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Abstract

We examine whether compulsory voting influences habit-formation in voting. In Austria, some states temporarily introduced compulsory voting in national elections. We exploit border municipalities across two states that differ in compulsory voting legislation using a difference-in-differences and a difference-in-discontinuity approach. We investigate the long-term effects of compulsory voting on voter turnout, invalid votes and vote shares for left-wing and right-wing parties. The results show that compulsory voting increased voter turnout by 3.4 percentage points. When compulsory voting was abolished, voter turnout, however, returned to the pre-compulsory voting level. The results also do not suggest that compulsory voting influenced invalid votes and vote shares of left-wing and right-wing parties asymmetrically. We conclude that compulsory voting was not habit-forming.

JEL-Codes: D720, P100.

Keywords: compulsory voting, voter turnout, party vote shares, difference-in-discontinuity design, habit-formation, Austria.

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1 Introduction

Voter turnout has declined in many industrialized countries. In German and Austrian general elections, for example, voter turnout decreased from about 90 percent in the 1970s to around 70 percent in the 2000s. An important issue to be investigated is whether electoral institutions such as compulsory voting influence voter turnout. Compulsory voting has been shown to increase voter turnout (Hirczy, 1994; Lijphart, 1997; Mackerras and McAllister, 1999; Fowler, 2013; Ferwerda, 2014; Bechtel et al., 2015, 2017; de Leon and Rizzi, 2016; Hoffman et al., 2017). Countries with compulsory voting include, for example, Australia, Luxembourg, Belgium and countries in Latin America.

Scholars examine how compulsory voting influences voter turnout and party vote shares and elaborate on voting as a habit-forming process. There is, however, only a single study examining how compulsory voting influences habit-formation in voting: Bechtel et al. (2017) investigate over 20 years of compulsory voting in federal referendums in the Swiss canton of Vaud between 1900 and 1970. The hypothesis to be investigated is that compulsory voting is habit-forming: in the course of compulsory voting, voters get used to participating in elections. Successful habit-formation would imply that citizens continue to take part in elections even when compulsory voting is abolished. When getting used to participating in elections, some voters may also rediscover voting as a civic duty. By using a synthetic control group design and a difference-in-differences estimator, Bechtel et al. (2017) find small spillover effects into other forms of political participation (voter turnout in federal elections and cantonal referendums), but do not find evidence of habit-formation. There is, however, no study yet examining whether the composition of voters changed when compulsory voting was introduced and abolished, i.e., asymmetrical (de)mobilization effects.

We investigate the effects of compulsory voting on voter turnout, invalid votes and party vote shares using municipality-level data from Austria between 1975 and 1999. After World War II, the nine Austrian state governments were allowed to introduce compulsory voting in national elections. Styria, Vorarlberg and Tyrol introduced compulsory voting in 1949, Carinthia followed in 1986. In 1992, compulsory voting in national elections was abolished at the federal level and overwrote state law. We exploit that (a) Carinthia had compulsory voting over the period 1986-1992 (but not before and afterwards) and (b) shares a border with Salzburg which never had compulsory voting. We apply a difference-in-differences and a difference-in-discontinuity design to border municipalities of the states of Carinthia (compulsory voting over the period 1986-1992) and Salzburg (no compulsory voting). We exploit that municipalities close to the state border are similar in terms of unobservable characteristics. The effect of compulsory voting is identified as the difference in the spatial state-border discontinuity in voter turnout, invalid votes and party vote shares before, under, and after compulsory voting. We investigate whether the effects of the introduction and abolition are similar in magnitude to estimate the effect of habit formation.

Our contribution is twofold. Firstly, compared to the closely related study of Hoffman et al. (2017), we use municipality-level data instead of state-level data and explore municipalities in the border region only. Adjacent municipalities in the border region are fairly more comparable in unobservable characteristics than the average of all municipalities in Carinthia and Salzburg. The border region we use is alpine and rural in both states. The alpine border reduces concerns about self-selection into treatment; citizens cannot move easily between Carinthia and Salzburg, if they disagree with compulsory voting. Secondly and most importantly, we examine how both introducing and abolishing compulsory voting influenced voter turnout, invalid votes and vote shares of left-wing and right-wing parties. Corroborating the results of Bechtel et al. (2017), we find that when compulsory voting was abolished, voter turnout de-

creased to the same extent as it had increased when compulsory voting was introduced (around 3 percentage points). This result does not suggest that compulsory voting was habit-forming in the aggregate. But, even though compulsory voting is not shown to influence voter turnout, it might change the composition of votes. If the introduction and abolition of compulsory voting affects groups of voters differently, compulsory voting might influence habit-forming asymmetrically among individual groups.

Asymmetric mobilization of voters would not be visible in the aggregate by only investigating voter turnout. Examining whether compulsory voting was habit-forming for individual groups would require individual voting data or at least aggregate data for groups of voters (disentangled by gender, age or education) that are not available for our sample. To shed some light on the effect of compulsory voting on sub-groups of voters, we examine whether compulsory voting influenced party vote shares, and hence, whether the sub-groups of left- and right-wing voters were affected asymmetrically. The results however do not suggest that compulsory voting influenced the vote shares of left-wing and right-wing parties and invalid votes. We conclude that compulsory voting was not habit-forming. Politicians may use less mandatory measures such as extending the opening hours of polling stations or prepaid postage (Potrafke and Roesel, 2016; Garmann, 2017; Schelker and Schneiter 2017) if they wish to increase participation in elections.

2 Related Studies

The magnitude of direct compulsory voting effects on voter turnout differs substantially across countries. Early studies use cross-country variation and show that compulsory voting increased voter turnout by about 10 and 13 percentage points (Powell, 1986; Jackman, 1987).

In Australia, compulsory voting drastically increased voter turnout by around 30 percentage points in the 1925 federal elections and by around 24 percentage points in state assembly elections (Hirczy, 1994; Fowler, 2013). In the Swiss canton Vaud, voter turnout increased in referenda during compulsory voting periods by some 30 percentage points (Bechtel et al., 2017). In Argentina, compulsory voting increased voter turnout by 18 percentage points (Jaitman, 2013). In Austria, the abolishment of compulsory voting laws in some Austrian states in 1992 decreased voter turnout in national elections, compared with states that never had compulsory voting, by 8.6 percentage points (Ferwerda, 2014). In a similar vein, Hoffman et al. (2017) investigate parliamentary, state and presidential elections in Austria between 1949 and 2010. The results suggest that voter turnout increased by approximately 10 percentage points. Compulsory voting is expected to increase the share of invalid votes (Hirczy, 1994). Citizens who abstained because they are just not interested in elections or are indifferent in party selection are likely to cast blank ballots that are considered to be invalid votes. In Austria and Australia, compulsory voting increased the share of invalid votes (Hirczy, 1994; Hoffman et al., 2017). The empirical evidence on the effect of compulsory voting on party vote shares is mixed (McAllister, 1986; Pacek and Radcliff, 1995; Nagel and McNulty, 1996; Aguilar and Pacek, 2000; Bohrer et al., 2000; Lutz and Marsh, 2007; Pettersen and Rose, 2007; Rubenson et al., 2007; Fowler, 2013; Ferwerda, 2014; Bechtel et al. 2015; de Leon and Rizzi, 2016; Hoffman et al., 2017).

Compulsory voting might also influence voting habits in the long run. Habitual voting implies that voting today influences the probability of voting in the next election (Brody and Sniderman, 1977; Miller and Shanks, 1996; Green and Shachar, 2000; Plutzer, 2002; Gerber et al., 2003; Fowler, 2006). Empirical studies show that measures such as voting campaigns influenced voting habits. Cutts et al. (2009) find a habit-forming effect of a Get Out The Vote (GOTV) campaign were citizens should be motivated to vote with a phone call or a personal

visit in English local elections. The GOTV campaign increased voter turnout in the year it was conducted by 3 percent and had a habit-forming effect in the subsequent election of 0.5. Hence, voting in the next election was approximately 1.5 percent higher in the treatment group who were part of the GOTV campaign in the previous election, compared to the control group. A similar result is derived by Gerber et al. (2003). A GOTV campaign with direct mail and personal canvassing in general and local US elections had a habit-forming effect of around one half.

Other measures have also been described to be habit-forming. For example, precipitation at the election reduced voter turnout at the current election and also at the next election (Fujiwara et al., 2016). The results show that a 1 percentage point decrease in voter turnout translates to a 0.6 to 1 percentage point decrease in voter turnout in the next election. Meredith (2009) uses a discontinuity at the voting-age restriction and shows that young citizens who were just over 18 in the 2000 U.S. presidential election were more likely to vote again four years later than citizens who were just under 18 and not eligible to vote in 2000. The results suggest a small habit-forming effect: voting in 2000 increased the likelihood of voting in 2004 by 3 to 4.5 percent, while voting in 2004 increased the likelihood of voting in 2006 by 11 to 11.3 percent. Also the first election being one with a usually low or high voter turnout influences future voting behavior (Franklin and Hobolt, 2011). Young individuals were more likely to vote in an election to the European Parliament when they experienced a national election before. Voter turnout was about 6 percentage points lower in elections to the European Parliament when it was the first election for young individuals compared to young individuals who participated in a national election previously.

