Trusting e-voting amidst experiences of electoral malpractice: The case of Indian elections

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Abstract

This paper constructs explanatory theory on trust in e-voting, a term that refers to the use of stand-alone IT artefacts in voting stations. We study e-voting as a techno-organisational arrangement embedded in the process of elections and the broader socio-economic context of a country. Following a critical realist approach, we apply retroduction and retrodiction principles to build theory by complementing existing studies of e-voting with insights from an in-depth case study of elections in India. First, we seek evidence of trust in e-voting in the responses of the public to the announcement of election results. Then we derive the following four mechanisms of trust creation or loss: the association of e-voting with the production of positive democratic effects; the making of e-voting part of the mission and identity of electoral authorities; the cultivation of a positive public attitude to IT with policies for IT-driven socio-economic development; and, in countries with turbulent political cultures, a clear distinction between the experience of voting as orderly and experiences of malpractice in other election tasks. We suggest that these mechanisms explain the different experience with e-voting of different countries. Attention to them helps in assessing the potential of electoral technologies in countries that are currently adopting them, especially fragile democracies embarking upon e-voting.

Keywords: e-voting, trust, India, critical realism, explanatory mechanisms, retroduction

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INTRODUCTION

E-voting refers to the casting, counting and tabulating of votes with the use of electronic systems in polling stations of national or provincial multiparty elections and referendums (IDEA 2011)[i]. With e-voting technologies, electoral management bodies (EMBs) may achieve better management of the logistics of elections and speedily produce election results (Fujiwara 2015; Hidalgo 2010). Speed of announcing results is important because long waiting breeds voter suspicion and, in some countries, it triggers violence. E-voting may reduce spoilt votes and enfranchise illiterate and certain categories of disabled citizens (Fujiwara 2015). It may also assist EMBs to overcome historically developed forms of electoral fraud (IFES 2013). But none of these benefits can be taken for granted. The use of e-voting technologies entails risks of mismanagement, disenfranchising voters, and introducing new possibilities of electoral fraud by manipulating the ICT artefacts (Loeber 2008; Wolchok et al. 2010).

E-voting is a contested way to conduct elections, with diverse attitudes and experiences around the world. In Brazil, India, Belgium, and several states of the US, elections have been conducted with e-voting technologies for more than ten years with widespread public confidence (Esteve et al. 2012; IDEA 2011; McCormack 2016). But in most countries, election stakeholders and public opinion towards electronic technologies have been cautious and sometimes decisively negative. The German High Court, for example, declared e-voting unconstitutional (Wynne 2009). Some countries make limited use of e-voting, only in municipal elections, in only some locations, or only as an option for disabled voters. Several countries, including the UK, Ireland, Paraguay, Bahrain, piloted e-voting technologies and decided not to use them (Melia et al. 2012). The Netherlands withdrew the e-voting machines after more than 20 years of use and returned to paper ballots (Oostveen 2010). Nevertheless, interest in e-voting technologies has been increasing in Asia, Africa and South

America (Esteve et al. 2012; IFES 2013). E-voting started being used in The Philippines in 2010, Bhutan in 2013, Namibia in 2014, and several other countries, including Ecuador, Mexico, Peru, Nigeria, Nepal have recently been piloting such technologies. According to the most recent survey data available (IDEA 2015), voting machines are currently being used in 26 countries for national or sub-national elections, or a combination of both. Eight countries have used e-voting in the past but withdrew it under public protestation or over different forms of security concerns. In 18 other countries, feasibility studies and/or tests have opened up the possibility of switching from current manual systems to electronic ones (IDEA 2015).

Motivated by the puzzling diversity of public opinion about the trustworthiness of an information technology (IT) application that concerns one of the core institutions of democracy, in this paper we seek to explain what engenders public trust in e-voting. Trust is highlighted in the literature on elections as a particularly important condition for democracy (IDEA 2011; McCormack 2016; Norris 2014; Sances et al. 2014). From an information systems (IS) perspective, the withdrawal of voting machines and reversal to paper ballot is an unprecedented phenomenon of reversing an IT infrastructure for a social activity but has received little attention in IS research. We study e-voting as a special case of nationwide socio-technical systems that are part of the organisational arrangements of the state, and seek to understand the creation of public attitude towards them.

We draw empirical evidence from India, which has been conducting elections with e-voting since 2004. Indian elections involve huge mobilisation of staff, logistics and security deployment: the general election in 2014 was the largest election ever conducted in history. Despite various malpractices, elections in India are a source of pride for the nation (Banerjee 2007) and a model of e-voting for many developing countries (Quraishi 2014). Our empirical study starts with observations of voter response upon announcement of voting results – acceptance or protestation – which we take as evidence of public trust in e-voting or suspicion towards it. We then examine mechanisms that generate trust or suspicion.

We adopt a critical realist (CR) perspective of incremental explanatory theory building by analogy and retroduction. Theorising by analogy (also known as 'retrodiction' in the conceptual vocabulary of critical realism) entails 'transforming existing cognitive resources into plausible theories of the mechanisms responsible for identified (typically less than strict) patterns of phenomena' (Lawson 1998). Retroduction is understood as 'positing mechanisms which, if they were to exist and act in the postulated matter, would account for phenomena singled out for explanation' (Lawson 1998). We draw analogies from prior explanation of trust in e-voting in Brazil (Avgerou 2013a; Frank et al. 2017; Gonggrijp et al. 2007b) and from research that investigated the withdrawal of e-voting in the Netherlands (Gonggrijp et al. 2007a; Loeber 2008; Oostveen 2010).

In the next section we review relevant literature to identify the main concerns about e-voting. We then explain the theoretical foundations of our research and justify our focus on the formation of trust in e-voting. We frame e-voting as a socio-technical entity in the context of the election cycle of democratic countries. We proceed to outline our research methodology, which we derive from critical realism, and then present and analyse the case study of e-voting in India. We first seek evidence of trust in e-voting, examining voters' responses to the announcement of election results. We then examine mechanisms that engender such trust, eliciting evidence from our field work and comparing it with existing understandings of trust in e-voting gained in prior research in Brazil and the Netherlands. We thus derive a mechanism-based causal explanation of trust in e-voting. In the conclusions, we point out the potential of our theoretical contribution to explain trust in other public sphere socio-technical systems, and derive practical insights for policy makers considering e-voting.

