Internet Voting Increases Expatriate Voter Turnout

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Abstract

Cross-border migration has increased rapidly in recent decades. In response, most democracies have extended voting rights to their citizens abroad. Nevertheless, expatriate voter turnout tends to be low. This article investigates a frequently proposed remedy—internet voting—based on a case study of extended internet voting trials in eight Swiss cantons. For causal identification, I exploit an unexpected federal intervention that led to a temporary suspension of internet voting in four of the eight cantons, during which expatriates could vote only by mail. Using difference-in-differences estimation, I find that the temporary suspension of internet voting decreased turnout among registered expatriate voters by 4.1 to 6.4 percentage points. Placebo tests suggest that pre- and post-suspension trends in expatriate voter turnout were close to identical in treated and control cases. Overall, the results of this study suggest that internet voting represents an effective method to increase electoral participation among citizens abroad. Still, expatriate voter turnout remained well-below domestic turnout even with internet voting available, suggesting that high voting costs are not the only reason why citizens abroad tend to vote at lower rates.

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1 Introduction

Cross-border migration has increased rapidly in recent decades. As a result, many countries are now host to sizeable immigrant communities, and many countries also have sizeable communities of citizens who live abroad. For example, it is estimated that more than 5 million U.S. citizens live outside of the U.S., or around 2% (Federal Voting Assistance Program 2018). A similar share of Germans live abroad[1] and an even larger share—almost 1 in 10—of UK citizens (Sriskandarajah and Drew 2006). One of the key questions raised by increasing cross-border migration concerns the voting rights of international migrants. Among other international human rights treaties, the 1948 Universal Declaration of Human Right recognizes universal suffrage as an inalienable part of human rights. According to some political theorists, this should have the consequence that all adult residents of a country are given the right to vote, including immigrants (Bauböck 2015). Yet in practice, voting rights often remain tied to citizenship, and most countries have strict naturalization policies (Koning 2011).[2] However, international migrants today tend to have a democratic say at least in their home country. Historically, most democracies did not have provisions for external voting (Caramani and Grotz 2015). But in recent decades, more and more democracies have chosen to remove the requirement that voters need to reside within the state territory. Today, expatriates from almost all democracies around the globe are eligible to vote in elections of their home country (Ellis et al. 2007).[3]

Still, expatriate voter turnout is usually very low (Lafleur 2015; Navarro et al. 2007). For example, less than 20% of eligible UK citizens abroad participated in the 2019 general election (Johnston 2020), while an estimated 7% of eligible Americans abroad participated in the 2016 U.S. election (Federal Voting Assistance Program 2018). The reasons for the low turnout among citizens abroad are not well-established. However, a frequently proposed explanation refers to the unique obstacles to voting faced by citizens abroad

[1] `https://tinyurl.com/yyrfw5p7`.

[2] Recently some democracies have moved to extend voting rights to non-citizens. However, non-citizen voting rights are almost always limited to local elections (Arrighi and Bauböck 2017).

[3] Ireland and Malta range among the few advanced democracies that have not extended voting rights to expatriates beyond diplomats and public servants (Hutcheson and Arrighi 2015).

(Braun 2007; Driza-Maurer et al. 2012; Ellis et al. 2007; Lafleur 2015). While domestic voters are increasingly automatically registered to vote in democracies around the world, citizens abroad almost always need to register before they can vote (James and Bernal 2020). Furthermore, in most countries, citizens abroad can only vote in-person in diplomatic missions, which for many implies high costs in terms of both travel and time. Therefore, several countries have introduced postal voting for citizens abroad, including Canada, Germany, and Norway (Navarro et al. 2007). However, significant obstacles remain even with postal voting. In many cases, expatriate voters will not only need to leave their homes and find the nearest mailbox, but also buy significantly priced international postage stamps. Furthermore, there have been frequent reports suggesting that problems with postal delivery can cause ballot papers to reach the authorities only after election day (Driza-Maurer et al. 2012). Even if expatriates submit their ballots, these may therefore never be counted. Expatriates may also decide against voting because they anticipate that their votes will not reach the authorities in time.

Given these issues, some commentators have suggested that citizens abroad should be given the option to vote over the internet (Braun 2007; Belchior et al. 2018; Ciornei and Nielsen 2020; Hutcheson and Arrighi 2015). While internet voting raises security concerns, one of its key advantages is that it promises to remove many of the obstacles to voting faced by citizens abroad. On the one hand, internet voting reduces the transaction costs to near-zero as it allows voters to vote from wherever they want and at whatever time they want (Germann and Serdült 2017). Furthermore, internet voting guarantees that votes are returned immediately to the authorities. Many political scientists have therefore argued that internet voting would increase electoral turnout (Alvarez et al. 2009; Goodman and Stokes 2020; Powell et al. 2012)—among all voters, but especially among citizens abroad (Braun 2007). However, to what extent internet voting actually increases electoral turnout remains unclear. This article provides new empirical evidence on the causal effect of internet voting on expatriate voter turnout. Specifically, I study the case of Switzerland, a small Western European nation with a fairly large population of expatriates. Official figures put the number of the Swiss abroad at around 770,000 in 2019

(i.e., every tenth Swiss citizen), most of whom live in Europe and North America. More importantly, however, Switzerland ranges among the few countries worldwide in which citizens abroad could vote online over an extended period of time. Therefore, this article provides the first systematic insight into the more long-term consequences of internet voting for expatriate voter turnout.

To estimate the effect of internet voting on expatriate voter turnout, I draw on a sample of eight cantons, all of which had first made internet voting available to their citizens abroad between 2008 and 2010. However, I only begin to observe the eight cantons several years after they had first made internet voting available to their citizens abroad. As is explained in the research design section, this minimizes the risk of sample selection bias, which could emerge because expatriate voter turnout can only be measured in terms of registered expatriate voters. Despite the relatively short time frame (2013 to 2019), the large number of referendums voted in Switzerland guarantees a sufficient sample size. For causal identification, I exploit a sudden and unexpected federal intervention in the summer of 2015 that led to a near-natural experiment, with the trials being temporarily suspended in four of the eight cantons due to the recent discovery of several issues with the security architecture of those cantons' internet voting software. The resulting between-canton variation in the availability of internet voting enables me to estimate the causal effect of internet voting on expatriate voter turnout using difference-in-differences estimation, and therefore to rule out many possible confounders by design. The results suggest that turnout among registered expatriate voters decreased by 4.1 to 6.4 percentage points as a result of the temporary suspension of internet voting. Placebo tests suggest that pre- and post-suspension trends in expatriate voter turnout were close to identical in cantons that were and were not exposed to the suspension, and the causal estimate passes a series of further plausibility and robustness checks.

Overall, the findings of this study suggest that internet voting leads to markedly higher turnout among citizens abroad. It is important to note that expatriates from all eight cantons under consideration could always vote by mail while in-person voting in diplomatic missions was never available. It is likely that internet voting would have an

even more pronounced effect on expatriate voter turnout in contexts where expatriates cannot vote by mail but have to cast votes in-person. Still, the results of this study also suggest that expatriate internet voting may not be the 'game-changer' some have hoped it to be. No doubt, turnout increases in the vicinity of 5 percentage points are substantial. But even with internet voting, expatriate voter turnout remained well-below turnout by domestic voters. As is discussed in the conclusion, this suggests that high voting costs are not the only reason why citizens abroad vote at lower rates.