But why is there a habit-forming effect and voting in one election affects the probability of voting in the subsequent election? The act of voting itself might be habit-forming. On the one

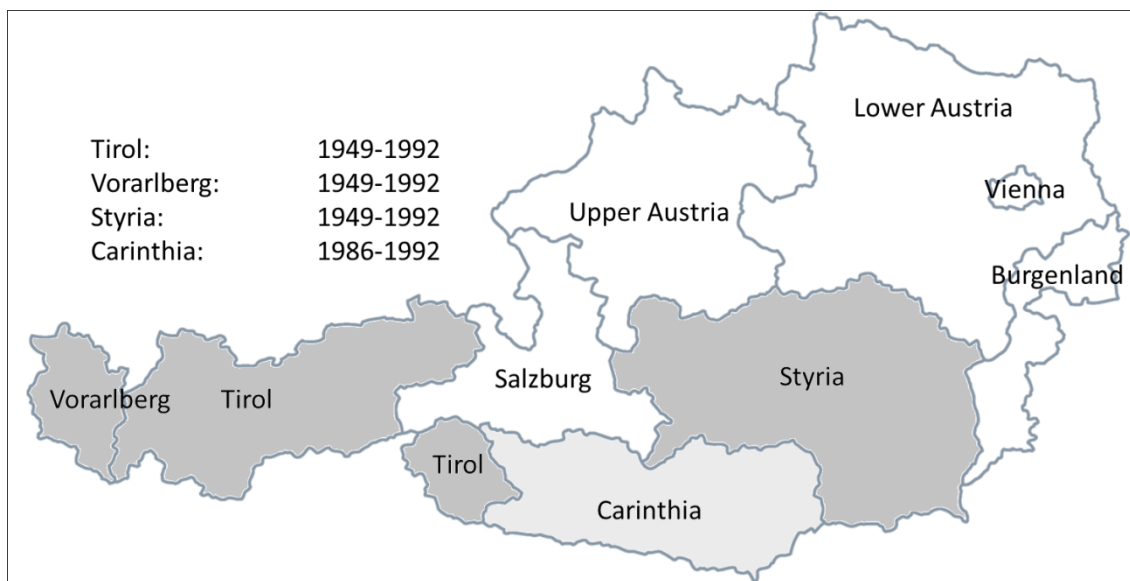
hand, going to the polls decreases the costs of voting in the next election, because voters gain knowledge about the voting procedure and the location of the polling station. On the other hand, voting subtly alters the way how citizens think about themselves. Civic participation confirms and reinforces an identity of having a sense of civic duty (Milbrath, 1965; Coppock and Green, 2016). The more often citizens participate in elections, inertia might set in and voting becomes just “what people like me do on Election Day” (Green and Shachar, 2000, p. 571; Gerber et al., 2003, p. 548; Cutts, 2009, p. 252).

We combine the strands of literature on direct short-term and long-term habit-forming effects of compulsory voting. Our hypotheses to be tested empirically are: (1) compulsory voting directly increased voter turnout; (2) compulsory voting gave rise to persistently higher voter turnout, even after compulsory voting was abolished; (3) compulsory voting increased invalid votes and had asymmetrical mobilization effects, i.e., influenced vote shares of left-wing and right-wing parties asymmetrically in the long run. Compulsory voting may hardly increase the vote shares of right-wing parties because voters of right-wing parties have a more strict sense of civic duty than voters of left-wing parties. When compulsory voting has been abolished, however, right-wing voters may stick more often to participate in elections than left-wing voters. Consequently, the composition of voters has changed in favor of right-wing parties even after compulsory voting is abolished. Left-wing parties may, however, also benefit from compulsory voting. Especially less-educated blue collar voters (who are often not inclined to vote for established conservative parties) may abstain from voting because they are not familiar with the voting procedure. Compulsory voting is likely to induce knowledge and experience how to vote across those low-educated voters (who would have not been interested in politics otherwise). The net effects for either ideological side however are a priori unclear.

3 Institutional Background in Austria

We focus on Austrian national elections.¹ Voting in national elections was compulsory, if directed by state law. Compulsory voting was introduced in 1949 in the states Tyrol, Styria and Vorarlberg. In 1986, Carinthia followed and introduced compulsory voting in parliamentary, presidential, state and local elections. Compulsory voting in national elections was abolished in all Austrian states in 1992 (see figure 1).²

Figure 1: Compulsory voting in national elections, states of Austria



Note: This map shows the states of Austria. Dark grey states had compulsory voting in national elections between 1949 and 1992. In Carinthia (light grey) voting in national elections was compulsory between 1986 and 1992.

The state law of Carinthia declared that fines for non-voting in parliamentary and presidential elections during the period of compulsory voting apply as regulated by federal law. In 1970,

¹ National elections take place on the same day in all Austrian municipalities. As of 2007, the National Assembly is elected for a term of five years (previously: four years). We focus on National elections, because even though the president is the federal head of the state of Austria, he or she mainly administrates ceremonial events such as receptions and addresses of welcome. State elections are held at different points in time across the nine Austrian states.

² There were other reforms of the electoral system. The voting age was reduced in 1949, 1970, 1994. Since the national elections in 2008, citizens have had the right to vote as of the age of at least 16 years. Citizens are allowed to vote at the polling station or to do early voting by using a voting card (Wahlkarte), if they cannot go to the polls on election day. By using the voting card, citizens are allowed to vote in any municipality. Since the parliamentary election in 1990, Austrian citizens living abroad are allowed to participate in elections by using voting cards. Postal voting in national elections was introduced in course of the election in 2008.

federal law introduced a fine of a maximum of 3.000 Schilling (around 750 USD in 2017 prices) and, if not paid, two weeks of imprisonment. There is, however, no information on the exact amount of fines charged, because the responsibility for the enforcement of this law was carried by the authorities of the place of election. There were several exceptions from compulsory voting. Excuses for non-voting included illness, professional commitments or other duties, being outside the state, e.g. due to travelling, urgent family matters, traffic disruption or other compelling circumstances. Due to these various excuses, sanctions were only weakly enforced (International Institute for Democracy and Electoral Assistance, 2016).

Voter turnout decreased in national elections from 97 percent in 1949 to 75 percent in 2013 (Figure 2). In 1945 the electorate was small for two reasons. Firstly, National Socialists were not eligible to vote, and secondly, the majority of war prisoners and evacuees had not yet returned to their home country. In 1949, the electorate increased by around 27 percent compared to 1945. After 1949, the electorate increased quite moderately. The average share of invalid votes was 1.5 percent over the period 1945-2013. The share of invalid votes was especially pronounced in 1990 at almost 3 percent.

The landscape of political parties represented in the national parliament hardly changed between 1945 and the 1970s. The major political parties SPÖ, the Social Democratic Party, and the conservative ÖVP - the Austrian Peoples Party - won a combined total of around 90 percent of the votes in national elections. Vote shares of the individual parties changed dramatically since the 1980s. The vote shares of the SPÖ and ÖVP began to decrease in the 1980s when the Green Party (Grüne) entered the political arena and the populist right-wing Freedom Party of Austria, FPÖ, started to gain a growing amount of electoral support. In the parliamentary election of 2013, SPÖ and ÖVP jointly received only 50 percent of the votes. The populist right-wing FPÖ entered the national parliament in 1949 and has been represented

there ever since.³ Before 1986, the FPÖ had vote shares of around 6 percent. After shifting the political agenda to the far-right and Jörg Haider becoming the chairman of the party in 1986, the FPÖ experienced rising vote shares, reaching a peak of 26 percent in 1999.⁴ Members from two green parties (VGÖ and ALÖ) founded the contemporary Green party of Austria after a defeat in the 1983 election. The vote shares of the Green party vary between 5 percent and 12 percent. Finally, there are few minor parties in Austria.⁵

Figure 2: Voter turnout in national elections in Austria, 1945-2013



³ In the elections of 1949 and 1953 the predecessors of the FPÖ - VdU/WdU ran for mandates.

⁴ The FPÖ has Neo-fascist roots (Ochsner and Roesel, 2016 and 2017).

