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The diffusion of internet voting. Usage patterns of internet voting in Estonia between 2005 and 2015☆

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ABSTRACT

E-voting has the potential to lower participation thresholds and increase turnout, but its technical complexity may produce other barriers to participation. Using Rogers' theory of the diffusion of innovations, we examined how the use of e-voting has changed over time. Data from eight e-enabled elections between 2005 and 2015 in Estonia, were used to investigate changes to the profile of e-voters and contrast them to those voting by conventional means. Owing to the aggregate share of e-voters increasing with each election, with one third of voters now casting their vote remotely over the internet, there was a lack of conclusive evidence regarding whether the new voting technology had diffused homogenously among the voting population, or remained a channel for the resourceful and privileged. Our findings show that diffusion has taken place, but not until after the first three e-enabled elections. Thus, internet voting has the potential to be used by a wide range of voter types, bridge societal divisions, and emerge as an inclusive innovative voting technology.

1. Introduction

Remote internet voting[1] has long been discussed as a means of increasing voter turnout in developed democracies, especially among younger people (Alvarez & Hall, 2004; Alvarez, Hall, & Llewellyn, 2008; Norris, 2001, 2003). However, such technology can only have a significant impact on political participation when its usage becomes widely diffused. Voting technologies can empower people who have faced participation hurdles (Vassil & Weber, 2011). Socially excluded groups or people with reduced mobility should especially benefit from modes that make it easier to cast a vote (Alvarez & Hall, 2004; Gibson, 2001). Such increased empowerment might also increase voter confidence and their willingness to participate in elections (Alvarez & Hall, 2006; Alvarez et al., 2008). As participation is required for effective representation, easily usable voting modes should, in theory, ensure a better overlap between the elected representatives and society. However, technology can also present additional barriers to the already disadvantaged, in effect nullifying its theoretical promise (Berinsky, 2005; Norris, 2003). It also needs to be acknowledged that e-voting will not address underlining reasons for abstention, such as political disillusionment or a lack of political interest. This does not mean that internet voting is a "technological fix" to an issue that cannot be fixed using technology. E-voting can impact turnout among those who have accessibility problems, such as the disabled and elderly. Moreover, it can also mobilize those who do not have clear mobility problems, but who simply do not vote due to inconveniences related to conventional voting. Thus, e-voting is first and foremost a convenient voting method and therefore should appeal to those parts of the electorate who have abstained due to paper voting being too cumbersome.

The actual practice of remote e-voting has been implemented in a limited number of countries. Exactly how remote e-voting influences voting behavior and parties' strategies is unknown. Studies on technology usage show that the most likely users and beneficiaries are young, technology savvy, well-resourced, and connected people (Schlozman, Verba, & Brady, 2010; van Dijk, 2000, 2005). There is clear evidence that the same applies to the early adopters of e-voting (Alvarez, Hall, & Trechsel, 2009; Trechsel & Vassil, 2011). However, what we do not know is whether e-voting has the potential to diffuse beyond this subpopulation to a broader and less homogenous group of voters, or whether it remains a tool for those with skills and resources. As diffusion is the prerequisite of e-voting having a large impact upon turnout, discussions about how and why new modes of voting might improve participation or representation, require empirical evidence of the

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[1] We use the terms e-voting, remote internet voting, and internet voting interchangeably throughout this paper to describe online voting using a remote computer and digital identification, i.e. voting without visiting a polling station.

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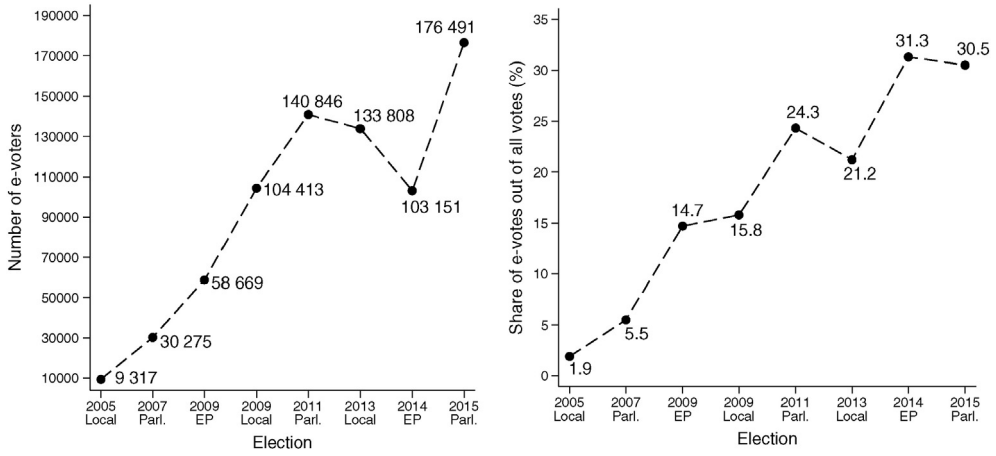

Fig. 1. Dynamics of e-voting in Estonia, 2005–2015.

conditions and patterns by which new technologies are adopted over time. If the rate of adoption of a new voting technology is slow and its diffusion limited to specific subpopulations of the electorate, it is unlikely that e-voting will have a positive impact upon voter turnout and quality of representation.