2 Previous Work

The effect of internet voting on electoral turnout remains an open question. Several existing studies have examined the effect of internet voting on turnout among domestic voters. However, the findings vary dramatically from study to study, with some suggesting that internet voting has no effect on domestic voter turnout (Bochsler 2010; Germann and Serdült 2017), others that internet voting increases domestic voter turnout by 1 to 4 percentage points (Goodman and Stokes 2020; Spada et al. 2016; Trechsel and Vassil 2011), and still others suggesting even larger effects (Solop 2001). At the same time, it is also not always clear to what extent findings from existing studies can be trusted because many suffer from obvious methodological issues, such as reliance on self-reported impact measures (cf. the discussion in Germann and Serdült 2017). Among the notable exceptions ranges a recent study by Goodman and Stokes (2020), which uses a difference-in-differences design to estimate the causal effect of internet voting on actual turnout rates in local elections in Ontario, Canada. Their results suggest that domestic voter turnout increased by around 3.5 percentage points if a municipality offered the option to vote online. Another notable exception is the study by Germann and Serdült (2017), who drawing on a similar design found that the provision of internet voting did not increase turnout among domestic voters in two Swiss cantons.[4]

Even less is known about the effects of internet voting on expatriate voter turnout.

[4]However, Swiss internet voting has been shown to have increased the effective turnout in terms of valid votes cast because it reduces the risk of voters making mistakes that lead to the invalidation of their ballots (Germann, forthcoming).

To the best of my knowledge, the only prior study is Fowler (2020), which studied West Virginia's pilot trial with a mobile voting application in the context of the 2018 U.S. midterm elections. West Virginia's pilot trial was targeted exclusively at citizens abroad. Eligible expatriates could file an application for an external absentee ballot, download the app to a mobile device, and then cast their ballot using the app. For causal identification, Fowler exploits the favorable circumstance that only 24 of West Virginia's 55 counties participated in the trial. Using difference-in-differences estimation, he estimates that turnout among registered expatriate voters increased by 3 to 5 percentage points if a county offered mobile voting.[5] This is a substantial effect, especially when considering the broad range of alternative (and comparatively convenient) voting options enjoyed by expatriates from West Virginia: postal voting as well as the option of scanning the completed ballot papers and then returning them by fax or e-mail.

Nevertheless, the lessons that can be drawn from a single case are necessarily limited. Notably, it is not clear whether turnout effects measured in pilot trials like West Virginia's replicate over the longer term. Novelty effects and increased media attention could lead to unusually high turnout effects in pilot trials. At the same time, turnout effects could also be lower in pilot trials because some voters may initially shy away from engaging with new security measures (Hall 2015). Furthermore, West Virginia's pilot trial was quite limited in scope. A mere 144 votes were cast via the mobile voting app. While Fowler's results are promising, there is a clear need for more evidence. This paper makes a step in this direction via an analysis of internet voting trials involving expatriates from eight Swiss cantons. Notably, the Swiss cases analyzed in this paper enable a more conventional comparison because unlike in West Virginia, no uncommon external voting options like e-mail voting are available to the Swiss abroad. More importantly, in Switzerland internet voting was trialed in dozens of electoral contests and over a period of more than a decade. Therefore, this study provides a first insight into the more long-term impact of internet

[5]It is worth noting that Fowler is able to draw on individual-level voter records. While a weakness of Fowler's approach is that he has to focus on *likely* expatriate voters, with corresponding potential for false positives and negatives, a key advantage is that this allows Fowler to observe the same voters over time. That way, he avoids the risk of sample selection bias described below. Unfortunately, no individual-level voter records are available in the Swiss case.

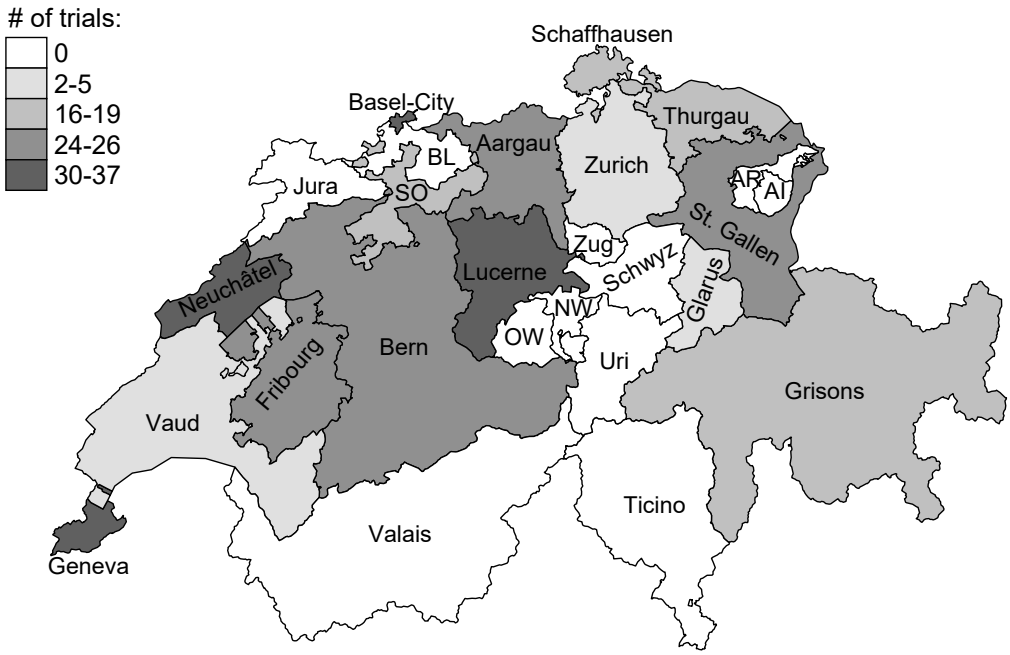
voting on expatriate voter turnout. The next section provides a short overview of the Swiss internet voting trials. The section after that presents the research design.

3 Internet Voting in Switzerland

Switzerland ranges among the internet voting pioneers and has conducted a large number of internet voting trials between 2003 and 2019. However, even if Switzerland trialed internet voting over a period of more than 15 years, internet voting was never fully generalized. Switzerland's approach to internet voting is best described as cautious, for which the temporal suspension of internet voting in 2015 and the (perhaps) more permanent suspension in 2019 constitute just two examples (for both, see further below). Switzerland's internet voting roll-out was also strongly shaped by its federal structure. Notably, the country's highly decentralized form of electoral administration prevented the central government from stepping in and offering an internet voting solution that could then be used across the country (Mendez 2010; Mendez and Serdült 2014). Instead, it was the cantons that decided whether they want to trial internet voting, and when. The result was a potpourri, with internet voting being trialed in some but not other cantons, at different points in time, and—critically in the context of this paper—using a variety of different software solutions.

Broadly speaking, the Swiss internet voting trials can be grouped into two phases. The first lasted from 2003 to 2007 and involved a series of pilot trials in a total of three cantons. All trials during the pilot phase were limited to domestic voters. Citizens abroad became a key target group only in the second, more expansive phase. The second phase began in 2008, when the first canton—Neuchâtel—chose to extend the option to vote online to its citizens abroad (Germann and Serdült 2014; Germann et al. 2014). Several other cantons followed suit in subsequent years. Overall, a total of 15 (out of 26) Swiss cantons trialed internet voting for expatriates between 2008 and 2019. In many of the 15 cantons, the trials stretched over several years and included a large number of electoral events (see Figure 1).

Figure 1: Expatriate internet voting trials in federal electoral events, 2008–2019



Note: AI = Appenzell Innerrhoden; AR = Appenzell Ausserrhoden; BL = Basel-Country; NW = Nidwalden; OW = Obwalden; SO = Solothurn.

Internet voting was popular among the Swiss abroad. Figure 2 shows the share of internet votes in all votes cast for all federal-level trials for which such data is available. As becomes visible, typically half or even more of all votes were submitted online. All remaining votes were submitted by post, the only other voting option available to the Swiss abroad. For comparison, in trials with domestic voters, often only around 20% of votes were cast online (Serdült et al. 2015). A likely reason for the higher popularity of internet voting among expatriates is that internet voting offers relatively larger convenience gains to citizens abroad. That said, it is worth noting that in one canton—Neuchâtel—the internet voting rate never exceeded 15%. The likely reason is that internet voting came with an additional hurdle in the case of Neuchâtel. Specifically, expatriate voters from Neuchâtel had to sign up for a broader e-governmental portal before they were allowed to vote online, which required physical presence at a location in Switzerland.