CONCERNS ABOUT E-VOTING

Some governments have computerised the polling and counting process in an end-to-end fashion, others only parts of it. Invariably, e-voting takes place in a controlled environment in polling stations, polling kiosks, or other locations supervised by officers appointed by the EMB. Commonly used are Direct Recording Electronic (DRE) voting machines (EVMs),

which comprise ballot devices located in polling booths and used by voters to cast their votes, and a control unit in the polling station used by polling officers, on which votes are recorded and aggregated (IFES 2013; Wolchok et al. 2010).

Multiple benefits are expected from voting technologies, but there are also important concerns about them. A summary of both and relevant literature sources are shown on Table 1. In this section we focus on the concerns surrounding the use of EVMs, which are likely to affect negatively perceptions of the trustworthiness of e-voting: their reliability for recording votes, the potential for fraudulent manipulation of the technologies, the extent to which technology allows for secrecy of individual votes and possibility for verification.

Expected Benefits	**Sources**
Improved management of the logistics of the elections	IDEA (2011), IFES (2013), Fujiwara (2015), McCormack (2016)
Reduction in the number of null and invalid votes; faster production of election results	IDEA (2011), IFES (2013), Fujiwara (2015), McCormack (2016)
Enfranchisement of illiterate and disabled people with technologies designed for their needs	Hidalgo (2010), IDEA (2011), IFES (2013), Fujiwara (2015)
Potential to combat various forms of electoral fraud (e.g. stuffing the ballot box)	IDEA (2011), IFES (2013), McCormack (2016)
Increased convenience for voters	Hidalgo (2010), IDEA (2011), Fujiwara (2015)
Concerns	**Sources**
Difficulties in assessing reliability of the recording of casted votes	Selker & Goler (2004), Stewart (2004), Loeber (2008), Wolchok et al. (2010), Stewart (2017)
Lack of transparency – potential for fraudulent manipulation of the technologies	Feldman et al. (2006), Gonggrijp et al. (2007), Wolchok et al. (2010), Halderman et al. (2015)
Potential for violation of the secrecy of the votes casted	Gritzalis (2002), Feldman et al. (2006), Gonggrijp et al. (2007), Loeber (2008), Wolchok et al. (2010)
Limited possibilities to recount votes	Feldman et al. (2006), Stewart (2004), Halderman et al. (2015)
New types of errors induced by voting machines	Zucco and Nicolau (2016)

Table 1 Potential benefits and concerns associated with e-voting

Several of the expected benefits and issues have been studied in the context of American elections in the aftermath of a major controversy about the extent to which maladministration and malfunctioning of voting technologies distorted the election outcome in the 2000 Presidential election (Stewart 2004). Since the 2002 Help America Vote Act (HAVA), the United States saw a massive investment in voting machines (IDEA 2011), and their diversity across states has provided opportunities for studying several aspects of election administration and voters' attitudes (Sances et al. 2014; Selker et al. 2004; Stewart 2017).

A major concern about EVMs is inaccurate recording of votes. Researchers of the Caltech/MIT Voting Technology Project (VTP)[ii] estimated that in the 2000 election "between 1.5 and 2.0 million voters failed to have their vote registered because of voting machine failures" (Stewart 2017). Subsequent research scrutinised the design of new voting machines and debated the extent to which improved technologies overcome the lost votes problems of the 2000 elections. E-voting in Georgia, a state whose residual vote rate in the 2000 presidential election was the second highest in the country, received a great deal of attention. Research by computer scientists found security vulnerabilities in the EVMs introduced in the subsequent election (2002) but it also found significant reductions in 'lost votes'.

Estimates of 'lost votes' are fraught with difficulties of causal interpretation. The commonly used construct of 'residual vote', computed as the percentage of ballots cast that did not record a vote in a particular race, does not separate intentional non-voting from errors or malfunctioning in voting machines (Alvarez 2009; Alvarez et al. 2005). Studies in other countries produced mixed results about the capacity of EVMs to accurately record voters' preferences. In Brazil, research showed that EVMs have in many elections reduced the number of common errors that result in 'spoilt votes' (Fujiwara 2015). But voting with EVMs seems to have created new complications. Zucco and Nicolau (2016) argued that electronic technology in Brazil, while reducing the number of spoilt votes, caused a sharp rise in party-label votes (*votos de legenda*) i.e. votes for parties rather than individual candidates.

Beyond technical malfunctioning that may cause problems for accurate recording of voters' preference, computer scientists frequently also voice concern about the vulnerability of e-voting systems to manipulation by insider agents or external hackers (Feldman et al. 2006; Halderman et al. 2015; Wolchok et al. 2010). Vote rigging is an ever present threat in all countries, including long established democracies (Caro 1990). E-voting opens new avenues for fraud by manipulating the software and hardware components of voting machines. Secrecy about the software and hardware design is often presented as a mechanism to protect EVMs from hacker tampering. Computer security experts challenge the prudence of such policy, and concerns about malicious hacking are more acute in systems provided by commercial vendors who do not allow access to test their systems software claiming copyright protection (Loeber 2008; Moynihan 2004).

Another major concern is whether EVMs protect vote secrecy. To ensure that votes are cast freely, the voting systems should not make it possible to trace links between vote and voter. Several technical features, such as automated authentication procedures and a voting time recording function in the control unit, may make it possible to trace voters' identity (Gritzalis 2002). An apparently opposite concern is the need for the possibility of verification that votes cast are recorded as the voter intended. The need to reconcile secrecy and verifiability is one of the most salient features of e-voting, and the one that makes it unique in the landscape of IT applications. IT applications are normally constructed in such a way that output-based verification is possible: for example, if customers are not sure about the reliability of a banking transaction system, they can check their account statement to ensure all transactions have been properly recorded. But the importance of secrecy of the vote, which is a central feature of elections in democracies (Pastor 1999) requires the obliteration of any connection between the voter's identity and the vote cast. The absence of a paper trail makes it hard to convince the voter of the reliability of the system, and removes the option of recounting for verification:

> (…) breaking the link between voter and vote means that the examination of an e-voting system after an election cannot prove directly that every vote was indeed counted and tallied as cast. This is why indirect proofs of the validity of the electronic results, such as paper trails or system certification are important. Without such mechanisms, manipulated or incorrect results produced by an e-voting system could remain undetected for a long time. (IDEA 2011)

Thus, a core issue in the debate on the merits of e-voting is the presence or not of a paper trail, or VVPAT, to provide a physical record of the voters' choices. By manually recounting the VVPAT receipts, the results presented by the voting system can be independently checked, and the results of an election can be verified by a manual recount from a random sample of polling stations (IDEA 2011). But VVPAT has problems too (Ansari et al. 2008). Selker and Goler (2004) found potential problems with ergonomics, logistics, security, fraud and mechanical fragilities of paper trail machines.

