way clustered at bill and legislator level. Dependent variable is 1 if the legislator deviated from the party line (abstention is not defined as deviation).

Table 5: Controls at bill level

VARIABLES	(1) Bill gov.	(2) Enactment	(3) SR first	(4) NR votes first	(5) Pop. initiative	(6) Party no	(7) All
SR * reform	-0.029**	-0.029**	-0.029**	-0.029**	-0.029**	-0.028**	-0.028**
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)
SR	0.058***	0.058***	0.058***	0.058***	0.058***	0.065***	0.065***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)
Reform	-0.012*	-0.011*	-0.011*	-0.013**	-0.011*	-0.012*	-0.014**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Gov. bill	0.014*						0.012
	(0.008)						(0.008)
Enactment		0.015**					0.017**
		(0.007)					(0.009)
First council			0.000				-0.003
			(0.006)				(0.006)
First voter				-0.021			-0.020
				(0.023)			(0.023)
Pop. initiative					-0.010		-0.035***
					(0.009)		(0.012)
Counter proposal					-0.004		-0.024*
					(0.013)		(0.014)
Party no						0.100***	0.101***
						(0.016)	(0.016)
Constant	0.030***	0.035***	0.042***	0.063***	0.043***	0.024***	0.032
	(0.007)	(0.005)	(0.006)	(0.023)	(0.005)	(0.006)	(0.020)
Observations	68,102	68,102	68,102	68,102	68,102	68,102	68,102
Adjusted R-squared	0.010	0.010	0.009	0.010	0.009	0.042	0.046

Note: *** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares regressions. Standard errors in parentheses, two-way clustered at bill and legislator level. Dependent variable is 1 if the legislator deviated from the party line (abstention is not defined as deviation).

6.1.2 Alternative Definitions of Party Line

In keeping with the literature, we defined the party line as whatever the majority of party members has voted for. On the one hand, this definition is intuitive as the party majority should be a good measure of party ideology. Moreover, descriptives showed that parties tend to vote relatively cohesively, with an average of 95.4% party members voting for the same alternative. On the other hand, party lines with narrow majorities can potentially signal some form of party disagreement. We therefore run alternative specifications in which we define the party line according to majority cutoffs of c% with $c \in \{90, 80, 67, 50\}$. As a consequence, we exclude votes with party majorities below the cutoff. Results are reported in columns (1) to (4) in Table 6. We find that the size of the estimated effect increases in absolute terms the more loosely the party line is defined, but the negative effect is robust throughout the various cutoffs.

In a similar vein as Levitt (1996), we also run a regression specifying the party line as whatever

Table 6: Alternative definitions of party line

VARIABLES	(1) 90%	(2) 80%	(3) 67%	(4) 50%	(5) Party boss
SR * reform	-0.019**	-0.022**	-0.028**	-0.029**	-0.021
	(0.009)	(0.011)	(0.012)	(0.013)	(0.014)
SR	0.042***	0.050***	0.057***	0.059***	0.035*
	(0.009)	(0.012)	(0.013)	(0.015)	(0.018)
Reform	0.001	0.000	-0.004	-0.010*	-0.012
	(0.001)	(0.002)	(0.003)	(0.006)	(0.011)
Constant	0.003***	0.009***	0.021***	0.037***	0.068***
	(0.001)	(0.001)	(0.003)	(0.005)	(0.009)
Observations	55,700	60,855	64,470	67,507	68,052
Adjusted R-squared	0.020	0.016	0.013	0.010	0.003

Note: *** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares regressions. Standard errors in parentheses, two-way clustered at bill and legislator level. Dependent variable is 1 if the legislator deviated from the party line (abstention is not defined as deviation). Party line in (1)-(4) is defined as what 90, 80, 67, or 50% of party members vote for. In (5) the party line is defined according to how the party leader voted.

the party leader has chosen. The coefficient becomes insignificant, which is of little surprise. As explained above, party leaders are less dominant political figures in Switzerland compared to their counterparts in other countries. This means that on certain decisions even party leaders deviate from party lines.