Excepting Neuchâtel's additional sign-up requirement, expatriate internet voting worked similarly in all cantons. Around four weeks before every electoral contest, the Swiss election authorities mailed the voting materials to all registered expatriate voters. Upon

receipt of the voting materials, expatriates could fill out the ballot papers and return them by mail. Or, they could vote online, using the security codes enclosed with the voting materials. In Neuchâtel, the security codes were enclosed only if an expatriate voter had previously signed up in-person for the e-government portal. In all other cantons, the security codes were automatically enclosed.[6] Beyond this, there were few practical differences for expatriate voters. While different internet voting solutions were in use in different cantons and at different points in time, they were all similar to use. Importantly, all were browser-based, meaning that no additional software had to be downloaded or installed. Also, no extra hardware had to be acquired by voters. This is contrary to, for example, Estonia, where voters need a special identity card including a digital signature as well as a smart card reader in order to vote online (Alvarez et al. 2009).

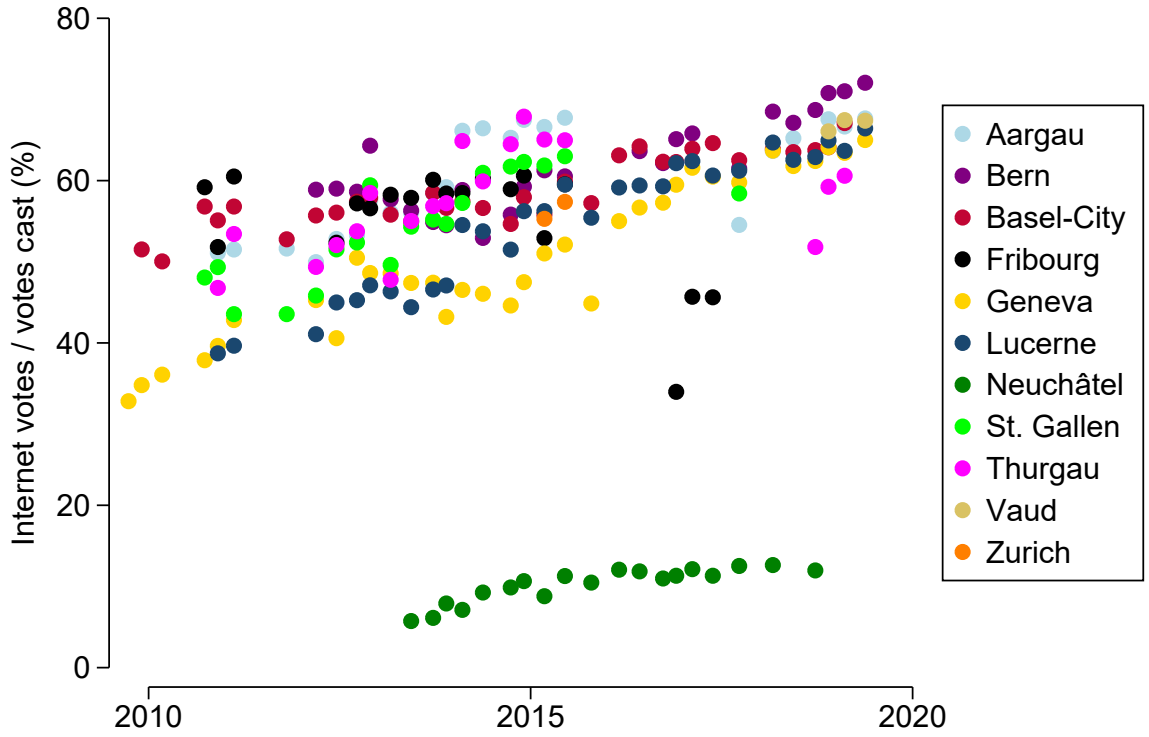
Finally, it should be noted that the Swiss internet voting trials came to a halt in 2019. In the years leading up to 2019, the evidence had started to mount that the internet voting solutions that had been in use were not secure enough to guarantee the safe conduct of elections. The first major evidence in this direction came to light in 2015, which led to the temporary suspension of internet voting described in the next section. Additional security issues, this time with a different internet voting solution (Swiss Post), came to light in early 2019 (e.g., Culnane et al. 2019). As a result, the Swiss federal government suspended all internet voting trials in 2019, with the intention to resume only if and when more secure software solutions become available.

4 Causal Identification Strategy

The goal of this article is to estimate the causal effect of internet voting on turnout among the Swiss abroad. This goal implies two key challenges. First, expatriate voter turnout is likely to depend on a myriad of factors besides internet voting, including the socio-demographic profile of expatriate voter populations (e.g., age, education, and political interest) as well as contextual factors like the salience and closeness of electoral contests.

[6]The canton of Geneva introduced a sign-up system similar to Neuchâtel's in late 2016, but this applied to domestic voters only. Geneva's citizens abroad never had to sign up for internet voting during the period under study.

Figure 2: Usage of internet voting by Swiss expatriates, 2009–2019, federal electoral events



Note: No data is available for the trials in the cantons of Glarus, Grisons, Schaffhausen, and Solothurn. Furthermore, data is incomplete in the cases of Bern, Fribourg, Neuchâtel, St. Gallen, and Zurich (cf. the discussion in Germann and Serdült 2014). *Data source:* Serdült et al. (2015), updated with official records.

Therefore, naive comparisons of expatriate voter turnout in contests with and without internet voting are likely to be misleading. Complicating matters further, in Switzerland (as elsewhere) there is little-to-no relevant data available on citizens abroad that could be used for controlling purposes (e.g., data on the socio-demographic profile of citizens abroad).[7] Other possible confounders, such as the closeness and salience of electoral contests, are similarly difficult to measure (Keele and Minozzi 2013).

Second, the ideal measure of the dependent variable—turnout in terms of all *eligible* expatriate voters—is not available in the context of Switzerland. Several cantons do not

[7]To my knowledge, only a single survey targeted at the Swiss abroad and covering all cantons analyzed was conducted (Lutz 2012). While this survey offers a useful snapshot, cross-sectional confounders are automatically accounted for in difference-in-differences estimation. It is, therefore, unnecessary to introduce cross-sectional aggregate measures from this survey, such as average education or political interest, as controls in the models estimated below.

separate the number of votes cast by domestic and expatriate voters in their electoral statistics. Hence, data on expatriate voter turnout is only available for some but not other cantons. But much more problematically, expatriate voter turnout can only ever be measured in terms of *registered* expatriate voters because it is not clear how many eligible but unregistered expatriates there are in a canton.[8] Unfortunately, this could give rise to a second source of bias besides omitted variable bias. This is because the introduction of internet voting may not only affect the probability that expatriates turn out, but also the probability that they register to vote. If so, the number of registered voters (and, therefore, the denominator in the turnout measure) becomes a direct function of the treatment, giving rise to sample selection bias. Of course, in the absence of cantonal data on the total number of eligible expatriate voters, there is no sure way to tell whether expatriates actually became more likely to register to vote as a result of internet voting.[9] However, the introduction of internet voting could at least in theory have affected the registration rate; and if that were the case, estimates of the effect of internet voting on registered expatriate voter turnout were biased.