Few technology and elections experts who highlight and analyse technology vulnerabilities and security risks of e-voting systems call for an altogether banning of EVMs in elections. Most tend to suggest combinations of technology features and organisational measures to make them more reliable and secure (Shahandashti et al. 2016; Volkamer 2009; Xenakis et al. 2005). Technology fixes include improvements of screen design to avoid user errors, encryption, and the provision of VVPAT (Ansari et al. 2008); organisational measures include tests of the accurate recording of votes during the deployment of the technology (Ganz et al. 2016; McCormack 2016). Drawing mostly from the experience of the use of EVMs in the US, Moynihan (2004) concludes:

> (…) there is no such thing as a completely secure electronic system, and therefore e-voting will never be error free. However, given current trends in the adoption of DREs, it may be better to seek a system that moves DRE towards high reliability rather than rejecting technology that will be adopted anyway. (p. 526)

STUDIES OF TRUST IN VOTING TECHNOLOGIES

While the technical and organisational characteristics of e-voting rightly attract scrutiny and discussion, the literature on elections also highlights the significance of voters' trust (IDEA 2011; McCormack 2016; Norris 2014; Sances et al. 2014). Suspicion of maladministration or fraud in voting leads citizens to doubt whether the election results are an accurate representation of cast votes, consequently causing doubts about the legitimacy of elected governments (Norris 2014). We assume a continuum between complete trust and complete suspicion, rather than a binary of trust and mistrust. We take trust to be the perception of the trustworthiness of a system. As such, trust is not a direct reflection of trustworthiness properties of a system and requires careful research to understand the way it is manifested and the way it is produced or damaged (Avgerou 2013a; Gandhi 2014; Gonggrijp et al. 2007b; Oostveen et al. 2004; Oostveen et al. 2005; Verma 2005). We take trust to be an enacted cognitive state of voters, which is associated with their life experiences of interaction with multiple actors embedded in the political and socio-economic context of a country (Weick 1988).

Often research in e-voting refers to confidence rather than trust. The difference between trust and confidence has been debated in economics, sociology and political science (Luhmann 2000; Newton et al. 1999; Tonkiss 2009). A generally accepted view is that trust is a matter of a risky choice while confidence does not presuppose perception of risk and does not involve a choice over alternatives (Pieters 2006). In our research we assume that trust is an appropriate concept because people have a choice of action based on their perception of its trustworthiness. Non-trust is evidenced by action that challenges the election arrangements, non-participation in voting, or challenge of election results. Another distinction between trust and confidence is made by Newton and Norris (1999), who use the term trust to refer to interpersonal relations, and confidence to refer to institutions. Nevertheless, the term 'political trust' is widely used in political science to refer to trust in

institutions, e.g. the police, parliament, army, and this is the notion we adopt in this paper (Avgerou 2013a).

Evidence about citizens' trust, or confidence in e-voting has been sought through public opinion surveys. Some studies that compare EVMs to traditional voting methods find high levels of confidence and indeed user preference for e-voting (Alvarez et al. 2011). In the aftermath of the 2000 election in the US, Everett et al. (2008) find significantly greater user satisfaction with EVMs as compared to traditional paper ballots. Several hypotheses about factors contributing to voters' confidence about election results have been tested with survey data, including satisfaction with the outcome of the elections and confidence in voting technologies. Sances et al (2014), for example, examine 30 national surveys and, among other findings, they note that voters seem to be more confident when the type of ballot technology used in their country remains the same from election to election.

When available, public survey data provide useful indicators of levels of trust and evidence to test the validity of various postulated hypotheses about conditions that engender trust. But data on public attitude towards e-voting are lacking in many countries; they are lacking in India, Brazil, and most other countries using or planning to use e-voting. More importantly, survey data on a complex concept such as trust in e-voting hide ambiguities of interpretation of responses. Ambiguities may stem from perceptions of the object of trust in e-voting – for example whether responders are aware of the voting machine embedded in a political context (Pieters 2006), or of the technical features of the voting machine and of alternatives (Smith 2016). Surveys of opinions on trust may not correspond to subsequent behaviour that involves trust or suspicion. Often responders indicate in surveys mistrust towards an institution, for example to a particular type of schools, while they voluntarily continue to prefer them to alternatives (O'Neill 2002). Public surveys of citizens' opinions without adequate causal explanation that associates attitudes towards e-voting with contextual conditions may produce misleading indicators of trust. Indicatively, some surveys of perceptions of e-voting in the Netherlands in the mid-2000s, showed highly positive attitudes

to e-voting, in contrast to the wave of suspicion that led to the withdrawal of the systems and reversal to paper ballot in 2006 (Oostveen et al. 2005; Oostveen 2010).

Following methodological guidelines for critical realist research, our case study approach is best suited to trace such causal context-specific processes of trust creation. It allows us to examine the way technology artefacts come to produce effects in relation to their immediate setting of use as well as broader historically formed circumstances and socio-political institutions.

THEORETICAL FRAMING OF THE STUDY

The functionality of the artefacts used for voting, the easiness of their use, their security features, robustness or propensity for malfunctioning (Altman et al. 2002; Kallinikos 2012; Selker et al. 2004; Stewart 2004) are all important contributors to the conduct of voting and voters' perception of the trustworthiness of elections. But an explanation of organisational and social phenomena involving IT on the basis of technology properties alone is too limited (Markus et al. 1988). To explain phenomena involving IT artefacts, human-computer-interaction (HCI) research looks beyond the artefact and draws from social theories to consider the context of their use (Dourish 2004; Nardi 1996). In IS, theory on the socio-technical (or socio-material) nature of phenomena involving technology suggests that explanations should consider not only the material properties and the digital functionality of technology artefacts but also the way these make sense to people and are enacted in the context of organisational processes (Leonardi et al. 2012; Markus et al. 2008; Mutch 2010; Orlikowski 2007; Volkoff et al. 2007). In this study, we take the object of trust to be a socio-technical entity of the cycle of elections, embedded in a country's political institutions and socio-economic conditions.

A socio-technical perspective of e-voting shifts the focus on the material properties of EVMs to the way they are deployed in polling stations, supervised, and enacted in specific elections. E-voting in our study is a techno-organisational arrangement embedded in the political and socio-economic context of a country or region. It comprises technology

mediated practices organised by EMBs in relation to other actors involved in the processes of e-voting, such as technology service providers, political party representatives, election observers, the media, etc. The object of trust in our research is a voting technology intertwined with the regulated practice of a government organisation, the EMB, in a country's election processes.