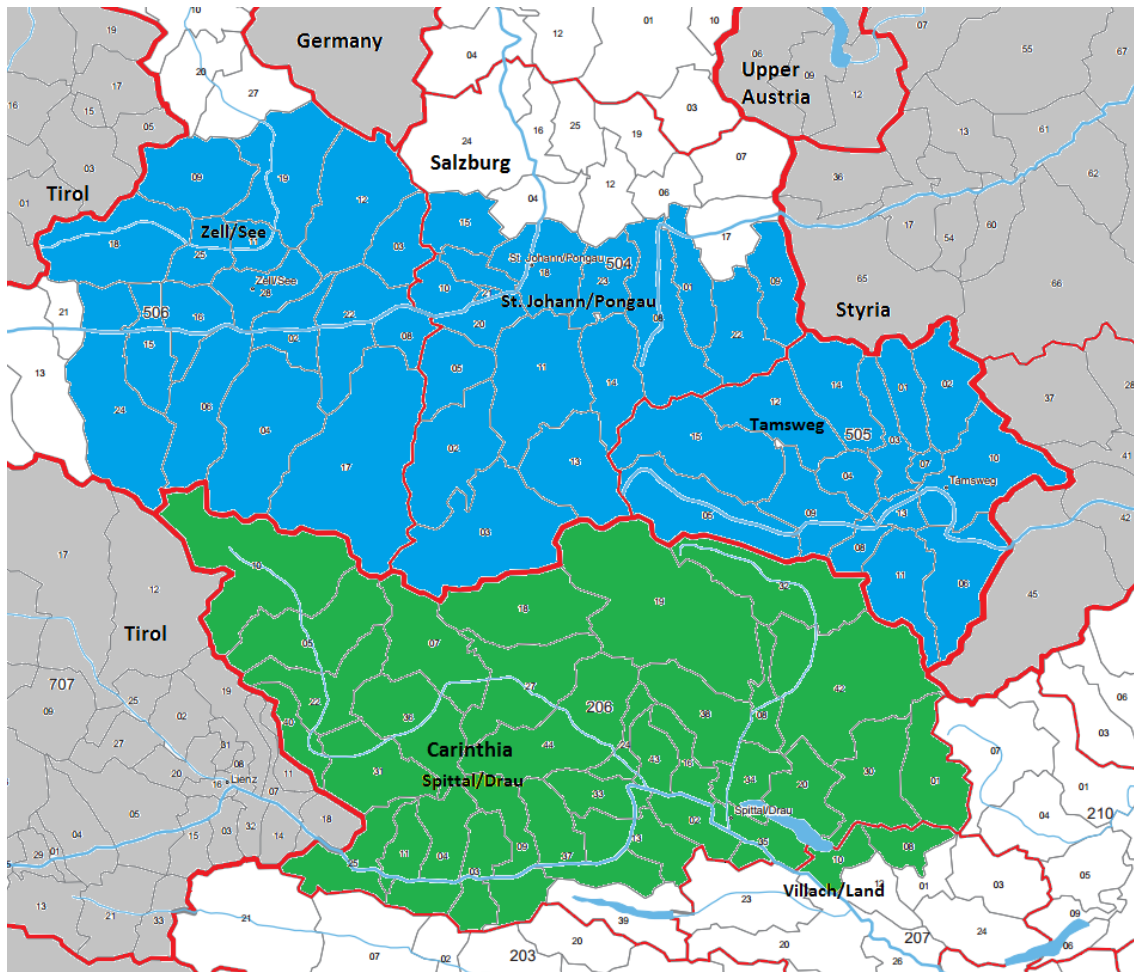
⁵ The left-wing and communist party KPÖ was represented in the National Assembly of the Second Republic between 1945 and 1959. With the election of 1959 the KPÖ became a minor party with a vote share of around 1 percent. Other minor parties represented in the National Assembly during the Second Republic are the liberal LIF (elections 1994, 1995), the nationalist BZÖ (elections 2006, 2008), Team Stornach (election 2013) and the liberal NEOS in an electoral alliance with LIF (election 2013).

4 Empirical Analysis

4.1 Data and Sample

We compare voting behavior in municipalities across the border of the Austrian states of Carinthia and Salzburg. Municipalities in Carinthia are the treatment group, where voting became compulsory in 1986. Carinthia shares a common border with one state where citizens never had any obligation to vote - Salzburg. We use municipalities in Salzburg as the control group. The treatment is the change in the electoral law, namely the introduction of compulsory voting in 1986 and the abolition of compulsory voting in 1992. The time periods for the treatment period are the two national elections under compulsory voting in Carinthia, 1986 and 1990. As the period without any treatment, we use three elections before and after compulsory voting in 1975, 1979, 1983 and 1994, 1995, 1999. The sample includes 31 municipalities in Carinthia and 47 in Salzburg. Figure 3 shows the municipalities in each sample. We consider all municipal mergers since 1945 and transform the data to a consolidated territorial status.

Figure 3: Sample municipalities in Carinthia and Salzburg



Note: Blue municipalities are included in our sample of Salzburg; green municipalities are included in our sample of Carinthia. Grey municipalities are located in other Austrian states or Germany.

The Austrian Federal Ministry of the Interior provided historical brochures for all national elections between 1919 and 2013. We digitalized municipal-level information on the electorate, votes cast, valid and invalid votes and votes per party for each election between 1975 and 1999. We compute voter turnout and party vote shares. Voter turnout is the number of votes cast divided by the number of the electorate, and party vote shares is the proportion of votes per party among all valid votes. Following Hoffman et al. (2017), we label the populist right-wing FPÖ and the conservative ÖVP as right-wing parties, and the Social Democratic

SPÖ and the Green party Grüne⁶ as left-wing parties. Summary statistics of the individual variables are shown in table 1. The maximum voter turnout is above 100 percent, because voters using a “voting card” (*Wahlkarte*) are allowed to cast their vote in any municipality. Citizens may request voting cards if they cannot be in their home municipality at the day of election. In the parliamentary election of 1986, for example, 118,426 votes were not casted in home municipalities in Austria. Out of the 118,426 votes, 11,332 valid voting cards issued in Carinthia were casted in “foreign” municipalities in Carinthia or any other Austrian state (3.3 percent of all valid votes in Carinthia). In Salzburg, 6.150 valid voting cards were issued (2.29 percent of all valid votes in Salzburg). At the municipality level we cannot disentangle direct votes and voting cards. In any event, the share of valid voting cards on all valid votes was small and similar in Salzburg and Carinthia, varying between 2.3 and 5.5 percent. Our sample includes four observations with voter turnout of 99 percentage points and higher: two in Carinthia (Bad Kleinkirchheim and Malta, 1975), two in Salzburg (Schwarzach im Pongau, 1979 and Tweng, 1983) and only one directly at the border (municipality of Malta). Therefore, the voting cards should not influence our inferences.⁷

⁶ Also including the Kärntner Grüne, who run for office in Carinthia in 1986 and ALÖ and VGÖ, the predecessor of the Grüne, who run for office in 1983.

⁷ Inferences do not change when we exclude the four municipalities in which voter turnout was 99 percent and higher. In any event, voters may also use voting cards in other municipalities.

Table 1: Summary statistics

	N	Mean	SD	Min	Max
Voter turnout	624	84.80	5.96	65.28	113.75
Invalid vote share	624	1.34	0.75	0.00	4.30
Left-wing vote share	624	42.24	10.97	13.91	74.00
Right-wing vote share	624	56.22	10.82	24.61	85.51
Carinthia (yes = 1)	624	0.40	0.49	0.00	1.00
Compulsory voting (yes = 1)	624	0.25	0.43	0.00	1.00
Electorate	624	1,787.35	1,761.68	151.00	11,611.00
Growth rate of electorate	624	0.01	0.01	-0.03	0.07
SPÖ	624	39.95	11.37	13.91	74.00
ÖVP	624	36.26	13.32	8.23	72.85
FPÖ	624	19.96	11.30	1.90	51.47

Note: dummy Carinthia is one for municipalities in Carinthia and zero for municipalities in Salzburg; dummy compulsory voting is one for the years 1986 and 1990 and zero otherwise.

4.2 Identification Strategy

We use adjacent border municipalities in the states of Carinthia (temporary compulsory voting) and Salzburg (no compulsory voting) to identify the effects of compulsory voting in a difference-in-differences (DD) model. The advantage of including only municipalities close to the border, and not Salzburg and Carinthia as a whole, is that adjacent border municipalities are more comparable in terms of unobserved characteristics than state averages. The border region between Salzburg and Carinthia is alpine and rural. The alpine border reduces concerns about self-selection into treatment; citizens cannot move that easily between Carinthia and Salzburg, if they disagree with compulsory voting.

Our main identification assumption is that voting in border municipalities in the state of Carinthia would have evolved like border municipalities in Salzburg in the absence of compulsory voting. The common trend assumption describes that there is no interaction between groups and time, except for the treatment. In other words, in the absence of compulsory voting, border municipalities in both states should experience the same trend, which should be distinct for the municipalities in Carinthia under compulsory voting in the national elections

in 1986 and 1990. The common trend assumption cannot be tested but evaluated graphically. Figure 4 shows voter turnout, invalid votes and party vote shares in national elections between 1975 and 1999 for the municipalities in Salzburg and Carinthia. We highlight the elections under compulsory voting in Carinthia. In the national elections in 1975, 1979 and 1983, voter turnout in the municipalities close to the border between Carinthia and Salzburg was around 90 percent. Figure 4 indicates that the common trend assumption seems to be met. Voter turnout in the border municipalities in Salzburg followed the same trend as voter turnout in the border municipalities in Carinthia in the elections between 1986 and 1999. While voter turnout started to decline in the parliamentary election in 1986 in Salzburg, voter turnout in Carinthia increased in 1986. Hirczy (1994) concludes “that the decline in 1990 was a national problem and that Carinthia benefited from a sustained impact of mandatory voting” (p. 74).