Fortunately, an empirical strategy is available that allows me to simultaneously tackle the risk of bias due to omitted confounders and endogenous sample selection. The key idea is to focus the analysis not on the *introduction* of internet voting, but on its *continued provision (or not) after a prolonged period of prior availability.* Specifically, I will analyze a sample of eight cantons, all of which began to make internet voting available to expatriate voters on a continuous basis between 2008 and 2010 (see Table 1). However, I start to observe these eight cantons only in 2013, and therefore three to five years after they had first made internet voting available to expatriate voters. I continue to observe

[8]The Swiss federal government keeps records on the number of Swiss nationals who live abroad as well as their year of birth. These records suggest that in 2019, 610,000 out of the total of 770,000 Swiss abroad were eligible to vote. Unfortunately, though, the official records include no information on the canton in which a person is eligible to vote except if a person is already registered to vote.

[9]For reasons explained above, the share of eligible expatriates who are registered to vote can only be established for Switzerland as a whole. According to this data, the Swiss abroad became more likely to register over time, with the registration rate increasing from around 20% in the mid-2000s to around 30% in 2019. However, the extent to which this increase can be attributed to internet voting is not clear. Possible alternative explanations include the introduction of online voter registration in 2016, various get-out-the-vote campaigns targeted at expatriate voters during the period, as well as the increasing availability of internet-based forms of mass communication, which could have fostered a higher willingness among the Swiss abroad to get involved in the affairs of their home country.

Table 1: Analysis sample

Electoral event	Aargau	Basel-City	Fribourg	Geneva	Lucerne	Neuchâtel	St. Gallen	Thurgau
2013-03-03	X	X	X	X	X	X	X	X
2013-06-09	X	X	X	X	X	X	X	X
2013-09-22	X	X	X	X	X	X	X	X
2013-11-24	X	X	X	X	X	X	X	X
2014-02-09	X	X	X	X	X	X	X	X
2014-05-18	X	X	X	X	X	X	X	X
2014-09-28	X	X	X	X	X	X	X	X
2014-11-30	X	X	X	X	X	X	X	X
2015-03-08	X	X	X	X	X	X	X	X
2015-06-14	X	X	X	X	X	X	X	X
2015-10-18*	O	X	O	X	X	X	O	O
2016-02-28	O	X	O	X	X	X	O	O
2016-06-05	O	X	O	X	X	X	O	O
2016-09-25	O	X	O	X	X	X	O	O
2016-11-27	O	X	X	X	X	X	O	O
2017-02-12	O	X	X	X	X	X	O	O
2017-05-21	O	X	X	X	X	X	O	O
2017-09-24	X	X	X	X	X	X	X	O
2018-03-04	X	X	X	X	X	X	X	O
2018-06-10	X	X	X	X	X	X	X	O
2018-09-23	X	X	X	X	X	X	X	X
2018-11-25	X	X	X	X	X	X	X	X
2019-02-10	X	X	X	X	X	X	X	X

Note: X = both internet voting and postal voting were available; O = only postal voting was available; * = federal election; all other dates = one or more federal referendums.

the eight cantons until February 2019, after which internet voting was phased out. As is explained in detail below, this sampling strategy minimizes the danger that causal estimates are affected by sample selection bias. The dependent variable is turnout by registered expatriate voters in federal electoral events. There were a total of 23 federal electoral events during the period under study. In 22 of the 23 events, expatriates voted on one or more federal referendums (60 referendums in total across the 22 events). In addition, there was one federal election during the observation period (October 2015).

For causal identification, I exploit a 2015 intervention by the Swiss federal government that led to a temporary suspension of internet voting in four of the eight cantons under consideration. As noted above, decisions on the provision of internet voting are principally a cantonal matter; however, internet voting trials needed the prior authorization of the federal government. Until 2015, this never proved a problem and all cantons received authorization on a routine basis. However, in August 2015, the Swiss federal government unexpectedly refused to authorize the further usage of one of the three internet voting

solutions in use at the time, the so-called Consortium system. The refusal occurred as a result of an external security audit, which had revealed several shortcomings with the Consortium system, including a loophole that would have allowed malicious actors to expose voters' secret votes. Of the eight cantons in the analysis sample, four had made use of the Consortium system at the time and therefore had to suspend their internet voting trials (Aargau, Fribourg, St. Gallen, and Thurgau). All four swiftly pledged to transition to one of the other internet voting systems that were in use at the time (the Geneva system or the Swiss Post system). Contrary to the Consortium system, the latter two had passed the 2015 security audit and the federal government therefore continued to authorize internet voting trials if one of these systems was used. In all four Consortium cantons, internet voting became available again after one to three years. Meanwhile, the other four cantons under consideration continued to offer internet voting seamlessly during this period as they were already using the Swiss Post (Neuchâtel) or the Geneva system (Geneva, Basel-City, and Lucerne).

A key upshot of the 2015 federal intervention is that it enables the estimation of the causal effect of internet voting (or, to be more exact, the temporary lack thereof) on expatriate voter turnout using difference-in-differences estimation. Difference-in-differences estimation significantly reduces the threat posed by confounders because it does not require that the treatment and control groups are perfectly balanced on all confounders. More specifically, difference-in-differences estimation by design rules out all time-specific confounders, such as the closeness or salience of electoral contests. By design, difference-in-difference estimation also rules out time-invariant confounders, such as socio-demographic factors, which rarely change dramatically over short periods of time.[10] However, difference-in-differences estimation still relies on a strong assumption: that treatment and control outcomes would have moved in parallel in the absence of treatment (Angrist and Pischke 2009). In the present case, this means that expatriate voter turnout should have moved in parallel in cantons affected by the suspension and those that were not, assuming that internet voting had been continuously offered in all cantons. Further below, I provide

[10]This applies only as long as the relationship between time-invariant confounders and the outcome does not vary over time (Zeldow and Hatfield 2019).

indirect evidence in favor of the parallel trends assumption based on visual comparisons of pre- and post-suspension trends in expatriate voter turnout as well as placebo checks.

Another key upshot of the 2015 federal intervention is that it allows me to identify the causal effect of internet voting on registered expatriate voter turnout while relying solely on variation in the continued availability of internet voting after a prolonged period of prior usage. This minimizes the risk of bias due to endogenous sample selection, principally because internet voting is most likely to affect the registration rate around the time when it is first introduced. All of the cantons under consideration started to make internet voting available to expatriates between 2008 and 2010. Therefore, most of the effect of internet voting on the registration (if there was one) is likely to have materialized before the start of the observation period in 2013.[11] A remaining worry is that the temporary suspension of internet voting affected the registration rate going forward, that is, in 2015 and thereafter. I argue that any such effect is likely to be small and therefore unlikely to give rise to substantial sample selection bias. Most importantly, this is because expatriates remain on the electoral register indefinitely once they are registered to vote.[12] Therefore, if expatriates were motivated to register to vote due to the earlier availability of internet voting, they would remain in the data pool. It follows that the suspension could only have affected the number of new registrations. Any such effect is likely to be small or even non-existent, given that internet voting is most likely to affect the registration rate when it is first introduced; and given that all four cantons swiftly announced their intention to reinstate internet voting as quickly as possible. Consistent with this, below I show that the number of registered expatriate voters evolved similarly both before and after 2015 in cantons that were and were not affected by the suspension.[13]

[11] A caveat that needs to be mentioned is that prior to 2014, internet voting was only available to expatriates who resided in countries that allowed the exchange of encrypted data (Germann and Serdült 2014). With the lifting of this requirement, internet voting therefore became newly available to a minority of expatriates (around 10%), which could have driven up their registration rate. However, as this 'shock' affected all cantons simultaneously, any bias is likely to be soaked up by the time dummies.

[12] The only exception emerges when postal delivery of the voting materials fails at least three times in a row. Also note that this rule applies since 2015. Previously expatriates had to renew their registration every four years.