A critical realist perspective provides a theoretical basis for expanding the context considered in the explanation of a phenomenon beyond the organisational actors involved in the socio-technical configurations of voting and counting to examine broader processes and institutions that influence the formation of the phenomenon (Archer 2003; Dobson et al. 2013; Njihia et al. 2013).

Most relevant for explaining voters' perceptions and behaviour in elections concern the state of a country's democracy. (Altman et al. 2002; Beetham et al. 2008; Schmitter et al. 1991). Elections are a core aspect of a democratic regime, closely related to other institutions of democracy, such as citizenship and civil rights, as well as the socio-economic, cultural and political conditions enabling or inhibiting the effective performance of democratic institutions. Among the socio-economic conditions that restrict effective enactment of democratic principles of equality and liberty are illiteracy, poverty, and cultural traditions of discrimination of certain categories of citizens, as in the Indian caste system.

The most immediate aspect of the context of a country's democracy for the socio-technical e-voting system is the process of elections. In the next section we draw from the literature of political science to understand what it entails.

The electoral cycle

The notion of electoral cycle refers to the activities that recur between an election and the next one. The cycle comprises several stages "from the design and drafting of legislation, the recruitment and training of electoral staff, electoral planning, voter registration, the registration of political parties, the nomination of parties and candidates, the electoral

campaign, polling, counting, the tabulation of results, the declaration of results, the resolution of electoral disputes, reporting, auditing and archiving" (Norris 2013a, p. 567). Articulating the stages of the cycle provides a basis for assessing 'well functioning elections' and for identifying electoral malfunctioning (Bjornlund 2004; Elklit et al. 2005). Influential in the debate of what constitutes well-functioning elections is the normative theory of electoral integrity (Birch 2011; Norris 2013b) which elaborates global norms and standards governing the conduct of elections, including procedural correctness of all election stages.

Electoral malpractice refers to violation of electoral integrity. Norris (2013a) distinguishes *first-order* malpractice, involving for example deadly violence and human rights violations, from *second-order*, involving more mundane issues of maladministration. Although first-order malpractice usually attracts greater media attention (Bratton 2008; Dercon et al. 2012; Smith 2009), second-order malpractice can significantly affect voters' perception of electoral integrity. It concerns administrative deficiencies of diverse kinds, ranging from exclusion of entitled citizens from the electoral rolls to errors in voter authentication and vote counting (Birch 2011; Piccolino 2015; Piccolino 2016). Fraud occurring on the polling day is a small part of the all-encompassing election process and the range of issues that may compromise the extent to which election results represent citizens' preferences.

The model of electoral integrity (Figure 1) provides the rationale for associating trustworthiness of e-voting, as an aspect of electoral integrity, with public trust and acceptance of election results. This relationship is often expressed in negative terms of malpractices and their consequences: Election malpractices create perceptions that elections are fraudulent and damage citizens' trust in the electoral institutions or processes, leading to protests challenging the legitimacy of election results.

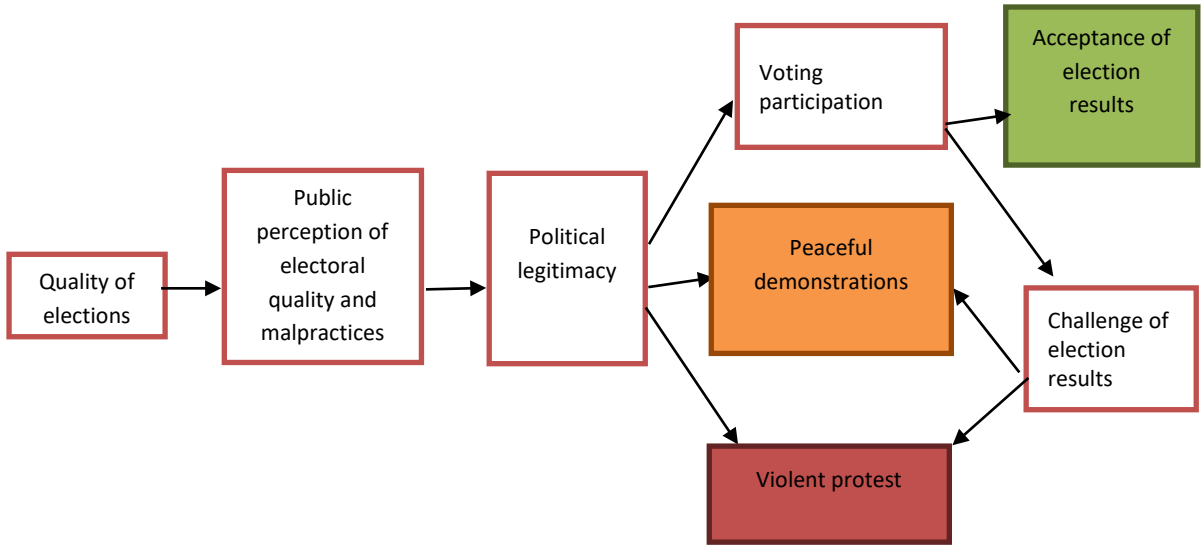

Figure 1 The model of electoral integrity.

Source: adapted from Norris (2014: 11)

We draw the following assumptions from this model of electoral integrity: if voters perceive the elections as politically legitimate and participate in voting, depending on whether they trust e-voting they will accept election results or they will protest, either peacefully or violently. Voter protests, however, either prior or after the election day, may be caused by doubts of political legitimacy and discontent with other aspects of the election cycle. A challenge for the study of trust in e-voting is the disentangling of the various public concerns expressed in post-election observed action.

RESEARCH METHODOLOGY

Our case study aims to identify and explain citizens' trust or suspicion in e-voting in India by following a methodology informed by critical realism, a general theory which provides a rationale for developing empirically supported causal explanations. According to critical realism, observed phenomena are a subset of possibilities that may occur from the enactment of causal powers and structures of entities existing in the 'real world' independently of human perception (Lawson 1998; Mingers et al. 2013; Smith 2006; Wynn

et al. 2012; Zachariadis et al. 2013). A causal explanation is constructed by identifying generative mechanisms, that is, by 'detailing the means or processes by which events are generated by structures, actions, and contextual conditions involved in a particular setting' (Wynn et al. 2012).