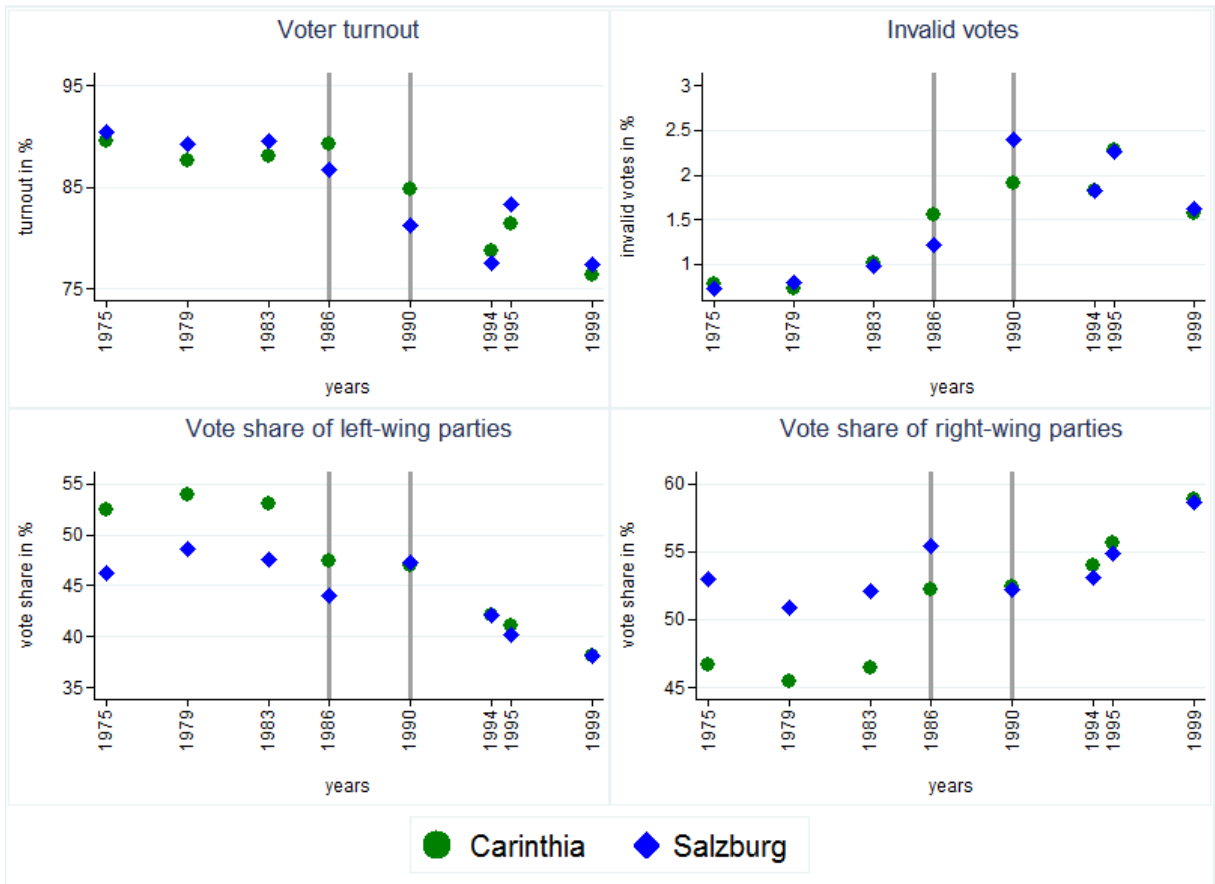
Figure 4 does not suggest that compulsory voting increased the share of invalid votes in the border municipalities between Carinthia and Salzburg. The municipalities in Salzburg and Carinthia followed a common trend in the elections prior to 1986. The share of invalid votes subsequently increased in Carinthia to a larger extent than in Salzburg in 1986, but this relationship reversed in 1990.

The common trend assumption seems also to be fulfilled for party vote shares before 1986. The vote share for left-wing and right-wing parties stagnated between 1975 and 1983. In 1986, the vote share of left-wing parties started to decline, whereas the vote share of right-wing parties increased. The vote share of left-wing parties stagnated in Carinthia but somewhat increased in Salzburg over the period 1986-1990.

Another key identification assumption is that sorting into treatment was exogenous. A major concern might be that previous voting behavior may have influenced introducing compulsory voting in Carinthia. Carinthia introduced compulsory voting when voter turnout was high and

constant at around 91 percent (voter turnout in national elections was between 91 percent and 92 percent over the period 1959-1983). Thus, the law was not changed to respond to decreasing voter turnout, but compulsory voting was rather intended to increase democratic legitimacy (Ferwerda, 2014, p. 243). The federal government decided to abolish compulsory voting in 1992 and hence the individual characteristics of municipalities in Carinthia are unlikely to have influenced the abolition of compulsory voting. We also focus on municipalities close to the border between Carinthia and Salzburg only. The change in the voting law was likely to be exogenous: the municipalities close to the border do not have a large political power. For example, the 31 Carinthian municipalities close to the border to Salzburg accounted only for approximately 15 percent of the electorate in Carinthia in 1986. Furthermore, Carinthia did not experience other changes in the electoral law at the same time. Thus, our treatment effect should not be influenced by policy changes other than compulsory voting.

Figure 4: Voter turnout, invalid votes and party vote shares in national elections (1975-1999)



We estimate a difference-in-differences (DD) model that takes the following form:

$$Y_{it} = \alpha_i + \theta_t + \gamma(Ca_i \cdot CV_t) + X'_{it}\lambda + \epsilon_{it} \quad (1)$$

where Y_{it} describes voter turnout, invalid votes, or the party vote share of left-wing and right-wing parties in municipality i and in election t (1975-1999). Ca_i is a dummy that takes on the value 1 for Carinthian municipalities, and 0 for municipalities in Salzburg. CV_t is a dummy variable that equals 1 for the elections of 1986 and 1990, and 0 otherwise. $(Ca_i \cdot CV_t)$ measures the interaction and γ will thus estimate the treatment effect. We also include municipality fixed effects α_i , year fixed effects θ_t and a vector of control variables X'_{it} . We use the number of the electorate and the average annual growth rate of the electorate to control for

municipality size and economic growth. The fixed effects account for different idiosyncratic effects. Year fixed effects, for example, absorb a national trend to implement or abolish compulsory voting, which is municipality invariant but year specific. Municipality fixed effects capture differences between Salzburg and Carinthia that are time invariant. We estimate the model by Ordinary Least Squares (OLS) and standard errors robust to heteroscedasticity (Huber, 1967; White, 1980).

To disentangle the effect of introducing and abolishing compulsory voting on the dependent variables, we modify our baseline model by including dummy variables for the periods before and after compulsory voting:

$$Y_{it} = \alpha_i + \theta_t + \sum_{j=1}^2 \delta_j (Ca_i \cdot time_{j,t}) + X'_{it}\lambda + \epsilon_{it} \quad (2)$$

where $time_{j,t}$ are two dummy variables that identify the periods before ($j = 1$: 1975-1983) and after ($j = 2$: 1994-1999) compulsory voting was in place. δ_j is the corresponding coefficient. δ_1 measures the effect of introducing compulsory voting, δ_2 measures the effect of abolishing compulsory voting. The period of compulsory voting is the reference period and is compared to the period before compulsory voting (δ_1) and to the period after compulsory voting (δ_2).

To estimate a habit-forming effect of compulsory voting on our dependent variables, we investigate whether the difference between the coefficients measuring the introduction (δ_1) and abolishment of compulsory voting (δ_2) is statistically significant different from zero.⁸ If, for example, introducing compulsory voting increased voter turnout by 5 percentage points, and abolishing compulsory voting decreased voter turnout by 2 percentage points, compulsory

⁸ Hence, we test whether the difference between δ_1 and δ_2 from equation (2) is statistically different from zero.

voting would have had a long-term effect on voter turnout. But if voter turnout reacts to the introduction and abolishment of compulsory voting by the same order of magnitude, there is no habit-forming in the aggregate.

We also extend the DD regression by a polynomial that captures the distance of each municipality to the border between Salzburg and Carinthia. We consider municipalities close to the state border because they are close to each other and should be comparable in their unobservable characteristics. Municipalities in Carinthia directly bordering municipalities in Salzburg should, however, be even more comparable; while municipalities situated further away from the border may differ due to their more distant location. Therefore, by including the distance to the border in our empirical model, we put more weight on municipalities close to the border to consider unobserved heterogeneity. Doing so gives rise to the difference-in-discontinuity (DC) model, with the distance to the border as the running variable (Grembi et al., 2016).⁹ The model can also be interpreted as a RDD in a panel framework. Thus, we investigate discontinuities in voter turnout across the state border over time. We estimate the DC regression in a global approach with a linear and quadratic polynomial model.