[13] It is important to note that a negative effect of the temporary suspension on the number of new registrations (and, therefore, the denominator in the turnout share) would bias estimates of the effect of

Four more comments are in order before proceeding to the results. First, it is important to emphasize that the federal government acted promptly after learning about the Consortium system's security deficits in 2015 (and similarly acted promptly after learning about issues with the Swiss Post system in 2019, as noted above). Therefore, it is unlikely that voters would have had particularly strong concerns about the security of these systems while they were in use.

Second, it is possible that Neuchâtel's additional sign-up requirement affected not only the popularity of online voting among expatriate voters (see above), but also the potential of internet voting to increase expatriate voter turnout. Unfortunately, though, this question cannot be be answered with the research design at hand because there is no variation in the availability of internet voting in Neuchâtel during the observation period.

Third, only eight of the total of 15 cantons that trialed expatriate internet voting are included in the analysis because in most of the remaining cases data on expatriate voter turnout is unavailable for some (e.g., Bern) or even all of the period analyzed (e.g., Grisons). In one case (Vaud), data on expatriate voter turnout is available throughout the analysis period, but this canton first made internet voting available only in 2018. My causal identification strategy requires that internet voting was available much earlier.

Finally, I do not include the 11 cantons that never trialed expatriate internet voting in the analysis. Most of these cantons do not provide data on expatriate voter turnout; however, the key reason why I choose to omit cantons that never trialed expatriate internet voting is that they would likely increase the heterogeneity of the sample. Similarly to other convenience voting reforms, internet voting could have increased the likelihood that less committed expatriate voters register to vote. If so, the addition of never-internet voting cantons would introduce additional cross-canton heterogeneity in terms of the composition of expatriate voter populations, which in turn could threaten the parallel trends assumption (Berinsky 2005). That said, in the robustness section I show that the results remain similar when the three never-internet voting cantons for which data on expatriate voter turnout is available are added to the analysis.

the suspension of internet voting on registered expatriate turnout voter downwards rather than upwards. In other words, if present, sample selection bias would bias the causal estimate towards zero.

Table 2: Estimate of the causal effect of the temporary suspension of internet voting on registered expatriate voter turnout

Temporary suspension	-5.249
	(0.499)
	[0.000]
Cantons	8
Electoral events	23
Observations	184

Note: The estimate is based on OLS regression including canton and electoral event fixed effects. The standard error estimate is clustered by canton and shown in parentheses. The p-value is shown in square brackets.

5 Results

I proceed to estimate the causal effect of internet voting on turnout among the Swiss abroad. The sample consists of the previously mentioned eight cantons and includes a total of 23 electoral events between 2013 and February 2019. The dependent variable is registered expatriate voter turnout measured in terms of percentages (M = 34%; SD = 5.5). The central independent variable is the temporary suspension of internet voting in four of the eight cantons. During the suspension, registered expatriates could only vote by mail. On all other occasions, they had a choice between postal and internet voting. The unit of analysis is an electoral event in a canton. Overall, the sample includes 184 observations (i.e., canton-electoral events). Internet voting was available in 156 of the 184 cases, and unavailable in the remaining 28. The causal effect of the temporary suspension on registered expatriate voter turnout is estimated using ordinary least square regression (OLS) including canton and electoral event fixed effects. Two-way fixed effects regression generalizes the classic difference-in-differences estimator for two time-periods to contexts with multiple time periods (Angrist and Pischke 2009, 233–241). To account for time dependence, the standard error estimate is clustered by canton.

I find that registered expatriate voter turnout decreased by an estimated 5.2 percentage points as a result of the temporary suspension of internet voting (see Table 1). The 95% confidence interval ranges from a 4.1 to a 6.4 percentage points reduction in registered expatriate voter turnout and the effect of the temporary suspension is statis-

tically significant (t = -10.52; $p < 0.000$). To better grasp the magnitude of this effect, I compare the observed turnout rates during the suspension to the counterfactual turnout rates suggested by the model had internet voting not been suspended. I find that, on average, 29.8% of registered expatriate voters actually turned out during the suspension. By contrast, with 95% probability registered expatriate voter turnout would have been 4.1 to 6.4 percentage points higher had internet voting not been suspended, meaning that registered expatriate voter turnout would have increased to between 33.9% and 36.2%. This represents an increase of 14% to 21%.

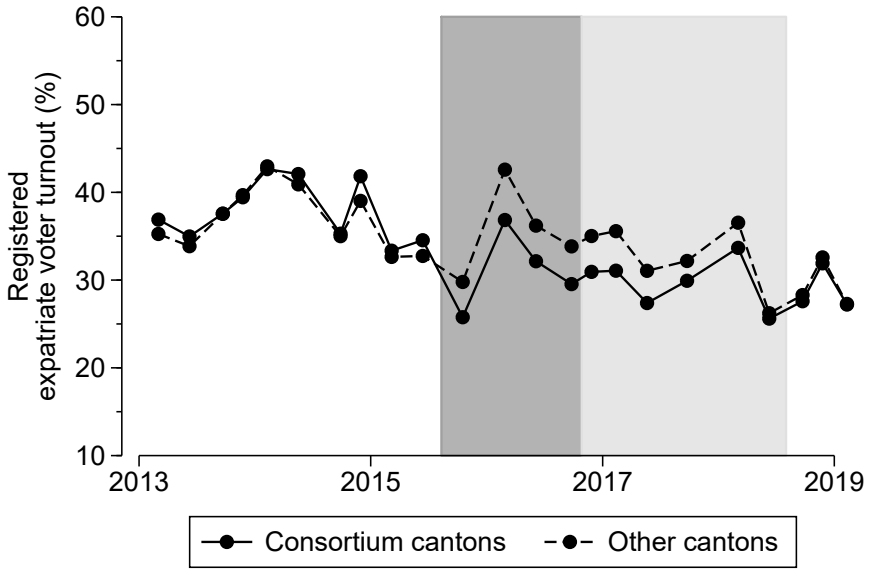
6 Identifying Assumptions and Robustness Checks

In this section, I demonstrate the plausibility of the two main assumptions needed for estimating the causal effect of the temporary suspension of internet voting on expatriate voter turnout. In addition, I report several robustness checks. I relax some of the causal identification assumptions underlying the above estimate, adjust the variance estimate for contemporaneous dependence in addition to time dependence, and report the results when cantons that never trialed internet voting are added to the specification.

6.1 Parallel Trends Assumption

As explained above, one of the two key causal identification assumptions is that registered expatriate voter turnout would have moved in parallel in treated cantons (i.e., cantons that were affected by the suspension) and control cantons (i.e., cantons that were not affected) had there not been the temporal suspension of internet voting. The parallel trends assumption cannot be tested directly as it relates to a counterfactual. However, it is possible to gauge its plausibility by comparing the evolution of the outcome variable in treated and control cantons before and after the temporary suspension (Angrist and Pischke 2009). Figure 3 shows that average registered expatriate voter turnout moved more or less in tandem in treated and control cantons before the summer of 2015. This increases confidence that expatriate voter turnout would have continued to follow a similar

Figure 3: Evolution of registered expatriate voter turnout in Consortium and non-Consortium cantons



Note: The figure shows average turnout rates among registered expatriate voters in four cantons that had used the Consortium system before August 2015 (Aargau, Fribourg, St. Gallen, and Thurgau) and four that did not (Basel-City, Geneva, Lucerne, and Neuchâtel). Internet voting was suspended in all Consortium cantons during the period marked in dark gray, and in some but not other Consortium cantons during the period marked in light gray. In the non-Consortium cantons, internet voting was available throughout.

trajectory also after the summer of 2015 had there not been the suspension. In reality, internet voting was of course suspended in the four Consortium cantons. As becomes visible, the two time series clearly diverge after this. The estimated effect is therefore visible also to the naked eye. The time series start to converge again after September 2016, when internet voting was successively re-introduced in the Consortium cantons. After June 2018, when internet voting was again available in all eight cantons, the two time series are almost identical again. This provides further evidence in favor of the parallel trends assumption.[14]

I provide additional evidence in favor of the parallel trends assumption based on two placebo tests. For the first, I define a placebo treatment and code it as 1 (0 otherwise)

[14]Figure 3 furthermore suggests a general downward trend in expatriate voter turnout. However, it is important to note that this refers to *registered* and not to *eligible* expatriate voters. Turnout among all eligible expatriates is unlikely to have decreased as the number of votes cast by expatriates actually increased over time, controlling for the suspension. Therefore, the downward trend observed in Figure 3 is likely due to expatriates with a low probability of voting becoming increasingly likely to register to vote (also see Figure 4).