Mechanisms are often unobservable. We infer their existence from examining observed phenomena, their constituent elements and their context, and making assumptions of causal associations between them. Often multiple possible sets of interacting mechanisms are empirically detected and, in such cases, the researcher has to compare their explanatory power and to judge which ones are supported by empirical evidence. In any case, mechanism-based explanation is inherently incomplete and non-generalisable across contextual settings. Most of the times there are complementary mechanisms that interact with the ones manifested in an empirical study. Also, detected mechanisms in one case may not be activated under different contextual conditions.

Although, according to critical realism, phenomena are rarely replicated in an identical form across contexts, similar contextual settings may give rise to 'demi-regularities' of causal mechanisms. Mechanisms explaining the formation of a socio-technical phenomenon in one setting provide plausible hypotheses for investigation of similar phenomena in a similar setting. We build theory by hypothesising the existence of mechanisms in a specific context and seeking empirical evidence for their validity. 'Best suited' for theory development in critical realist research are case studies, although quantitative methods can be used to identify causal mechanisms occurring in multiple contexts and assess their validity (Dobson 2001; Easton 2010; Wynn et al. 2012; Zachariadis et al. 2013). Findings from case studies can incrementally contribute to theory building by describing mechanisms in conceptual terms (Lee et al. 2003), which are subsequently validated and refined in other cases of similar contexts.

According to the methodological principles suggested by Wynn and Williams (2012), a general structure for a critical realist case study is as follows:

1. The starting point is an observation of a phenomenon to be explained.
2. Description of the phenomenon in terms of constituent components and its context.
3. Hypothesised mechanisms that generated the phenomenon in the specific context of the study. In the terminology of critical realism, the identification of plausible explanation is called retroduction if the mechanisms are inferred by thinking what processes and conditions may have brought about the observed phenomenon, and retrodiction if mechanisms are hypothesised by analogy, having been identified before in other similar settings. In other words, retroduction identifies new mechanisms, while retrodiction examines the validity of already known mechanisms in a new setting.
4. Analytical assessment of the validity of the hypothesised mechanisms; consideration of alternative explanations; selection of combinations that offer the most satisfactory explanation. Analysis draws from multiple data sources, triangulating evidence and enriching insights from multiple points of view to strengthen the validity of causal claims.
5. Theoretical stock taking; generative mechanisms across contexts.

Following the critical realist epistemology and methodological guidance, our research aims to explain the way contextual conditions create public trust in e-voting. But both trust and the mechanisms that generate it are unobservable. In this research we infer the existence of trust in polling results produced by e-voting from the observation of public acceptance of or disputes and protests over the election outcomes. We then identify mechanisms that explain the creation of citizens have confidence that the election results produced by the socio-technical entity of e-voting are a faithful account of the preferences of the electorate.

Thus, more specifically, in the case study of Indian e-voting, the starting point is the observation of public responses when election results are announced. Then we construct a two-stage explanation, involving two sets of hypotheses and analytical assessments. The

first hypothesis is that e-voting is highly trusted in India. We confirm by retroduction that observations of public responses to election results in India suggest the existence of trust in e-voting. We then hypothesise mechanisms explaining the production of trust in the Indian e-voting. We do so by a combination of retrodiction, seeking evidence to corroborate the validity of mechanisms identified in other cases (Avgerou 2013a; Loeber 2008; Oostveen et al. 2004), and retroduction, identifying an additional mechanism from the study of the Indian elections.

Data collection

We chose to study e-voting in India because of its reputation as a successful case of EVM use in nationwide and state elections since 2004. We started with a literature review to familiarise ourselves with the political history of India since independence, in particular the history of its elections (Banerjee 2007; Banerjee 2014; Corbridge et al. 2000; Corbridge et al. 2005; Quraishi 2014). The scale of election operations and complexity of this context of e-voting, the mix of very large numbers of socio-economically disadvantaged with an increasingly large middle class and a sizable privileged group, and differences among states and regions make it an extreme case as far as the organisational effort of e-voting is concerned.

We drew data from multiple sources, listed in the Appendix. Primary data were collected over three research visits in April 2015, August-September 2015 and May 2016. During the first two visits, we conducted interviews with electoral officers, engineers who worked in the companies that designed and produce the EVMs, members of political parties, journalists, political scientists, civil society activists and voters in the states of Karnataka and Kerala. Voters were interviewed in multiple contexts. We also triggered conversations with personal acquaintances in public places, such as tea stalls and street markets, to elicit perceptions of e-voting by the general public.

We thus formed a general understanding of Indian elections, the social and historical context in which they occur, the range of technologies utilised for their conduct, and the electoral

management bodies running them. These first visits confirmed the impression we had formed from secondary sources that there is a widespread positive attitude towards e-voting among voters, political parties and electoral observers. This finding is all the more interesting because it became also clear from our reading and interviews that Indian elections are not free from malpractice. First order malpractice is common in most states and in some areas there is serious electoral violence before and after the election day.

Our third visit took us to New Delhi; Kolkata and Nandigram in West Bengal; Trivandrum in Kerala, and again Bangalore in Karnataka to explore the relationship of different post-election indicators (peaceful results acceptance or protests) and generative mechanisms of trust in e-voting. We chose to study closely e-voting in the legislative assembly elections of Kerala and West Bengal for two reasons. The first is that these two states are characterised by a high level of political participation, the second is that they differ in their political mobilisation, including their histories of polling and protest. Attention to these two conditions is important for interpreting observed responses to the announcement of election results. We realised in our preliminary research that we needed to disentangle trust in e-voting from indifference and intimidation as alternative explanations in cases of peaceful acceptance of election results, and suspicion towards e-voting from anger related with other electoral malpractices in cases of post-election protests.

Political participation is a form of civic engagement that leads citizens to become involved with political life, 'intended to influence either directly or indirectly political choices at various levels of the political system' (Conge 1988). If the level of political participation in a state is high, we expect the electorate to be aware of e-voting and alert about malpractice, including potential problems occurring in e-voting. If therefore results are accepted without protests, we can assume this is a sign of trust in the voting arrangements rather than a sign of citizens' apathy or intimidation. By political mobilisation we refer to the history of struggle for socio-economic development, including party politics and class-based movements.

Understanding the form of citizens' political struggle is important for the analysis of observed protests and violence at the announcement of election results.