A placebo specification is used to examine the validity of the difference-in-differences and regression-discontinuity design, whereby the dependent variables in equation (1) and (2) are replaced by an additional outcome measure that should not be affected by the treatment. We use the size of the electorate and growth of the electorate. The results are shown in table 2. Compulsory voting did not influence the electorate and growth of the electorate.

⁹ See for example Grembi et al. (2016) and Foremny and Solé-Ollé (2016) for applications of the Differences-in-Discontinuity estimator and especially Grembi et al. (2016) for a detailed derivation.

5 Results

5.1 Difference-in-differences

The results of the DD model over the entire period, including fixed municipality and fixed time effects, suggest that compulsory voting increased voter turnout by around 3.4 percentage points (table 3, column (1)). The effect is fairly substantial because voter turnout in the border municipalities was already high at around 88 percent in 1983. Column (4) shows the effect of introducing and abolishing compulsory voting. Voter turnout increased by 3.6 percentage points with the introduction of compulsory voting and decreased by 3.2 percentage points with its abolishment.¹⁰ The orders of magnitude of the changes in voter turnout when compulsory voting was introduced and abolished are quite similar. In column (7), we test whether the difference of the two effects is statistically different from zero.¹¹ A positive sign indicates that the effect of the introduction was larger than the effect of the abolishment which would imply that compulsory voting had a persistent effect on voter turnout in the three elections after its abolishment. The difference in the effects, however, does not turn out to be statistically significant. Therefore, the results do not suggest that compulsory voting was habit-forming in terms of participation in elections.

The obligation to vote draws voters to the polls who might be uninterested in elections and their political outcomes. Thus, compulsory voting is expected to increase invalid votes. The results in table 4 column (1), by contrast, do not show that compulsory voting increased invalid votes. The estimated treatment coefficient even has a negative sign, but lacks statistical

¹⁰ The coefficient of the introduction of compulsory voting was multiplied by (-1) for better readability. Since the period with compulsory voting is the base category, the effect of introducing compulsory voting would be negative if voter turnout was lower before compulsory voting was introduced.

¹¹ To calculate the difference between the introduction and abolishment effect, the introduction effect has to be multiplied by (-1), so that for both, the introduction and abolishment the period with compulsory voting is the baseline period. For column (7) this would imply: $3.605 \cdot (-1) - (-3.237) = -0.368 \cdot (-1) = 0.368$.

significance. As we do not see any DD effects in invalid votes, we also do not observe any habit-forming (column (7)).

We now turn to the vote shares of left-wing and right-wing parties. The overall effect of compulsory voting on the party vote share of left-wing parties (SPÖ and Grüne) was slightly negative (column (1) in table 5). Splitting the effect into the introduction and abolishment shows that the party vote share of left-wing parties decreased by 4.7 percentage points when compulsory voting was introduced and decreased further by 1.2 percentage points when compulsory voting was abolished (column (4)). Overall, the left-wing parties lost votes over the entire period. The difference between the two effects is statistically significant (column (7)). The pattern is reversed for right-wing parties (ÖVP and FPÖ). The coefficient estimate of the compulsory voting variable over the entire period is positive and statistically significant (column (1) in table 6). Considering only the introduction of compulsory voting shows that the right-wing party vote share increased by around 4.7 percentage points when compulsory voting was introduced (column (4)), while the vote share of right-wing parties increased even more in the period after compulsory voting was abolished. Regarding the right-wing parties, the difference of the effects is statistically significant (column (7)). The vote shares of left-wing and right-wing parties developed in a coherent way while introducing and abolishing compulsory voting: left-wing parties lost vote shares over the entire period, while right-wing parties gained vote shares. At a first glance, this result indicates that compulsory voting mobilized voters asymmetrically – effects one would not observe by only considering voter turnout as dependent variable. We acknowledge that the difference between the two effects is statistically significant. In any event, we hesitate to interpret the results as habit-formation. Instead, the coherent development might indicate that party vote shares followed unobservable regional trends. When we account for proximity to the Carinthia-Salzburg border, however, habit-

forming effects in party vote shares also lack statistical significance, an issue that is discussed in some more detail below.

5.2 Difference-in-discontinuities

We now take municipalities' distances to the border into account by extending the analysis to a difference-in-discontinuities estimation. Figure 5 shows voter turnout, invalid votes and vote shares of left-wing and right-wing parties in the periods before, during and after compulsory voting, while the municipalities are ordered by their distance to the state border. The difference in party vote shares on both sides of the border seems to vanish, the closer the municipalities are to the border.

The results of the DC models corroborate the DD results of compulsory voting on voter turnout. Compulsory voting increased voter turnout by around 3.7 and 2.7 percentage points (table 3 linear DC in column (2) and quadratic DC in column (3)). The effect of introducing compulsory voting on voter turnout is statistically significant in both DC specifications. The effect of the abolishment is statistically significant in the linear DC model (column (5)), but lacks statistical significance in the more powerful quadratic specification (column (6)). The difference in the effects also does not turn out to be statistically significant once the distance to the border is considered. Against the background that the quadratic specification deals with spatial patterns more properly, the results do not suggest that compulsory voting induced habit-formation in terms of voter turnout.

The inferences for invalid votes are unchanged in the linear DC model, the quadratic DC model being the exception (table 4, columns (2), (3), (5), (6)). However, the difference in the effects does not turn out to be statistically significant throughout all specifications.

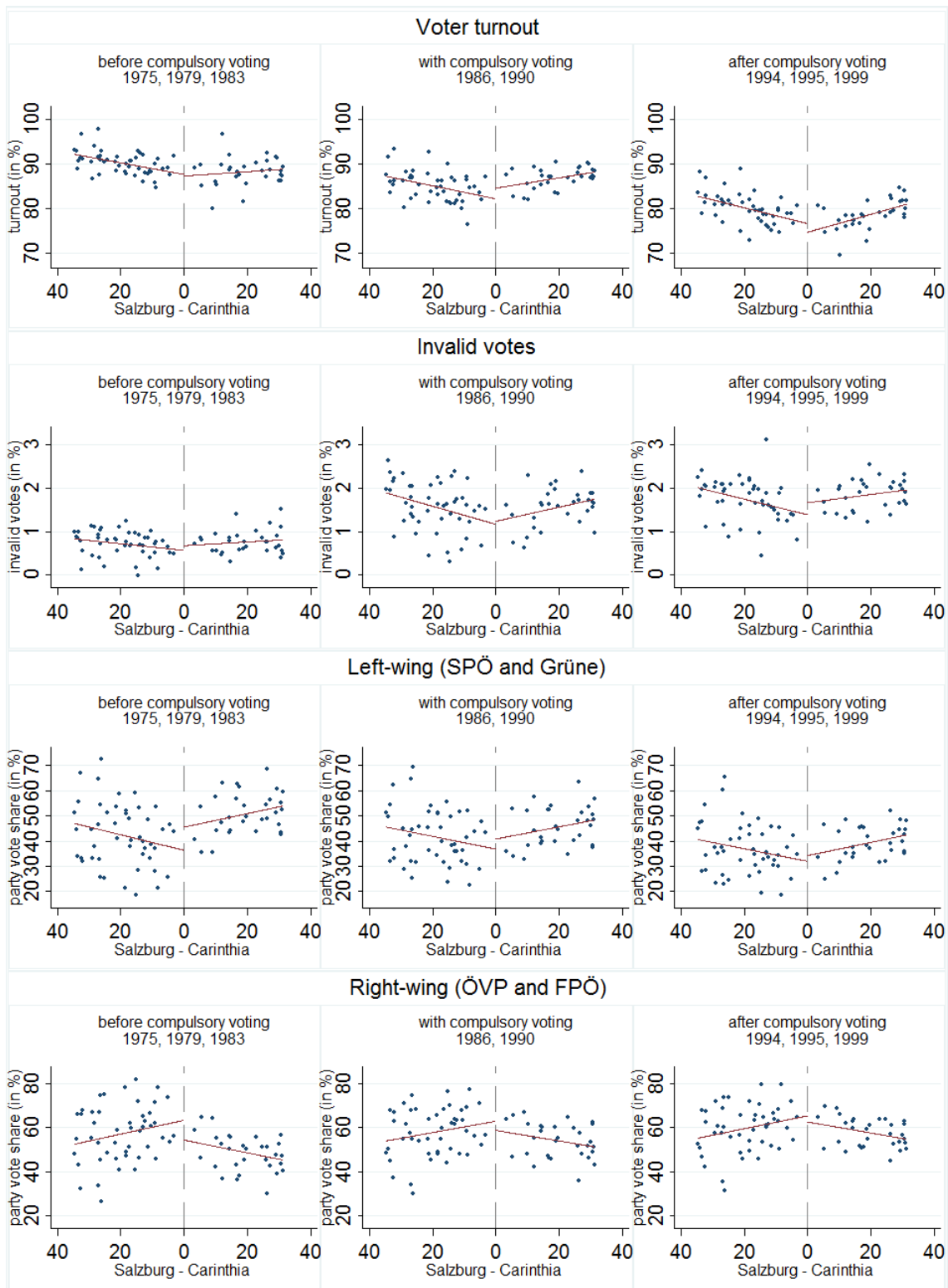
The estimated effect of compulsory voting on party vote shares remains similar in the linear DC model, compared to the DD estimation. Left-wing parties constantly lost votes over the entire period, while the vote shares of right-wing parties increased (tables 5 and 6). The coefficients lack statistical significance in the quadratic DC specification. In general, the effects of compulsory voting on the party vote shares sometimes lack statistical significance when we account for the distance to the border. With the quadratic polynomial the effects always lack statistical significance. While the results of compulsory voting on voter turnout are robust throughout the three different model specifications (table 3), the results on left- and right-wing party vote shares differ across specifications. Therefore, we hesitate to interpret the results of columns (7) and (8) in tables 5 and 6 as habit-forming. Again, the quadratic specification is more flexible and thus suitable to address spatial idiosyncrasies in vote shares. The difference-in-discontinuities results thus do not indicate that compulsory voting had a long-term habit-forming effect on the vote shares of left-wing and right-wing parties.