Table 3: Placebo treatment tests

Model	(1)	(2)
Temporary suspension	-4.882	-5.415
	(0.445)	(0.668)
	[0.000]	[0.000]
Placebo treatment 1	1.124	
	(0.955)	
	[0.278]	
Placebo treatment 2		-1.019
		(1.251)
		[0.442]
Cantons	8	8
Electoral events	23	23
Observations	184	184

Note: The table shows coefficients from OLS regressions including canton and electoral event fixed effects. The dependent variable in both models is turnout among registered expatriate voters (in %) in federal electoral contests. Standard errors clustered by canton are shown in parentheses and the p-values in square brackets.

in the four Consortium cantons starting in early 2014 and ending in June 2015—that is, immediately before the suspension in August of that year. Model 1 in Table 3 shows that this placebo treatment has no statistically significant effect on registered expatriate voter turnout when it is added to the two-way fixed effects model reported above (t = 1.18; p = 0.28). This provides formal statistical evidence that the turnout trends were similar in treated and control cantons before the suspension. For the second placebo test, I use another placebo treatment that I code as 1 (0 otherwise) in Consortium cantons after June 2018, when internet voting had become available again in all Consortium cantons. Again, I find no statistically significant placebo effect (t = -0.81; p = 0.44; see model 2 in Table 3). This confirms that turnout trends were parallel not only before the suspension, but also after the re-introduction of internet voting in the Consortium cantons.

Next, I report the results from two robustness checks that allow me to relax the parallel trends assumption. First, I re-estimate the main model while adding canton-specific time trends. Canton-specific time trends will pick up potential bias due to time-varying confounders as long as they change smoothly over time, such as slow changes in the socio-economic composition of a canton's expatriate voter population. Reassuringly,

Table 4: Robustness checks

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Temporary suspension	-4.778	-4.749	-5.860		-5.067	-4.645	-5.249	-4.039
	(0.556)	(0.664)	(0.489)		(0.448)	(0.441)	(0.453)	(0.756)
	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]	[0.000]
Suspension (first year)				-4.952				
				(0.803)				
				[0.000]				
Suspension (second/third year)				-5.424				
				(0.458)				
				[0.000]				
Linear canton-specific time trends	✓	✗	✗	✗	✗	✗	✗	✗
Quadratic canton-specific time trends	✗	✓	✗	✗	✗	✗	✗	✗
Cantons	8	8	8	8	8	8	8	11
Electoral events	23	23	23	23	19	15	13	23
Observations	184	184	143	184	152	120	184	253

Note: The table shows coefficients from OLS regressions including canton and electoral event fixed effects. Standard errors clustered by canton (all models except 7) or by canton *and* electoral event (model 7) are shown in parentheses and p-values in square brackets.

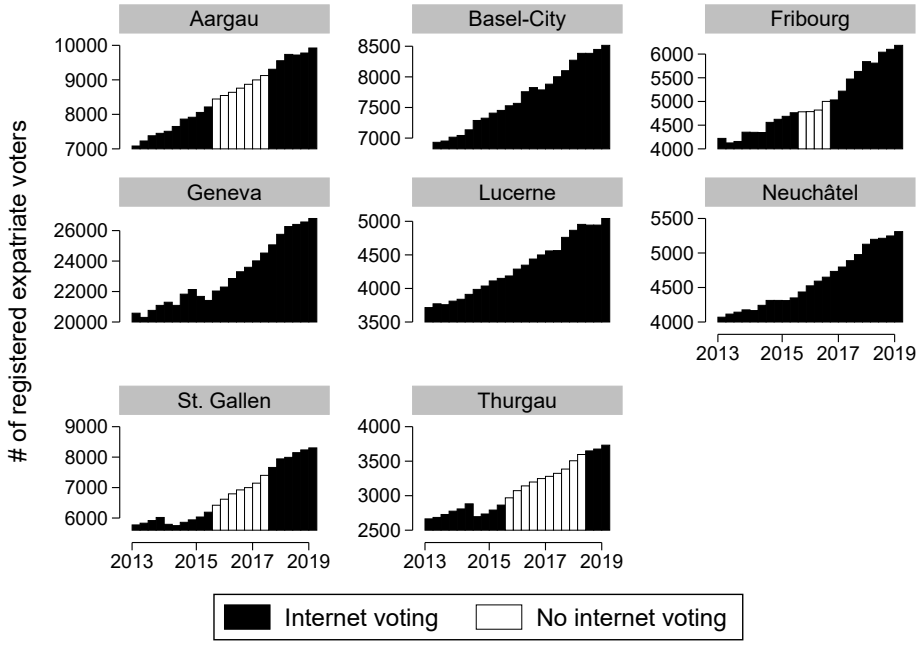
models 1 and 2 in Table 4 show that the causal estimate remains highly similar when linear or quadratic canton-specific time trends are added to the specification, respectively.

Second, I re-estimate the main model while dropping all cases with simultaneous cantonal or municipal electoral contests. In some but not other cantons, expatriates are eligible to vote not only in federal matters, but also in cantonal and municipal matters. A danger this raises is that cantonal and municipal contests that coincided with federal contests could have mobilized additional voters, which would violate the parallel trends assumption. That danger is small, given that most cantonal and (even more so) municipal votes constitute second-order contests. Still, confidence in the estimated effect is increased by the fact that the results remain similar when all 51 cases with simultaneous cantonal or municipal contests are dropped (see model 3 in Table 4).

6.2 Exogenous Sample Selection

The second key causal identification assumption is that the treatment (i.e., the suspension) has no association with the probability that eligible expatriate voters are registered to vote. Unfortunately, this assumption cannot be tested directly because the total number of eligible expatriates in the different cantons and, hence, the registration rate, is unknown. However, it is again possible to investigate the plausibility of this assumption.

Figure 4: Evolution of the number of registered expatriate voters



As argued above, the biggest threat to the assumption of exogenous sample selection emerges as the suspension of internet voting could have decreased the number of new registrations in the second half of 2015 and beyond. Fortunately, a look at the number of registered expatriate voters makes this seem unlikely. As Figure 4 shows, all eight cantons under consideration saw relatively constant increases in the number of voter registrations by expatriates throughout the observation period. Notably, this includes the time in which internet voting was suspended in four of the eight cantons. Of course, it is not possible to rule out an effect on the registration *rate* based solely on data on the *number* of registrations. Still, the fact that there are no structural breaks in the time-series makes it much less plausible that the suspension affected the registration rate in a significant way.

Model 4 in Table 4 provides additional evidence in this direction based on an indirect test. To understand the logic of this test, recall that expatriates, once they are registered to vote, remain on the electoral register indefinitely. Therefore, the suspension could only have affected the number of *new* registrations. It follows that if the suspension negatively affected the registration rate, that effect would likely have become bigger over

time, as more and more registrations would have been "lost" due to the suspension. Therefore, sample selection bias would also increase over time and we should observe temporal variation in the treatment effect. Model 4 shows that this is not the case. The treatment effect remains similarly sized during the first year of the suspension and thereafter and, according to a Wald test, the coefficients for the first year of the suspension and the remaining period of the suspension are statistically indistinguishable ($F = 0.41$; $p = 0.54$). This further improves confidence that the suspension did not cause sample selection bias.