In a last approach to support the validity of our definition of party line, we compare our inferred party lines with official party recommendations for popular initiatives.[24] Prior to referendum votes on popular initiatives, parties and interest groups officially issue voting recommendations to the electorate. It is reasonable to argue that such recommendations reflect the party line.

For all 31 popular initiatives debated and concluded during the 2011-2015 term, we find that the voting recommendation coincides with our measure of party line. The decision of the party majority is a good representation of the party platform.

6.1.3 Electoral Cycles

The literature contends that impending elections have an impact on party discipline (e.g., Levitt 1996; Lindstädt, Slapin & Vander Wielen 2011). As parties seek to present a united front to prospective voters and offer a strong party platform during the campaign trail, party cohesion increases in election years. Traber, Hug and Sciarini (2014) provide supportive empirical evidence

[24] The popular initiative is a direct democratic instrument which allows any eligible citizen to propose changes to the federal constitution upon collecting 100,000 signatures within 18 months. Parliament is legally obliged to debate the initiative, a potential compromise, and a counter-proposal.

from the National Council. Their finding is in accordance with the negative reform coefficient in most of our regressions. If the electoral cycle was identical for both chambers, it would not pose a problem to our research design, which is based on DiD estimation. However, if the cycle differed according to chamber, e.g. because of different election rules, the estimated effect of electronic voting could be due in part to the electoral cycle. It is in our favor, however, that the reform does not coincide with the election year.

To address the issue of election cycles, we conduct placebo regressions with all final passage votes taken during the preceding legislative period (12/2007-11/2011). Throughout the term, neither chamber implemented changes to their voting procedures that affected transparency. Again, we apply the same procedure for inferring unobserved votes in the Council of States as explained in the data section. We restrict the sample to six parties since the BDP did not exist at the beginning of this legislative period.[25] We construct a placebo reform in 03/2010 which corresponds to the timing of the real reform that occurred during the subsequent legislative period. Table 7 shows the results. The placebo reform has no significant effect on the probability of party line deviation (the coefficient is even positive).

Additionally, we run a triple difference regression using the difference in the preceding legislative period as the third difference. The results are shown in Table 8. It is of little surprise that the

Table 7: Election cycles: placebo legislature 2007-2011

	(1)	(2)	(3)	(4)
VARIABLES	Placebo 2007/11	Without BDP	Timetrend	Party timetrends
SR * placebo reform	0.011	0.011	0.010	0.020
	(0.014)	(0.014)	(0.014)	(0.013)
SR	0.038**	0.039**	0.038**	0.047***
	(0.015)	(0.016)	(0.015)	(0.014)
Placebo reform	-0.002	-0.002	0.006	0.004
	(0.006)	(0.006)	(0.010)	(0.010)
Constant	0.038***	0.038***	0.044***	0.042***
	(0.004)	(0.004)	(0.010)	(0.010)
Observations	65,184	63,867	65,184	65,184
Adjusted R-squared	0.006	0.007	0.007	0.033

Note: *** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares regressions. Standard errors in parentheses, two-way clustered at bill and legislator level. Dependent variable is 1 if the legislator deviated from the party line (abstention is not defined as deviation). Observations based on final passage votes 2007-2011. The placebo reform corresponds to the timing of the actual reform in the third session of the legislative period. The BDP is dropped in (2). Linear year timetrend (3) and party timetrend (4) included.

[25] We start by repeating our baseline with the reduced number of parties for the original votes in the 2011-2015 legislature. Dropping the BDP, which is a small party, does not affect the main results.

Table 8: Election cycles: triple difference

VARIABLES	(1) DiDiD	(2) Without BDP	(3) Timetrend	(4) Party timetrends
SR * reform * 49th legislature	-0.040*	-0.040*	-0.040*	-0.038**
	(0.020)	(0.021)	(0.020)	(0.019)
SR * reform	0.011	0.011	0.011	0.019
	(0.014)	(0.014)	(0.014)	(0.013)
SR * 49th legislature	0.020	0.020	0.020	0.019
	(0.016)	(0.016)	(0.016)	(0.014)
Reform * 49th legislature	-0.009	-0.010	-0.009	-0.007
	(0.009)	(0.009)	(0.009)	(0.009)
SR	0.038**	0.039**	0.038**	0.046***
	(0.015)	(0.016)	(0.015)	(0.014)
Reform	-0.002	-0.002	0.005	0.002
	(0.006)	(0.006)	(0.009)	(0.008)
49th legislature	0.004	0.005	0.003	0.005
	(0.006)	(0.006)	(0.006)	(0.006)
Constant	0.038***	0.038***	0.044***	0.041***
	(0.004)	(0.004)	(0.008)	(0.008)
Observations	133,286	129,095	133,286	133,286
Adjusted R-squared	0.008	0.008	0.008	0.027