However, we generally call for caution in interpreting the party vote share results. Most importantly, the rise of right-wing populism in Austria may explain why left-wing party vote shares decreased and right-wing party vote shares increased over the entire period. In 1986, Jörg Haider became the chairman of the right-wing populist FPÖ and shifted the party to the far-right (Luther, 1987, p. 393). Haider managed to double his party's vote share in Austria (1983: 4.98 percent; 1986: 9.73 percent). The strongest FPÖ bases were Carinthia, where Haider became the governor in 1989 (Hirczy, 1994, p. 74), as well as Salzburg. In Carinthia and Salzburg, the FPÖ won 20.9 percent and 15.9 percent of votes in the 1986 national elections. The FPÖ succeeded because it received electoral support from voters with manifold political preferences and from different backgrounds (Luther 1987, p. 394: "the FPÖ's gains from the two major parties were roughly equal (about 130,000 from each)"). Luther (1987) maintains that in 1986 only around a third of the FPÖ voters shared the same ideology, with

some holding far right, racist and anti-Semitic views. The remaining two thirds were protest voters, attracted by Haider's campaigning, but not his political ideology.

We also use individual vote shares of the SPÖ, ÖVP and FPÖ as dependent variables. We do not use the vote share of the Green party because the Green party did not exist over the entire period 1975-1999. The results show that vote shares of the SPÖ and ÖVP decreased and the vote share of the FPÖ increased when compulsory voting was introduced and abolished (Appendix). It is quite difficult to disentangle whether compulsory voting or Jörg Haider's activities gave rise to the FPÖ's electoral success.

Figure 5: Voter turnout, invalid votes and party vote shares in national elections



Note: the x-axis displays the distance of the municipalities to the border between Salzburg and Carinthia (in km); left hand side: Salzburg, right hand side: Carinthia.

5.3 Robustness

We test the robustness of our results in various ways. The results should not be sensitive to including or excluding individual control variables. Therefore, we estimated the model excluding control variables (table 7). Inferences do not change.

The municipalities that are further away from the state border may differ from those closer to it. We only estimate the DD model for the municipalities that are directly located at the border and share a border with a municipality from the other state (table 8). The results show that compulsory voting increased voter turnout by around 3.8 percentage points. Introducing and abolishing compulsory voting influenced voter turnout by approximately the same magnitude, the difference in the effects of introducing and abolishing compulsory voting again lacks statistical significance. However, the effects of compulsory voting on the left-wing and right-wing party vote shares do not turn out to be statistically significant. We find some evidence for habit-forming effects (columns (4) and (5)). But, as the party vote shares developed similarly when compulsory voting was introduced and abolished, this might indicate unobservable regional trends. In any event, we believe that our quadratic DC model balances the number of observations and accounting for unobservable heterogeneity better than the border subsample because the number of border municipalities decreases to only 17. In the more suitable quadratic DC model, we do not find that compulsory voting had habit-forming effects on the vote shares of left-wing and right-wing parties.

A problem may arise if there is municipality specific clustering or serial correlation. In this case, robust standard errors may be downward-biased. Therefore, we clustered the standard errors at the municipality level (table 9). The inferences do not change. We also ignore the time dimension and pool the data before, during and after compulsory voting was in place to account for a possible inconsistency of the standard errors, as proposed by Bertrand et al.

(2004) (table 10). The standard errors become larger, as expected, but the main results remain unchanged.

6 Discussion

Our estimated effects of compulsory voting on voter turnout are in line with the results of Hirczy (1994) and Hoffman et al. (2017), but merely somewhat smaller. Hirczy (1994) reports the effect of introducing compulsory voting on voter turnout in national elections in Carinthia to be around 5 percentage points by comparing average voter turnout rates. Hoffman et al. (2017) consider national elections in Austria between 1949 and 2010 using state level data. They report that compulsory voting increased voter turnout by around 6.5 percentage points. We show that these effects might be overstated to some extent based on unobservable differences across states. Compared to Hirczy (1994) and Hoffman et al. (2017) we use municipality instead of state level data and consider municipalities close to the border between Salzburg and Carinthia. The municipalities close to the border are likely to be more similar to each other than municipalities being far from the border. Therefore, our approach should capture unobserved heterogeneity better than using state averages.

In line with Hoffman et al. (2017), our results do not show that compulsory voting increased invalid votes. Hoffman et al. (2017) find a small increase in invalid votes for presidential and state elections; however, for national elections between 1949 and 2010 the estimate lacks statistical significance. Hoffman et al. (2017) do not find an effect of compulsory voting on left-wing and right-wing party votes shares. Ferwerda (2014) investigates the abolishment of compulsory voting in 1992 and finds a small shift from minor parties to the SPÖ, but the results for all other parties do not turn out to be statistically significant.

The external validity of these results is limited because the dependent variable voter turnout is bounded at 100 percent. The effect on voter turnout is likely to be a “lower bound”. Even in a high voter turnout country such as Austria, compulsory voting increased voter turnout levels, the exceptions and only weakly enforced fines notwithstanding.

Our results do not support the expectation of habit-formation in voting. One may maintain that the two elections in 1986 and 1990 with compulsory voting in Carinthia were not sufficient to change its inhabitants’ voting habits in the long-run. We also acknowledge that our results do not support habit-formation in the aggregate and cannot rule out that compulsory voting was habit-forming for individual voters. However, Bechtel et al. (2017) examine over 20 years of compulsory voting in federal referenda in the Swiss canton of Vaud and do not find any evidence of compulsory voting having habit-forming effects either. Moreover, short-term interventions such as voter mobilization programs, precipitation on election days, or voting age restrictions are shown to influence the habit of voters. Bechtel et al. (2017) conclude that their result of compulsory voting not being habit-forming is in line with a rationalist model of political participation. Voters react quickly to the fees of non-voting. That there is evidence for habit-forming in voting for GOTV campaigns and precipitation but not for compulsory voting may have different reasons. The nature of compulsory voting might explain the lack of habit-formation. On the one hand, compulsory voting forces citizens to the polls, while precipitation, GOTV campaigns or the first election being a U.S. presidential or European Parliament election do not force citizens into anything. On the other hand, compulsory voting changes the cost structure of voting (Bechtel et al., 2017), while the other interventions did not influence costs. The different effects of measures such as GOTV campaigns and compulsory voting may also be driven by the different samples the authors used. Overall, the general pattern seems to be that the smaller the subset of compliers (mobilized by some exogenous event such as lack of rainfall), the stronger the evidence for habit formation.

7 Conclusion

We examine the short-term and long-term (habit-forming) effects of compulsory voting on voter turnout, party vote shares and invalid votes. We focus on municipalities at the border between the Austrian states of Carinthia and Salzburg. Voting in parliamentary election was compulsory in Carinthia between 1986 and 1992, but remained voluntary in Salzburg. The results show that compulsory voting increased voter turnout in the border municipalities in Carinthia by 3.4 percentage points, a numerically important effect because voter turnout was already pronounced (88 percent in 1983). Compulsory voting did not influence invalid votes.

We also investigate whether compulsory voting had long-lasting effects and was habit-forming. Our results, however, do not indicate any long-term effects. After the abolition of compulsory voting, voter turnout immediately returned to its pre-compulsory voting level. Hence, the effect of compulsory voting did not fade out over time, as would be expected, since voting is seen as a habit-forming process. The results also do not suggest asymmetrical effects across left-wing and right-wing parties when we take the distance of municipalities to the border between Carinthia and Salzburg into account. We acknowledge, however, that disentangling the effects of compulsory voting and Jörg Haider's (FPÖ) activities on the party vote shares is difficult.

Future research should examine why some measures such as precipitation or GOTV campaigns are habit-forming in voting but other policy measures are not. Investigating the channels of different measures might help to increase voter turnout in the long-run. Moreover, if individual voting data is available, the influence of compulsory voting on different groups (e.g. by political identification, education, age) should be evaluated to examine in more detail the effects of compulsory voting laws.