Political participation, characterised by the prominence of the Left, is very high in both states, but their histories of political mobilisation are different. Kerala is widely known for its high rankings in social development and civic engagement (Heller 1996; Véron 2001), whereas West Bengal has had a more complicated development history with lower attainments (Mallick 2007). In particular, West Bengal is renowned for episodes of turbulence over the last decades (Sinharay 2014) and is often depicted as a hotbed of armed booth capturing. While the voters and academic researchers we interviewed sustain that cases of booth capturing have diminished after the introduction of EVMs, electoral violence still occurs in the state. Indicatively, the 2011 state assembly election ended with 34,000 people detained, 24 killed, and hundreds injured in street battles.[iii] Similarly, in elections for municipal corporations in 2015 there were incidents of gunfire around polling stations and the media reported that several electoral booths were attacked with arms.[iv] A violent climate was hence expected for the 2016 legislative assembly election too.[v] This limited our access to the polling stations on the election day. We were able to interview voters and local academics during and after the election day, but high security presence around polling stations prevented us from getting permission to observe voting activity and to interview voting facilitators on duty.

In contrast, Kerala elections are known to be largely, but not entirely, trouble-free. While elections are peaceful in most of the state, there is a history of political violence in the north of the state since 1971, with the town of Kannur as the epicentre of clashes between the Hindu Right, the Muslim League and the Marxist Left (Chaturvedi 2011). Kerala's Crime Records Bureau estimates that at least 100 people have been murdered and many more injured in political violence during elections in the last 10 years in the area of Kannur.

We observed the last day of the campaign in Trivandrum for the legislative assembly elections of Kerala on 16th May, visited a polling station on the election day where we

interviewed political party representatives and polling station staff, and talked informally with voters. On the day of the vote counting, on 19th May, and the following two days we interviewed voters and party representatives in Trivandrum, we watched the news on various TV channels and read newspapers.

As our empirical study progressed and our understanding of the object of interest unfolded, interview questions became increasingly more specific. Interviews were framed initially as a means to discover, and later in the research, as a means to validate explanations emerging from our analysis. We gradually focused our attention on two types of interviewees. One is voters belonging to political party organisations, which include people from all social classes. The other is voters living in disadvantaged socioeconomic contexts, for which we visited a civic organisation in Bangalore, two organisations (a governmental one and an NGO) working with vulnerable communities in Trivandrum and one of the slum colonies where such organisations operate. Our interviews spanned a large range of ages, from young voters who casted their first vote using the EVMs in the 2014 General Election to older voters who had experience of the paper-ballot based elections held before the introduction of e-voting.

We produced descriptions on four key aspects of Indian elections: the context in which elections are run, both at the national and at the state level; technologies of voting and counting as well as technologies for registration and voter authentication; and the voting processes on the election day, as we observed in polling stations of Trivandrum, Kerala.

STARTING POINT: OBSERVATION OF RESPONSES TO E-VOTING RESULTS

In May 2016, we observed the state legislative assembly elections in Trivandrum, capital of the state of Kerala. There were 1204 candidates from 52 political parties contesting elections throughout the state. There was a turnout rate of 77.35%, the highest ever registered in the state. The two main coalitions in Kerala are the United Democratic Front (UDF), led by the

Indian National Congress, and the Left Democratic Front (LDF), led by the Communist Party of India (CPI-M). The 2016 election was won by the LDF with an unusually large margin of 91 seats, vs. the 47 gained by the UDF. The Bharatiya Janata Party (BJP), which rules the country since 2014, gained one seat - they never had a seat in the Keralan parliament before this election.

In Trivandrum, the results produced by e-voting were duly accepted by election stakeholders: voters, official observers, political parties, and the media. The LDF victory was anticipated by most commentators according to a pattern of alternating into power that characterises Kerala. Since 1982, Kerala's State Assembly election results have followed an anti-incumbency pattern, in which the coalition in power has been voted out by the other coalition at the next round. LDF victory celebrations took place, but in an orderly way and without noticeable instances of violence. Even the BJP celebrated its victory of obtaining their first seat ever in the Keralan parliament. Party activists roamed around the streets carrying party flags, made stands on the roadside, and publicly celebrated, without incidents or police intervention in Trivandrum districts.

The post-election situation was different in North Kerala, where violence erupted upon the announcement of the election results:

> The violence began within hours of the May 19 election results. That day, RSS[vi] workers allegedly attacked CPI(M) victory processions in different parts of Kannur district in which one person was killed and eight others injured. The retaliation was swift. CPI(M) cadres allegedly burnt down houses of RSS workers. The Bharatiya Janata Party took the battle to Delhi on May 22, trying to reach AKG Bhavan, the CPI(M) headquarters. Six hundred BJP workers were detained.[vii]

In West Bengal, where we interviewed voters and academics on the election day and in its immediate aftermath, the overall turnout was 83%, one of the highest in the state's history. The elections campaign was marked by an increase in political violence which was 5 times

higher compared to the rest of the year (32 vs.6 events per week)[viii]. Clashes among political parties continued after the election day in several constituencies:

> A day after polls took place in Howrah, six houses were damaged and a shop set on fire, with both CPM[ix] and TMC blaming each other. After Kolkata had voted, families of CPM workers and polling agents across the constituency were allegedly beaten up and their homes were vandalised. Thirteen persons were injured in various incidents of post-poll violence in South 24 Parganas district.[x]

Voters in Kolkata that we spoke to during and after election day predicted violence in parts of the state on announcement of the results, and that is what happened: when the results were announced, nine people were injured by a bomb at a victory parade of the winning party at Kipalpur. The state secretary of CPM claimed that over 500 party offices were set on fire and houses of CPM leaders were attacked in several districts and Kolkata, and a Left Front delegation marched to the Kolkata police headquarters to protest against the post-election violence.

Given these observations, the challenge for our research is to disentangle public attitude to e-voting from attitude to other aspects of the elections. Is it valid to interpret lack of disputes of the election results, as in Trivandrum, as indication of trust in e-voting, or are there are other explanations of acceptance of election results without protestations? To what extent were the incidents of post-election protests and violence in the states we visited due to suspicion towards the trustworthiness of e-voting, or due to discontent with other aspects of the elections?

DESCRIPTION OF THE PHENOMENON IN TERMS OF CONSTITUENT COMPONENTS AND ITS CONTEXT

The elections context

The EMB of India is a three-member agency, the Election Commission of India (ECI), consisting of a Chief Election Commissioner (CEC) and two election commissioners. The commissioners are appointed for up to six years by the President, on the recommendation of

the Prime Minister. So far, the suitability of the persons appointed for these roles has not been an issue in Indian politics, although there are suggestions for a more inclusive selection process that will involve also the opposition parties in Parliament and representatives of other state institutions (Quraishi 2014). The ECI oversees the preparation of electoral rolls and conducts elections for the two houses of parliament and state legislative assemblies. The commissioners are assisted by a Secretariat of about 350 staff. At the state level, State Election Commissions are headed by Chief Electoral Officers appointed by the ECI in consultation with the state government. But the tasks of voter registration and the conduct of elections involve millions of personnel, who are drawn from central and local government employees, most of them for a limited period of time during elections. It is estimated that it takes eleven million polling and security staff to conduct general elections.