Note: *** p<0.01, ** p<0.05, * p<0.1. Difference - in - difference - in - difference. Ordinary least squares regressions. Standard errors in parentheses, two-way clustered at bill and legislator level. Dependent variable is 1 if the legislator deviated from the party line (abstention is not defined as deviation). Observations based on final passage votes 2007-2011. The placebo reform corresponds to the timing of the actual reform in the third session of the legislative period.

coefficients are negative and the suggested effect is larger in absolute terms than before.

The results prove robust even when election cycles are taken into account: the placebo regression is insignificant, and taking the triple difference still shows that the transparency reform has had a significant effect.

6.2 Who drives the effect?

The results and robustness checks indicate that on average party discipline in final passage votes improved since the recording of individual decisions. However, there is a possibility that the effect differs across parties.

Table 9 shows the results of our baseline regression for each of the parties separately.[26] The treatment effect is significantly negative for three of the parties: SP (1), glp (3) and SVP (6). The average effect for the SP and SVP is economically large. Deviation from the party line decreases by 4.9 and 11.5 percentage points respectively with recorded voting. The SP and the SVP are

[26] It is impossible to repeat the regression for the subsample of legislators belonging to the BDP due to an insufficient number of observations.

Table 9: Results by party

VARIABLES	(1) SP	(2) GPS	(3) glp	(4) CVP	(5) FDP	(6) SVP
SR * reform	-0.049**	-0.021	-0.023*	0.000	-0.026	-0.115***
	(0.022)	(0.015)	(0.013)	(0.009)	(0.019)	(0.043)
SR	0.081***	0.067***	0.049***	0.001	0.049***	0.275***
	(0.019)	(0.011)	(0.010)	(0.008)	(0.014)	(0.042)
Reform	-0.007	-0.005	-0.001	-0.003	-0.004	-0.030**
	(0.009)	(0.008)	(0.001)	(0.010)	(0.009)	(0.015)
Constant	0.023***	0.027***	0.003**	0.030***	0.032***	0.088***
	(0.007)	(0.008)	(0.001)	(0.007)	(0.007)	(0.012)
Observations	16,229	4,740	4,092	11,849	11,702	16,616
Adjusted R-squared	0.022	0.012	0.027	-0.000	0.008	0.050

Note: *** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares regressions. Standard errors in parentheses, two-way clustered at bill and legislator level. Dependent variable is 1 if the legislator deviated from the party line (abstention is not defined as deviation). The effects are estimated for party subsamples. Estimations with the BDP alone are impossible due to the violation of rank conditions.

the two dominant parties at either end of the political spectrum. With the exception of the glp, which exhibited a 2.3 percentage point decline in deviations, there is little change among the center parties.

Table 10 provides an overview of party lines by political party. In total, the party line is "Yes" in almost 85% of all votes, reflecting that legislation is usually accepted at the final passage vote. Only very rarely is abstention the party line. Given that the SP and the SVP drive the overall negative effect of recorded voting, we take a closer look at these parties. Comparing shares of party lines for the SP with the overall average reveals that the SP is an "average" party in this regard.

The SVP is an exception: it has an almost equally divided number of votes with a supporting and an opposing party line respectively. It is thus the party most likely to reject legislation at the final stage. Evaluating the individual voting decisions of SVP members in the Council of States reveals that roughly 95% of all deviations from the party line were yes votes. This means that SVP members in the Council of States voted yes even though their party line was to reject the bill. Given that SVP legislators in the Council of States have more frequently voted in accordance with their party line since the introduction of vote recording, they are more likely to oppose legislators from the other parties. Indeed, there is now a greater tendency by the SVP to assume an opposition role in the Council of States, just as it already does in the National Council.