The assumption of exogenous sample selection could also be violated in a different way. Specifically, it is possible that the earlier introduction of internet voting continued to affect the registration rate in differential ways during the early observation period (i.e., before the partial suspension in 2015). As argued above, this is not very likely because the suspension was unexpected and could not therefore have been anticipated. Moreover, I only observe cantons from 2013 onward, when internet voting had been available to expatriates for at least three years. Because internet voting is most likely to affect the registration rate around the time it is first introduced, it is unlikely that the availability of internet voting continued to affect the registration rate in differential ways between 2013 and 2015. However, it is possible to relax this assumption by starting to observe the eight cantons at an even later point in time, thus allowing the potential effect of the introduction of internet voting on registrations even more time to unfold. Reassuringly, models 5 and 6 in Table 4 show that the estimated effect remains very similar when cantons are observed only from 2014 and 2015 onward, respectively. This further improves confidence that the estimate documented above does not suffer from significant sample selection bias.

6.3 Additional Robustness Checks

Model 7 in Table 4 shows that the variance estimate is almost identical if standard errors are clustered not only by canton, but *also* by electoral event (z = -11.58; p = 0.000). In addition to serial correlation, the two-way clustered standard error estimate adjusts

for possible contemporaneous dependence among referendums and elections voted on the same date. Finally, model 8 shows that the suspension continues to have a similarly sized effect on registered expatriate voter turnout when cantons that never trialed internet voting are added to the model. This shows that the estimated effect is not dependent on my preferred choice of control units. Note that only three of the 11 cantons that never trialed internet voting provide data on expatriate voter turnout (Appenzell Innerrhoden, Uri, and Valais). All others cannot, therefore, be included in model 8.[15]

7 Conclusion

The findings of this study suggest that internet voting can markedly increase expatriate voter turnout. Importantly, the effect measured in this study is also broadly similar, if slightly larger, than the 3 to 5 percentage points increase measured in a prior study of a pilot trial with mobile voting for expatriates in West Virginia (Fowler 2020). A possible reason why the effect measured in this study is somewhat larger is that voters from West Virginia had an unusually broad range of alternative voting options including postal voting, fax voting, and e-mail voting. By contrast, the only alternative voting option enjoyed by the Swiss abroad is postal voting. However, more important is the similarity in effect sizes. Internet voting has now been shown to lead to substantively large increases in expatriate voter turnout in two different democratic settings; and in both a one-off pilot trial and in extended trials that stretched over many years and dozens of electoral events.

The results of this study can also be compared with those from the broader literature on domestic voter turnout. The evidence on the consequences of convenience voting reforms such as early in-person voting or postal voting remains inconsistent, but few studies have found effects as large as this study (cf. Gronke et al. 2008) and several have

[15]Another possible concern with my identification strategy emerges because the removal of an established voting method implies that some voters suddenly lose access to their habitual voting method. This could lead to an unusually high drop-off, especially in the period immediately after the suspension before former internet voters had the chance to (re-)develop the habit to vote by mail. Alleviating such fears, model 4 in Table 4 shows that the suspension had the same effect on expatriate voter turnout in the first and subsequent years of the suspension.

even reported null results (e.g. Hanmer 2009). As discussed in more detail above, the existing evidence on the effects of internet voting on domestic voter turnout are similarly mixed. But again, few studies have found effects as large as this study and several, including notably a study of the effect of internet voting on domestic voter turnout in two Swiss cantons (Germann and Serdült 2017), found null results. This could suggest that the potential of internet voting to boost turnout is larger when it comes to expatriates.

Nevertheless, this study cannot provide a blanket recommendation in favor of internet voting for expatriates, nor should it be read as such. First, as the Swiss experience has made clear, existing internet voting solutions have security issues (Culnane et al. 2019; Halderman 2017). More secure software solutions have been proposed, such as systems with end-to-end verification[16], but these currently remain in development (Ali and Murray 2017).

Second, a key open question refers to the relationship between internet voting and representation. Even if internet voting brings new voters to the polls, it is not necessarily the case that participation becomes more equal. In fact, it is plausible that internet voting could serve to reinforce existing representational biases, principally because richer voters are more likely to be connected to the internet and tend to have better computer skills (Alvarez and Nagler 2001; Serdült et al. 2015). There is a pressing need for studies investigating whether internet voting reduces existing representational deficits, or whether it instead leads to even more unequal mobilization.

At the same time, it should also be noted that despite the significant effect size, internet voting for expatriates may not be the 'game-changer' some have hoped it to be. In the Swiss cases analyzed here, two thirds of registered expatriate voters tended not to participate even when internet voting was available. In addition, there is an unknown number of eligible expatriates who are not even registered to vote. Of course, Switzerland is well-known for its low electoral turnout. Still, turnout among in-country voters was considerably higher during the observation period (47% among eligible voters). This suggests that high voting costs are only part of the explanation why expatriates vote at

[16]End-to-end verification provides evidence to voters that their vote is accurately recorded and included; and it provides evidence to everyone that the final result was properly tallied.

such low rates.

A key question raised by this study is then what factors other than high voting costs could explain the low turnout rates of citizens abroad. The answer is unclear because while voter turnout ranges among the most-studied outcomes in political science, almost all existing studies have focused on the determinants of turnout among in-country voters. However, it can be speculated that many expatriates, especially if they have lived outside of their home country for a long time or were even born "abroad", do not feel a sufficient connection to their home country and therefore have no desire to get involved. Relatedly, it is possible that expatriates with dual citizenship think it would be unfair to cast votes in two countries. Expatriates may also vote at lower rates due to their more limited exposure to election campaigns. Testing these and other explanations constitutes an interesting avenue for future research.

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Data Availability

The data and code required to replicate all analyses reported in this article can be found at `https://doi.org/10.7910/DVN/JTOUUO`.

References

Ali, Syed T., and Judy Murray. 2017. "An Overview of End-to-End Verifiable Voting Systems." In *Real-World Electronic Voting: Design, Analysis and Deployment*, ed. by Feng Hao and Peter Y. A. Ryan, 173–217. Boca Raton, FL: CRC.

Alvarez, R. Michael, Thad E. Hall, and Alexander H. Trechsel. 2009. "Internet Voting in Comparative Perspective: The Case of Estonia." *PS: Political Science & Politics* 42 (3): 497–505.

Alvarez, R. Michael, and Jonathan Nagler. 2001. "The Likely Consequences of Internet Voting for Political Representation." *Loyola of Los Angeles Law Review* 34 (3): 1115–1152.

Angrist, Joshua D., and Jörn-Steffen Pischke. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton, NJ: Princeton University Press.

Arrighi, Jean-Thomas, and Rainer Bauböck. 2017. "A Multilevel Puzzle: Migrants' Voting Rights in National and Local Elections." *European Journal of Political Research* 56 (3): 619–639.

Bauböck, Rainer. 2015. "Morphing the Demos into the Right Shape. Normative Principles for Enfranchising Resident Aliens and Expatriate Citizens." *Democratization* 22 (5): 820–839.

Belchior, Ana M., Joana Azevedo, Marco Lisi, and Manuel Abrantes. 2018. "Contextual Reasons for Emigrants' Electoral Participation in Home Country Elections: The Portuguese Case." *Journal of Contemporary European Studies* 26 (2): 197–214.

Berinsky, Adam J. 2005. "The Perverse Consequences of Electoral Reform in the United States." *American Politics Research* 33 (4): 471–491.

Bochsler, Daniel. 2010. *Can Internet Voting Increase Political Participation? Remote Electronic Voting and Turnout in the Estonian 2007 Parliamentary Elections*. Paper prepared for presentation at the 'Internet and Voting' conference, Fiesole, June 3–4, 2010.