India is a federation of 29 states and seven special territories, where elections take place at three levels. First, every five years a national election is held for the Lower House of Parliament (Lok Sabha), in which 543 members are elected through a first-past-the-post system. Second, every five years there are also elections for the members of state legislative assemblies (MLAs), distributed in different months and years for different states. Third, elections are conducted for municipal and village bodies, at different points in time for different states. With a population of more than 1.3 billion, the organisation of elections is a massive effort. In the 2014 general elections, there were 834 million registered voters, of whom 554 million voted at 931,986 polling booths. Elections occur in many phases to facilitate the movement of electoral staff and security.

Indian elections have a global reputation of 'moderate' integrity, turnout is high and has grown over the decades, leading to the highest turnout in the last Lok Sabha election in 2014 (66.38%)[xi]. The general perception is that elections are the defining feature of the exercise of democracy in India, mobilizing citizens from all classes and castes (Ahuja et al. 2012; Banerjee 2014). Nevertheless, malpractice of both first and second order is widely

present, although the intensity and type of malpractice vary substantially across states. An ex-Chief Election Commissioner describes first order problems as follows:

> Pre-election conflicts are primarily concerned with fidelity issues and possible manipulations in electoral rolls, while those during the election campaigning period include disruption of opponents' campaigns, intimidation of candidates and voters and a general atmosphere of threat and violence. The poll day conflicts comprise preventing people from voting, violence at or around polling stations, booth capturing and rigging, damage to electoral voting machines and threat to election personnel. Post-election tensions include counting day conflicts, victimization of voters and clashes between the winners and losers. (Quraishi 2014)

The ECI has taken multiple actions to prevent electoral malpractice. Most important among them have been the development and enforcement of rules about posting administrative personnel deputed for election duties away from the place of their permanent position to avoid influence from their favourite parties or candidates; compulsory submission of candidates' affidavits (disclosing information about criminal records, education, wealth, etc); compulsory disclosure of party campaign expenses; a code of conduct about political parties' campaigning; election observers in charge of monitoring adherence to the code of conduct; pre-election alcohol bans, armed guarding of polling stations; and the introduction of technologies for the preparation of electoral rolls, voter authentication, casting and counting votes (Verma 2009).

The Indian EVM

In India, the design of the EVMs was based on a machine built to run trade union elections in a state-owned company, Bharat Electronics Limited (BEL), in the early 1980s. EVMs were first used in the Paravoor constituency of Kerala in 1982. In 1989, following the recommendations of an electoral reform committee, the electoral law was amended by Parliament to allow the use of EVMs, and these were gradually introduced in elections around the nation since 1998. Since the Lok Sabha election in 2004, e-voting has become mandatory in all elections. EVMs are manufactured by BEL and another state-owned

company, the Electronic Corporation of India Limited (ECIL), based in Hyderabad. At the time of writing the ECI owns more than 11 million EVMs, of three different generations, the latest of which released in 2006-2007.

The Indian EVM consists of a ballot and a control unit, connected by a 5-meter cable. Prior to the election day, each key on the ballot unit is marked with the name of a candidate and the symbol of their party. Recognition by symbols is particularly important, as India has a high illiteracy rate amounting to 25.6%, particularly so in the rural and tribal areas. The feature that sets the Indian design apart from other EVMs is that the software is provided as firmware, meaning that it is encoded in the EVM's EPROM (Erasable Programmable Read-Only Memory). EVMs are used for both the voting and the counting phases. Votes are cast and stored within the machine itself, which is then brought to counting centres where votes from the machines are aggregated and tabulated.

Figure 2 The Indian EVM.

Source: Wikipedia

Incidents of blatant machine malfunctioning, such as adding all votes to one party, although isolated and very rare among the hundreds of thousands of deployed machines, raise concern about undetected malfunctioning and the possibility of malicious tampering. The security of the Indian EVMs has repeatedly caused controversy (Herstatt et al. 2017; Rao

2010). Several political parties made allegations of machine tampering in the 2009 national elections as well as after the 2016 state legislature election in Utter Pradesh. A civil society initiative, VeTA (Citizens for Verifiability, Transparency, and Accountability in Elections) comprising computer security experts, political scientists, legal professionals and activists challenged the EVMs as insecure, bearing potential for rigging.

Challengers of the Indian EVM security managed to acquire and inspect a machine. A study by Wolchok et al. (2010), of an EVM used in the 2009 Lok Sabha election, argues that the machine can in principle be hacked in at least two ways, consisting respectively in a violation of vote security and in an arbitrary modification of the results[xii]. The study found technical fragilities that could in principle be exploited with malicious intent. One of the authors of the study, a security scientist based in the US that we interviewed, told us that the attacks demonstrated in the study can be performed by substituting key components of the machine's circuit. Hackers would, however, need to break into 'strongrooms', the heavily protected with locks and guns buildings where the machines are stored.

The Indian election process

Before elections, voters need to register in the electoral rolls. Registration happens locally, at the state election commission (SEC). A person eligible to vote should register at his/her place of residence, or online if such type of registration is available in the state[xiii]. It is the responsibility of the voter to transfer his/her registration within and across states upon change of place of residence, up to three to four months ahead of a forthcoming election.

Election dates for general and state elections are announced by the ECI, usually between two and three months before the election days. Upon announcement of election dates, a code of conduct is released by the ECI, to which political parties and candidates have to abide. The code of conduct provides rules with respect to the electoral campaign and polling day. Election observers are assigned to constituencies on a random basis to minimise the risk of threats and intimidation by local party loyalists.

EVMs are kept in guarded storage. Before elections machines are checked by the manufacturers, BEL or ECIL, and a mock poll of at least a thousand votes is done in 5% of units, randomly selected by the political parties. Machines are paper-sealed, signed by the parties, and given a unique number. They are then randomly allocated to assembly constituencies, and when transported there they are prepared with ballot papers on the balloting units showing the symbols of contesting parties. They are mock tested again and thread-sealed. They are randomly allocated to polling stations and stored in a strongroom till the day of the election, when, at the presence of candidates and the election observers they are dispatched to the polling stations. Before polling begins, the presiding officer does a mock poll of at least 100 votes in the presence of the candidates or their authorised agents, and the machines are again sealed for the third time. If the mock poll is unsuccessful, a new EVM has to be requested, which may lead to repolling for that particular station.