Table 10: Party lines by parties in %

Party	BDP	CVP	FDP	GPS	SP	SVP	glp	Total
Yes	96.84	95.79	92.63	80.00	84.21	49.47	92.98	84.56
No	2.46	3.16	7.37	16.14	12.63	45.26	6.32	13.33
Abstain	0.70	1.05	0	3.86	3.16	5.26	0.70	2.11

NOTE: Share of party lines "Yes", "No" and "Abstain" by party and vote. Based on all 299 final passage votes in the 2011-2015 legislative period.

6.3 Consequences of Electronic Voting Records: Aggregate Voting Results

Does the increase in cohesive party voting have an effect on aggregate voting results? The focus of our study are final passage votes. To pass legislation in Switzerland, both chambers require a larger number of yes than no votes. During the 2011-2015 legislative period only four of the 299 bills were rejected (in three cases they failed to receive majority support in the National Council). Therefore, the passage of legislation is more the rule than the exception. Final passage votes come at the end of a sometimes protracted legislative process. Bills that are unlikely to garner a majority of votes are dismissed much earlier and never reach the final stage. Conclusively, recording individual decisions from final votes does not have an effect at the extensive margin of acceptance or rejection of legislation.

We investigate whether changes occurred at the intensive margin of bill acceptance in the chambers measured by the share of yes votes and conventional measures of agreement, $Agreement_{ic}$ in vote i in chamber c. We run a DiD regression of the following form:

$$Agreement_{ic} = \alpha + \beta_1 CoS_{ic} \times Transparency_{ic} + \beta_2 CoS_{ic} + \beta_3 Transparency_{ic} + \epsilon_{ic}$$

The dependent-variable share of yes votes, the Rice Index and the Agreement Index show no difference before and after electronic voting.[27]

Results are shown in Table 11. Coefficients in specifications (1)-(4) are highly insignificant. The share of votes accepted unanimously in the Council of States, however, drops from 62.5% before electronic records, to 47.3% afterwards. In the National Council this measure dropped from 20.8% to 17.5%. While the coefficient in (5) suggests a decrease in unanimity in the Council of States by almost 12 percentage points, the effect is narrowly insignificant at conventional significance levels.

[27] Y_i, N_i, and A_i are the aggregate numbers of yes, no votes and abstentions in vote i respectively. The Rice index (Rice 1928) is defined as $Rice_i = \frac{|Y_i - N_i|}{Y_i + N_i}$. The Agreement Index (Hix, Noury & Roland 2005) takes abstentions into account: $Agreement_i = \frac{max\{Y_i, N_i, A_i\} - \frac{1}{2}[(Y_i + N_i + A_i) - max\{Y_i, N_i, A_i\}]}{Y_i + N_i + A_i}$.

In sum, we do not find any significant changes in aggregate voting results caused by a decline in party line deviations - neither at the intensive nor the extensive margin. The lack of changes at the intensive margin might reflect the increase in no votes from the opposition, offsetting more unified voting in the remaining parties.

Table 11: Aggregate measures of unity

VARIABLES	(1) % Yes	(2) % Yes	(3) Rice	(4) Agreement	(5) Unanimous
CoS * reform	-0.013	-0.030	-0.024	-0.044	-0.119
	(0.021)	(0.022)	(0.042)	(0.033)	(0.074)
CoS	0.126***	0.135***	0.250***	0.201***	0.417***
	(0.014)	(0.015)	(0.029)	(0.023)	(0.049)
Reform	0.001	0.023	0.000	0.034	-0.033
	(0.017)	(0.017)	(0.034)	(0.026)	(0.046)
Constant	0.812***	0.770***	0.625***	0.656***	0.208***
	(0.012)	(0.012)	(0.023)	(0.018)	(0.031)
Observations	598	598	598	598	598
Adjusted R-squared	0.173	0.165	0.174	0.166	0.150

Note: *** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares regressions. Robust standard errors in parentheses. Variables at chamber-vote level. Dependent variables: (1) yes votes as share of total yes and no votes; (2) yes votes as share of all votes; (3) Rice Index; (4) Agreement Index; (5) unanimity takes on value 1 if no councilor voted no in a chamber, and 0 otherwise.