Table 2: Test for confounding trends

		(1)			(2)		
		electorate			growth rate of electorate		
		coefficient	standard error	p-value	coefficient	standard error	p-value
CV overall effect	DD	1.123	13.243	0.933	-0.002	0.001	0.111
	linear DC	16.041	20.350	0.433	0.005	0.003	0.133
	quadratic DC	-4.507	36.049	0.901	0.006	0.008	0.414
CV introduction effect	DD	-48.325	54.095	0.374	-0.004	0.002	0.031*
	linear DC	80.408	92.970	0.390	0.004	0.004	0.293
	quadratic DC	-125.133	176.184	0.480	0.004	0.009	0.646
CV abolition effect	DD	-50.570	34.775	0.150	0.001	0.002	0.567
	linear DC	48.327	62.913	0.445	-0.006	0.004	0.120
	quadratic DC	-116.119	123.427	0.350	-0.009	0.008	0.287
CV habit-forming effect	DD	-98.895	86.997	0.259	-0.003	0.002	0.096*
	linear DC	128.735	153.422	0.404	-0.002	0.004	0.660
	quadratic DC	-214.252	295.481	0.417	-0.005	0.006	0.439

*** p<0.01, ** p<0.05, * p<0.1

Note: the regressions are the same as in tables 3 to 6 but with the electorate and growth rate of the electorate as the dependent variables; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; number of municipalities 78, number of observations: 624; DD: Difference-in-differences, DC: Difference-in-discontinuities; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

Table 3: Effect of compulsory voting on voter turnout in national elections

VARIABLES	(1) DD	(2) linear DC	(3) quadratic DC	(4) DD	(5) linear DC	(6) quadratic DC	(7) DD	(8) linear DC	(9) quadratic DC
CV overall effect	3.418*** (0.349)	3.6687*** (0.816)	2.687** (1.226)						
CV introduction effect				3.605*** (0.552)	2.876** (1.247)	3.808** (1.763)			
CV abolition effect				-3.237*** (0.500)	-4.497*** (1.143)	-1.535 (1.471)			
CV habit-forming effect							0.368 (0.786)	-1.621 (1.746)	2.273 (2.104)
Electorate (log)	-1.878 (2.987)	-1.886 (2.996)	-1.887 (3.002)	-1.250 (3.541)	-1.713 (3.519)	-0.823 (3.528)	-1.250 (3.541)	-1.713 (3.519)	-0.823 (3.528)
Growth rate electorate	-27.28* (14.75)	-27.65* (14.99)	-27.61* (14.97)	-27.18* (14.81)	-27.85* (15.07)	-27.41* (15.21)	-27.18* (14.81)	-27.85* (15.07)	-27.41* (15.21)
Constant	104.0*** (20.87)	104.1*** (20.94)	104.1* (20.98)	92.95*** (25.47)	96.29** (25.31)	89.88*** (25.37)	86.40*** (25.66)	89.77*** (25.50)	83.31*** (25.58)
Observations	624	624	624	624	624	624	624	624	624
R-squared	0.811	0.811	0.811	0.811	0.817	0.820	0.811	0.817	0.820
Number of municipalities	78	78	78	78	78	78	78	78	78

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: voter turnout is the dependent variable; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; columns (1), (4), and (7) refer to a difference-in-differences (DD) estimation that were extended in columns (2), (5), and (8) to a linear and in columns (3), (6), and (9) to a quadratic difference-in-discontinuities (DC) estimation; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

Table 4: Effect of compulsory voting on invalid votes in national elections

VARIABLES	(1) DD	(2) linear DC	(3) quadratic DC	(4) DD	(5) linear DC	(6) quadratic DC	(7) DD	(8) linear DC	(9) quadratic DC
CV overall effect	-0.0978 (0.0986)	-0.111 (0.246)	-1.093** (0.468)						
CV introduction effect				-0.0576 (0.107)	-0.0267 (0.278)	-1.028* (0.527)			
CV abolition effect				0.137 (0.114)	0.195 (0.259)	1.158** (0.493)			
CV habit-forming effect							0.0790 (0.101)	0.168 (0.215)	0.130 (0.403)
Electorate (log)	0.0497 (0.431)	0.0493 (0.429)	0.0532 (0.431)	0.185 (0.464)	0.0476 (0.434)	0.00864 (0.442)	0.185 (0.464)	0.0476 (0.434)	0.00864 (0.442)
Growth rate electorate	-2.710 (3.058)	-2.622 (3.024)	-2.553 (3.048)	-2.689 (3.063)	-2.587 (3.014)	-2.530 (3.053)	-2.689 (3.063)	-2.587 (3.014)	-2.530 (3.053)
Constant	0.390 (2.983)	0.392 (2.970)	0.364 (2.984)	0.619 (3.323)	1.604 (3.106)	1.884 (3.165)	0.177 (3.365)	1.172 (3.141)	1.455 (3.201)
Observations	624	624	624	624	624	624	624	624	624
R-squared	0.616	0.618	0.624	0.616	0.621	0.627	0.616	0.621	0.627
Number of municipalities	78	78	78	78	78	78	78	78	78

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: invalid votes is the dependent variable; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; columns (1), (4), and (7) refer to a difference-in-differences (DD) estimation that were extended in columns (2), (5), and (8) to a linear and in columns (3), (6), and (9) to a quadratic difference-in-discontinuities (DC) estimation; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

Table 5: Effect of compulsory voting on party vote share of left-wing parties of SPÖ and Grüne in national elections

VARIABLES	(1) DD	(2) linear DC	(3) quadratic DC	(4) DD	(5) linear DC	(6) quadratic DC	(7) DD	(8) linear DC	(9) quadratic DC
CV overall effect	-1.682*** (0.477)	-1.804* (1.045)	-1.316 (2.4829)						
CV introduction effect				-4.700*** (0.767)	-5.165*** (1.548)	-2.101 (3.194)			
CV abolition effect				-1.226** (0.582)	-1.767 (1.408)	0.322 (2.855)			
CV habit-forming effect							-5.926*** (0.966)	-6.932*** (2.090)	-1.779 (3.477)
Electorate (log)	10.18* (5.118)	10.19* (5.137)	10.21* (5.137)	0.0521 (5.089)	0.901 (5.382)	2.710 (5.250)	0.0521 (5.089)	0.901 (5.382)	2.710 (5.250)
Growth rate electorate	-11.46 (15.14)	-11.55 (15.27)	-11.40 (15.15)	-13.05 (13.77)	-13.47 (13.33)	-12.64 (12.97)	-13.05 (13.77)	-13.47 (13.33)	-12.64 (12.97)
Constant	-26.44 (35.71)	-26.49 (35.82)	-26.66 (35.84)	44.22 (36.61)	38.12 (38.74)	25.09 (37.80)	35.55 (36.91)	29.40 (39.03)	16.26 (38.07)
Observations	624	624	624	624	624	624	624	624	624
R-squared	0.645	0.645	0.647	0.708	0.710	0.724	0.708	0.710	0.724
Number of municipalities	78	78	78	78	78	78	78	78	78

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: party vote share of left-wing parties is the dependent variable; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; columns (1), (4), and (7) refer to a difference-in-differences (DD) estimation that were extended in columns (2), (5), and (8) to a linear and in columns (3), (6), and (9) to a quadratic difference-in-discontinuities (DC) estimation; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

Table 6: Effect of compulsory voting on party vote share of right-wing parties share of ÖVP and FPÖ in national elections

VARIABLES	(1) DD	(2) linear DC	(3) quadratic DC	(4) DD	(5) linear DC	(6) quadratic DC	(7) DD	(8) linear DC	(9) quadratic DC
CV overall effect	1.414*** (0.506)	1.793* (1.053)	1.134 (2.342)						
CV introduction effect				4.704*** (0.757)	4.783*** (1.580)	0.956 (3.273)			
CV abolition effect				1.758*** (0.592)	1.436 (1.377)	-1.060 (2.651)			
CV habit-forming effect							6.461*** (0.907)	6.219*** (2.098)	-0.104 (3.761)
Electorate (log)	-12.83** (4.991)	-12.85** (5.014)	12.88** (5.015)	-1.789 (4.864)	-2.083 (5.185)	-3.712 (4.964)	-1.789 (4.864)	-2.083 (5.185)	-3.712 (4.964)
Growth rate electorate	14.54 (15.23)	14.48 (15.33)	14.30 (15.22)	16.27 (13.79)	16.37 (13.64)	15.52 (13.14)	16.27 (13.79)	16.37 (13.64)	15.52 (13.14)
Constant	144.2*** (34.81)	144.3*** (34.96)	144.5*** (34.98)	67.75* (34.97)	69.87* (37.30)	81.61** (35.26)	74.40** (35.26)	76.53** (37.60)	88.37** (35.99)
Observations	624	624	624	624	624	624	624	624	624
R-squared	0.489	0.490	0.494	0.596	0.598	0.617	0.596	0.598	0.617
Number of municipalities	78	78	78	78	78	78	78	78	78