This paper addresses precisely the question: Who are the e-voters and has their profile changed over time? We used unique cross-sectional survey data from all eight of the legally binding e-enabled elections in Estonia between 2005 and 2015. Our goal was to determine whether the technology has diffused among the voter population, or whether it remains a convenient technical solution for a group of people already engaged in politics and who face limited barriers to participation in the first place.

1.1. E-voting in Estonia

Since 2005, Estonia has had a total of eight e-enabled elections where eligible voters could cast binding ballots over the internet. Internet voting has been used for local, national and European elections. The number of e-voters in the first e-enabled election was only 9317 (Fig. 1). However, the number increased in each succeeding election, reaching 176,491 in the 2015 national elections. In relative terms, the share of internet votes of total votes grew from a mere 2% in 2005 to >30% in 2014 and 2015.

A prerequisite for casting an electronic vote is a credit card sized electronic ID-card,[2] which are compulsory for all Estonian residents. Using digital identification, voters can use their personal computers when connected to the internet and equipped with a smart card reader, to cast an electronic vote (Alvarez et al., 2009). E-voting is available during the advanced voting period via a website hosted by the Estonian National Electoral Committee (2005–2011). E-voting itself involves three steps; first, the user opens the website and with their ID-card and first PIN-code to identify themselves, enters the system; second, after the system has verified the identity of the voter, it displays the list of candidates by party in the voter's respective district; third, by clicking on a candidate's name and then entering their second PIN-code, the voter casts their vote.[3]

The first five elections were reasonably similar for the user-end, with the only marked difference being the length of period during which e-voting was available: three days in 2005 and 2007; and 7 days in 2009, 2011 and 2013. From 2009, e-voters needed to download a voting program instead of voting via the web-embedded application. In 2013, a vote verification feature was introduced to the e-voting system that allowed voters to verify—using a smartphone or tablet—whether their electronic vote was received as cast. Other than these differences, the eight *e*-enabled elections were reasonably similar, providing a valid point of comparison of the related dynamics in user behavior.

On the technical side, e-voting requires internet access and a minimum level of computer literacy, both of which are not universal in Estonia. However, the act of e-voting is no more difficult than other online activities, such as banking or shopping.

2. Measuring diffusion

Theories on the diffusion of technological innovations provide a foundation for measuring and explaining the potential spread of e-voting in a society. The classical accounts of the diffusion of innovations provided by Ryan and Gross (1943) and Rogers (2003[1962]) have stood the test of time, being used over the years to explain a wide variety of phenomena, ranging from the spread of agricultural practices (e.g. Fliegel, 1993) to political reforms and policies (e.g. Starr, 1991; Jahn, 2006), medical practices (e.g. Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004), management (e.g. Abrahamson, 1991), and most crucially, technological applications in very different fields (e.g. MacVaugh & Schiavone, 2010). Rogers' (2003) account sees the diffusion of technology as a sequence of steps in an *innovation decision process*. This process includes gaining knowledge of the technology, being convinced of its usefulness, and ultimately, deciding to implement it. Adoption occurs if expectations are positively confirmed by experience. Once a distinct subgroup has reached the adoption stage and built up a critical mass of users, subsequent diffusion is reminiscent of a bank-run, where the number of people adopting it is partly a function of the number of prior adopters (Rogers, 2003: 206). This sequence has been demonstrated to apply to both collective and individual actors (see Wejnert, 2002).

The crucial aspect of using Rogers' account to explain e-voting regards the changing profile of adopters of technology at different stages of the process. The first adopters tend to be a small number of well-informed, innovative risk-takers (Rogers, 2003: 263). The secondary and tertiary adopters should more closely resemble the general population, and the unique characteristics associated with the first adopters should continually become less prominent. Eventually, even technological laggards might be motivated to adopt the technology, as the relative gains outweigh the costs of adopting (Rogers, 2003: 263–265).

As with every new internet technology, adoption requires a certain level of digital literacy, which is not always evenly distributed across social groups. This suggests that internet voting is most likely to appeal to

[2] Since 2011 voters can also use a smartphone-based mobile ID (using a special SIM card and PIN-codes) to authenticate themselves to the e-voting system. The ID card, however, is the more widely used identification method.

[3] For further details on the process of e-voting, see: http://vvk.ee/voting-methods-in-estonia/engindex/; Estonian National Electoral Committee (2005); OSCE/ODIHR (2007, 2011); Vassil and Weber (2011); Trechsel and Vassil (2011).