7 Concluding Remarks

The introduction of electronic voting and the publication of individual voting records has increased vote transparency in the Council of States, Switzerland's upper house in parliament. We find that unitary party voting increased with greater vote transparency. This outcome suggests that parties are the more important principals for legislators. Constituencies, on the contrary, seem to have a weaker influence on individual decisions. However, our study allows us to conclude that parties rather than voters are of *relatively* greater importance to legislators. It is possible, though, that the two countervailing effects partly offset each other.

In the short term, parties are the main beneficiaries of electronic voting as they gain from having more disciplined party members. Our result contrasts in part with accounts from Latin America accumulated by Carey (2009). His evidence from interviews was that electronic voting typically benefits the constituencies. One reason for this difference might lie in the relatively short time that has passed since the introduction of electronic voting.

Our findings are in line with Stadelmann, Portmann and Eichenbergers' (2014) results indicating no change in electoral representation once video records of session have become available. Potentially, voters are still unaware that a new source of information about their legislators exists, or find it too cumbersome to access. The coming legislative period will show whether voters will play a stronger principal role than parties.

A limitation of our findings is that transparency only increased for final passage votes. The remaining votes are subject to the old regulation which only permits voting records to be published if requested by at least 10 councilors. As we have shown above, the voting records published to date are relatively inconsequential in terms of policy outcomes. This might change in the future if spill-overs from recorded voting start affecting decisions on other votes too.

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Appendix

Example Ideological Voting

In a one-dimensional policy space, the literature points to the problem that some observed votes can be rationalized by either party pressure or autonomous legislator voting. Borrowing an example from McCarty, Poole and Rosenthal (2001), suppose two parties L (left) and R (right) have no ideological overlap. If politicians vote honestly on a right-leaning bill without party pressure, the bill might get rejected with all leftists and some moderate rightists opposing it. Under party pressure all rightists would accept the bill. However, the voting outcome also could be generated by seemingly ideological voting with a cutpoint[28] located between the moderates of each party.

A graphical representation of both votes can be found in Table 12. The vertical lines represent the cutpoints. Example 1 shows that legislators 1-4 would ideally reject the bill. However, the vote in Example 2 could be rationalized as either ideological voting (party ideology and individual ideology overlap) or legislator 4 being pressured to vote according to party line. Finding changes in the cutpoint therefore does not allow to conclude that party pressure has changed (Krehbiel 2000).

Table 12: Examples of ideological and party voting

	Example 1						Example 2					
Legislator	1	2	3	4	5	6	1	2	3	4	5	6
Party	L	L	L	R	R	R	L	L	L	R	R	R
Vote	N	N	N	N	Y	Y	N	N	N	Y	Y	Y

NOTE: Legislators from parties L (left) and right (R) vote on right bill. The cutpoint in Example 2 can be rationalized by perfect ideological party voting. Alternatively, it can be explained by party pressure making the moderate legislator 4 switch from rejecting the bill to accepting it.

[28] Cutpoints separate "yes" from "nay" voters on one-dimensional votes.

Data sources

Table 13: Overview of Variables and Data Sources

Variable	Source(s)	Description
Voting results Council of States	Videos through Amtliches Bulletin	yes, no, abstain, absent, excused
Voting results National Council	smartmonitor until summer 2014, thereafter Amtliches Bulletin	yes, no, abstain, absent, excused
Aggregate voting results	Amtliches Bulletin	Official aggregate yes, no, abstain, absent, excused for Council of States and National Council
Bill-related information	Amtliches Bulletin, Curia Vista	type of bill, type of legislation. first council, voting day and time, initiative/counter proposal
Election results	Swiss Statistical Office	Elected/not elected, number of votes received
Legislators' personal information	Parliament homepage	gender, birthday, party, party group, canton, academic degree, military rank, marital status

Note: This table provides an overview of the variables used with a short variable description, and the source from which it was retrieved.
Academic qualification, military rank, and marital status may vary over time. These variables were collected in September 2015 and thus reflect the status at that point in time. Marital status information is provided on a voluntary basis by legislators.