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: party vote share of right-wing parties is the dependent variable; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; columns (1), (4), and (7) refer to a difference-in-differences (DD) estimation that were extended in columns (2), (5), and (8) to a linear and in columns (3), (6), and (9) to a quadratic difference-in-discontinuities (DC) estimation; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

Table 7: Robustness check: effect of compulsory voting in national elections (without control variables)

		(1)		(2)		(3)		(4)	
		voter turnout		invalid votes		vote share left-wing parties		vote share right-wing parties	
		coefficient	standard error	coefficient	standard error	coefficient	standard error	coefficient	standard error
CV overall effect	DD	3.489***	0.353	-0.092	0.099	-1.707***	0.472	1.445***	0.501
	linear DC	3.530***	0.823	-0.123	0.248	-1.757**	1.031	1.734*	1.032
	quadratic DC	2.487*	1.276	-1.109	0.471	-1.257	2.433	1.058	2.267
CV introduction effect	DD	3.757***	0.508	-0.056	0.108	-4.655***	0.730	4.723***	0.732
	linear DC	2.753**	1.263	-0.037	0.281	-5.217**	1.523	4.842***	1.549
	quadratic DC	3.716**	1.780	-1.038*	0.532	-2.204	3.089	1.090	3.128
CV abolition effect	DD	-3.220***	0.460	0.128	0.110	-1.240**	0.590	1.833***	0.603
	linear DC	-4.307***	1.124	0.209	0.259	-1.702	1.429	1.374	1.403
	quadratic DC	-1.258	1.480	1.480	0.532	0.310	2.886	-1.027	2.707
CV habit-forming effect	DD	-0.538	0.663	0.072	0.093	-5.895***	0.934	6.556***	0.890
	linear DC	-1.554	1.729	0.172	0.213	-6.920***	2.109	6.215***	2.111
	quadratic DC	2.458	2.039	0.142	0.399	-1.894	3.446	0.063	3.672

*** p<0.01, ** p<0.05, * p<0.1

Note: the regressions are the same as in tables 3 to 6 but without control variables; voter turnout, invalid votes and party vote share of left-wing and right-wing parties are the dependent variables; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; number of municipalities 78, number of observations: 624; DD: Difference-in-differences, DC: Difference-in-discontinuities; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

Table 8: Robustness check: DD estimate for municipalities directly at the border

	(1)		(2)		(3)		(4)	
	voter turnout		invalid votes		left-wing vote share		right-wing vote share	
	coefficient	standard error	coefficient	standard error	coefficient	standard error	coefficient	standard error
CV overall effect	3.785***	0.680	-0.293	0.241	-0.163	1.006	-0.147	1.004
CV introduction effect	3.289**	1.423	-0.319	0.269	-2.414	1.387	2.212	1.398
CV abolition effect	-4.287***	0.984	0.267	0.271	-2.109	1.241	2.528*	1.279
CV habit-forming effect	-0.998	2.040	-0.053	0.238	-4.523**	1.707	4.740**	1.782

*** p<0.01, ** p<0.05, * p<0.1

Note: voter turnout, invalid votes and party vote share of left and right-wing parties are the dependent variables; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; number of municipalities 17, number of observations: 136 (subsample, only municipalities directly located at the border, sharing a frontier with a municipality from the other state); DD: Difference-in-differences, DC: Difference-in-discontinuity; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

Table 9: Robustness check: standard errors clustered at the municipality level

		(1)		(2)		(3)		(4)	
		voter turnout		invalid votes		vote share left-wing parties		vote share right-wing parties	
		coefficient	standard error	coefficient	standard error	coefficient	standard error	coefficient	standard error
CV overall effect	DD	3.418***	0.349	-0.098	0.099	-1.682***	0.477	1.414***	0.506
	linear DC	3.687***	0.816	-0.111	0.246	-1.803*	1.045	1.793*	1.053
	quadratic DC	2.687**	1.226	-1.093**	0.468	-1.316	2.482	1.134	2.342
CV introduction effect	DD	3.605***	0.552	-0.058	0.107	-4.700***	0.767	4.704***	0.757
	linear DC	2.876**	1.247	-0.027	0.278	-5.165***	1.548	4.783***	1.580
	quadratic DC	3.808**	1.763	-1.028*	0.527	-2.101	3.194	0.956	3.273
CV abolition effect	DD	-3.237***	0.500	0.137	0.114	-1.226**	0.582	1.758***	0.592
	linear DC	-4.497***	1.143	0.195	0.259	-1.767	1.408	1.436	1.377
	quadratic DC	-1.535	1.471	1.158**	0.493	0.322	2.855	-1.060	2.651
CV habit-forming effect	DD	0.368	0.786	0.079	0.101	-5.926***	0.966	6.461***	0.907
	linear DC	-1.621	1.746	0.168	0.215	-6.932***	2.090	6.219***	2.098
	quadratic DC	2.273	2.104	0.130	0.403	-1.779	3.477	-0.104	3.761

*** p<0.01, ** p<0.05, * p<0.1

Note: voter turnout, invalid votes and party vote share of left and right-wing parties are the dependent variables; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; standard errors are clustered at the municipality level; number of municipalities 78, number of observations: 624; DD: Difference-in-differences, DC: Difference-in-discontinuities; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

Table 10: Robustness check: pooled data

		(1)		(2)		(3)		(4)	
		voter turnout		invalid votes		vote share left-wing parties		vote share right-wing parties	
		coefficient	standard error	coefficient	standard error	coefficient	standard error	coefficient	standard error
CV overall effect	DD	3.389***	0.530	-0.112	0.102	-1.582**	0.624	1.324**	0.598
	linear DC	3.722***	1.426	-0.076	0.260	-2.055	1.482	2.014	1.393
	quadratic DC	2.730	2.933	-1.049***	0.523	-1.635	3.026	1.416	2.846
CV introduction effect	DD	3.154***	0.665	-0.042	0.105	-4.389***	0.558	4.468***	0.566
	linear DC	2.960*	1.633	-0.003	0.272	-5.273***	1.339	4.902***	1.353
	quadratic DC	3.651	3.067	-0.981*	0.559	-2.093	2.848	1.005	2.879
CV abolition effect	DD	-3.549***	0.637	0.173	0.120	-1.059*	0.554	1.667***	0.587
	linear DC	-4.707***	1.667	0.170	0.295	-1.565	1.342	1.236	1.421
	quadratic DC	-2.077	3.497	1.144**	0.582	0.713	2.848	-1.407	2.909
CV habit-forming effect	DD	-0.395	0.697	0.131	0.091	-5.447***	0.569	6.135***	0.588
	linear DC	-1.747	1.609	0.168	0.219	-6.837***	1.348	6.138***	1.421
	quadratic DC	1.573	2.700	0.163	0.430	-1.381	2.565	-0.402	2.790

*** p<0.01, ** p<0.05, * p<0.1

Note: voter turnout, invalid votes and party vote share of left and right-wing parties are the dependent variables; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; observations for the periods before, during and after compulsory voting are pooled and the time dimension is ignored; number of municipalities 78, number of observations: 624; DD: Difference-in-differences, DC: Difference-in-discontinuities; CV overall effect refers to equation (1), CV introduction and abolition effects refer to equation (2), CV habit forming effect tests whether the effect of introduction and abolition are statistically different from each other; the coefficient of the CV introduction effect was multiplied by (-1) for better readability.

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Appendix

Table A1: Effect of compulsory voting on party vote shares of the SPÖ, ÖVP and FPÖ in national elections

		(1) SPÖ		(2) ÖVP		(3) FPÖ	
		coefficient	standard error	coefficient	standard error	coefficient	standard error
CV overall effect	DD	-1.063**	0.49	-1.736***	0.491	3.151***	0.482
	linear DC	-1.081	1.081	0.316	1.075	1.477	1.051
	quadratic DC	-0.157	2.581	-0.676	2.058	1.810	2.314
CV introduction effect	DD	-4.058***	0.816	-3.131***	0.824	7.835***	0.773
	linear DC	-4.458***	1.624	-3.245*	1.645	8.028***	1.532
	quadratic DC	-1.515	3.211	-7.269**	2.994	8.225***	2.590
CV abolition effect	DD	-1.824***	0.579	0.392	0.664	1.365**	0.638
	linear DC	-2.493*	1.417	-3.964**	1.584	5.400***	1.628
	quadratic DC	-1.399	2.933	-6.049*	3.073	4.989	3.893
CV habit-forming effect	DD	-5.882***	1.005	-2.739**	1.122	9.200***	1.027
	linear DC	-6.950***	2.141	-7.209***	2.426	13.43***	2.406
	quadratic DC	-2.914	3.368	-13.32***	4.456	13.21***	4.820

*** p<0.01, ** p<0.05, * p<0.1

Notes: party vote shares of the SPÖ, ÖVP and FPÖ are the dependent variables; time and municipality fixed-effects are included; observations are municipalities in Salzburg and Carinthia in the eight national elections between 1975 and 1999; vote share of the Green party is not considered separately, because the Green party did not exist over the entire period 1975-1999; DD: Difference-in-differences, DC: Difference-in-discontinuity.