Braun, Nadja. 2007. "E-Voting and External Voting." In *Voting from Abroad*, ed. by Andrew Ellis, Carlos Navarro, Isabel Morales, Maria Gratschew, and Nadja Braun, 217–233. Stockholm: International IDEA.

Caramani, Daniele, and Florian Grotz. 2015. "Beyond Citizenship and Residence? Exploring the Extension of Voting Rights in the Age of Globalization." *Democratization* 22 (5): 799–819.

Ciornei, Irina, and Eva Østergaard Nielsen. 2020. "Transnational Turnout: Determinants of Emigrant Voting in Home Country Elections." *Political Geography* 78:102145.

Culnane, Chris, Aleksander Essex, Sarah Jamie Lewis, Olivier Pereira, and Vanessa Teague. 2019. "Knights and Knaves Run Elections: Internet Voting and Undetectable Electoral Fraud." *IEEE Security & Privacy* 17 (4): 62–70.

Driza-Maurer, Ardita, Oliver Spycher, Geo Taglioni, and Anina Weber. 2012. "E-voting for Swiss Abroad: A Joint Project between the Confederation and the Cantons." In *5th International Conference on Electronic Voting 2012 (EVOTE2012)*, ed. by Manuel J. Kripp, Melanie Volkamer, and Rüdiger Grimm, 173—187. Bonn: Ges. für Informatik.

Ellis, Andrew, Carlos Navarro, Isabel Morales, Maria Gratschew, and Nadja Braun, eds. 2007. Stockholm: International IDEA.

Federal Voting Assistance Program. 2018. *2016 Overseas Citizen Population Analysis Report*. `https://tinyurl.com/y5w7d28d`.

Fowler, Anthony. 2020. "Promises and Perils of Mobile Voting." *Election Law Journal* 19 (3): 418–431.

Germann, Micha. Forthcoming. "Making Votes Count with Internet Voting." *Political Behavior* DOI: 10.1007/s11109-020-09598-2.

— . 2020. *Replication Data for: Internet Voting Increases Expatriate Voter Turnout, Forthcoming in Government Information Quarterly. Harvard Dataverse.* DOI: 10.7910/DVN/JT0UU

Germann, Micha, Flurin Conradin, Christoph Wellig, and Uwe Serdült. 2014. "Five Years of Internet Voting for Swiss Expatriates." In *CEDEM 2014*, ed. by Peter Parycek and Noella Edelmann, 127–140. Krems: Danube University Krems.

Germann, Micha, and Uwe Serdült. 2017. "Internet Voting and Turnout: Evidence from Switzerland." *Electoral Studies* 47:1–12.

Germann, Micha, and Uwe Serdült. 2014. "Internet Voting for Expatriates: The Swiss Case." *eJournal of eDemocracy & Open Government* 6 (2): 197–215.

Goodman, Nicole J., and Leah C. Stokes. 2020. "Reducing the Cost of Voting: An Empirical Evaluation of Internet Voting's Effect on Local Elections." *British Journal of Political Science* 50 (3): 1155–1167.

Gronke, Paul, Eva Galanes-Rosenbaum, Peter A. Miller, and Daniel Toffey. 2008. "Convenience Voting." *Annual Review of Political Science* 11:437–455.

Halderman, J. Alex. 2017. "Practical Attacks on Real-World E-Voting." In *Real-World Electronic Voting: Design, Analysis and Deployment*, ed. by Feng Hao and Peter Y. A. Ryan, 143–170. Boca Raton, FL: CRC Press.

Hall, Thad. 2015. "Internet Voting: The State of the Debate." In *Handbook of Digital Politics*, ed. by Stephen Coleman and Deen Freelon, 103–117. Cheltenham: Edward Elgar Publishing.

Hanmer, Michael J. 2009. *Discount Voting*. New York, NY: Cambridge University Press.

Hutcheson, Derek S., and Jean-Thomas Arrighi. 2015. ""Keeping Pandora's (Ballot) Box Half-Shut": A Comparative Inquiry into the Institutional Limits of External Voting in EU Member States." *Democratization* 22 (5): 884–905.

James, Toby S., and Paul Bernal. 2020. *Is It Time for Automatic Voter Registration in the UK?* York: Joseph Rowntree Reform Trust.

Johnston, Neil. 2020. *Overseas Voters. House of Commons Briefing Paper 5923.* `https://tinyurl.com/y5w7d28d`.

Keele, Luke, and William Minozzi. 2013. "How Much Is Winnesota Like Wisconsin? Assumptions and Counterfactuals in Causal Inference with Observational Data." *Political Analysis* 21 (2): 193–216.

Koning, Edward A. 2011. "Ethnic and Civic Dealings with Newcomers: Naturalization Policies and Practices in Twenty-Six Immigration Countries." *Ethnic and Racial Studies* 34 (11): 1974–1994.

Lafleur, Jean Michel. 2015. "The Enfranchisement of Citizens Abroad: Variations and Explanations." *Democratization* 22 (5): 840–860.

Lutz, Georg. 2012. *Eidgenössische Wahlen 2011: Wahlteilnahme und Wahlentscheid*. Lausanne: Selects-FORS.

Mendez, Fernando. 2010. "Elections and the Internet: On the Difficulties of 'Upgrading' Elections in the Digital Era." *Representation* 46 (4): 460–469.

Mendez, Fernando, and Uwe Serdült. 2014. "From Initial Idea to Piecemeal Implementation: Switzerland's First Decade of Internet Voting Reviewed." In *Design, Development, and Use of Secure Electronic Voting Systems*, ed. by Dimitrios Zissis and Dimitrios Lekkas, 115–127. Hershey, PA: IGI Global.

Navarro, Carlos, Isabel Morales, and Maria Gratschew. 2007. "External Voting: A Comparative Overview." In *Voting from Abroad*, ed. by Andrew Ellis, Carlos Navarro, Isabel Morales, Maria Gratschew, and Nadja Braun, 11–39. Stockholm: International IDEA.

Powell, Anne, Clay K. Williams, Douglas B. Bock, Thomas Doellman, and Jason Allen. 2012. "E-Voting Intent: A Comparison of Young and Elderly Voters." *Government Information Quarterly* 29 (3): 361–372.

Serdült, Uwe, Micha Germann, Maja Harris, Fernando Mendez, and Alicia Portenier. 2015. "Who Are the Internet Voters?" In *Electronic Government and Electronic Participation*, ed. by Efthimios Tambouris *et al.*, 27–41. Amsterdam: IOS Press.

Serdült, Uwe, Micha Germann, Fernando Mendez, Alicia Portenier, and Christoph Wellig. 2015. "Fifteen Years of Internet Voting in Switzerland: History, Governance and Use." In *ICEDEG 2015*, ed. by Luis Téran and Andreas Meier, 149–156. New York, NY: IEEE.

Solop, Frederic I. 2001. "Digital Democracy Comes of Age: Internet Voting and the 2000 Arizona Democratic Primary Election." *PS: Political Science & Politics* 34 (2): 289–293.

Spada, Paolo, Jonathan Mellon, Tiago Peixoto, and Fredrik M. Sjoberg. 2016. "Effects of the Internet on Participation: Study of a Public Policy Referendum in Brazil." *Journal of Information Technology & Politics* 13 (3): 187–207.

Sriskandarajah, Dhananjayan, and Catherine Drew. 2006. London: Institute for Public Policy Research.

Trechsel, Alexander H., and Kristjan Vassil. 2011. *Internet Voting in Estonia: A Comparative Analysis of Five Elections since 2005*. Florence: European University Institute.

Zeldow, Bret, and Laura A. Hatfield. 2019. *Confounding and Regression Adjustment in Difference-in-Differences Studies*. Mimeo, Harvard University.