On election day, voting stations open 7am-7pm, and each station has several polling booths inside. Each booth houses electoral officers, as well as political party representatives and one EVM. Voters queue and enter a voting booth when a first election officer completes the identification process, checking the voter's card against the printout register for the booth. A second officer crosses out the voter's name in the printout, asks them to sign the register against their name, and marks their right index finger with an impermeable ink line. A third officer then unlocks the EVM, using the control unit attached to it. The voter proceeds to use the machine behind a screen, presses the button corresponding to the candidate name of their choice, and a sound signal is heard confirming that vote has happened. The voter then leaves the booth, supervised by a fourth officer.

At the closing time of polling stations, the polling officer in charge of the control unit presses the 'close' key, preventing the EVM from accepting any more votes. The machines are placed in plastic boxes and are taken to the strongroom, where they are kept under armed police guard till the day scheduled for the vote count. The machines are brought to the counting centres, which are usually located in public buildings but accessible only by the

election staff in charge. Pressing the 'results' key on each EVM reveals a sequence of outputs: the number of candidates, the total votes, and then the number of votes received by each candidate, from the highest to the lowest. These results are manually recorded from each machine, and aggregated to determine final results, usually within a few hours.

STAGE 1: ESTABLISHING A CASE OF TRUST IN E-VOTING

HYPOTHESIZING TRUST IN E-VOTING

There are various indications that e-voting is widely trusted in India. To begin with, the remarkably high level of trust in the ECI shown in public surveys suggests that e-voting, which is one of the most visible activities of this institution, is also trusted. According to the latest (2017) Electoral Integrity Project public perception surveys[xiv], the ECI enjoys the highest confidence rate among state organisations. Indian citizens rated the ECI 8.08 out of 10, comparatively they rated the political parties 4.58 and the police 5.5; in the US the EMBs are rated 7.23 out of 10, and the political parties 5.93, and the police 5.7. Indian citizens become clearly aware of the ECI when they vote and it is reasonable to infer that the trust in this institution is to a large extent a manifestation of attitudes to the voting procedures that involve the use of EVMs. In analyses of Indian political institutions, the introduction of EVMs is highlighted along other ECI interventions such as the deployment of central paramilitary forces, tougher legislation, and targeted security intensification in problematic areas that curbed first order malpractices such as booth capturing (Banerjee 2007; Vaishav 2017; Verma 2005).

Trust in the integrity of voting procedures is often discernible in the media. For example, when political parties challenge the hackability of EVMs, the media tend to defend the trustworthiness of the voting procedures and technology, explaining the challenges as futile complaints of 'bad losers'. Commenting on the two political parties' claims at the 2017

assembly elections in Utter Pradesh and Uttarakhand that EVMs were tampered with, the Indian Express wrote:

> This is nothing but petulance and a lack of grace in defeat' India's democracy is far from flawless, but voters trust the polling process as free and fair. Over the years, the EC has deservedly emerged as one of the country's most trusted institutions, a fair and independent monitor of the poll process. Courts, too, backed the EC's efforts to weed out the flaws and distortions. Political parties across the spectrum recognise the sanctity of the polling process and instances of the looser blaming it on the EVM, the EC, or polling officials are rare. There have been times when candidates have been defeated by a narrow margin […] and they have challenged the verdict in court, but such cases have been few and far between. [The Indian Express, 13 March 2017]

Most of our interviewees took the trustworthiness of e-voting for granted. Many of them barely engaged to answer our question *whether* e-voting is trusted. Instead, they spontaneously offered explanations of *why* it is trusted, telling us, for example, that with e-voting, the ECI managed to overcome booth capturing and ballot stuffing and to speed up the announcement of results.

These indications suggest the hypothesis that e-voting is widely trusted by voters in India. More specifically, we hypothesise that a) public acceptance of election results manifests trust in e-voting, and b) protests following election results have causes other than suspicion towards e-voting.

ASSESSMENT OF THE HYPOTHESIS OF TRUST IN E-VOTING

The difficulty of establishing the validity of the hypothesised trust in e-voting as an explanation for post-election public behaviour lies in disentangling trust attitudes to e-voting from alternative mechanisms that may be at play. Lack of protests after the announcement of election results in poor communities of developing countries may stem from indifference to democracy (Avgerou 2013a). Given widespread violence in Indian elections, another

possible explanation is intimidation. Also, protests after elections may express anger about election malpractices other than in the voting arrangements. In this section we first examine indifference to democracy - and elections more specifically - and intimidation as two alternative explanations for lack of protests on the announcement of election results. We then examine whether cases of protest and violence after elections express suspicion towards e-voting.

Indifference

The socio-economic conditions of voters are understood to affect their attitude to democracy, often creating apathy for elections (Aguilar et al. 2000; Blais 2006; Jensen et al. 2014). Poor and socially disadvantaged citizens may be less likely to vote; they may vote because of clientelistic relationships with political parties of powerful politicians or they may be vulnerable to vote buying. In such cases, lack of protest after elections may be an indication of indifference rather than trust in election institutions, and voting in particular.

India is an interesting case in comparative politics because, despite low economic indicators and social divisions, voter turnout is comparable to that in rich countries with egalitarian established democracies. Although voting is not mandatory, turnout in general elections increased substantially in the first 20 years of the Indian democracy to reach an average of 65.4% in 1967, and has remained above 60% since then (Banerjee 2014).

A study of turnout in different Indian states (Diwakar 2008) showed that, paradoxically, turnout is higher among the poor than the rich, the less educated than the graduates, and rural than urban voters. Several explanations have been suggested for the participation of the Indian poor and socially disadvantaged in elections, including patronage, expression of grievances to the incumbents of government and a ritual expression of people's valuing of democracy. In an ethnographic study in two villages in West Bengal in the 2001 assembly elections, Banerjee (2007) explains the high level of participation (more than 90% of the adult population) as taking the opportunity for confirming poor people's citizenship in a democracy. She observed a celebratory atmosphere in which the 'egalitarian mechanism of

the poll afforded particular pleasure [to the villagers]' (2007). Similarly, a study of the motivations of the poor and the non-poor for voting in three Indian states by Ahuja and Chhibber (2012) found that the poor feel that voting is a right, dignifies them as citizens and allows them to hold the arbitrary state to account. In contrast, better-off citizens are characterised by being better connected to the state, and this makes them better positioned to gain from its services and employment opportunities, which leads them to see voting as a duty in relationships of patronage with politicians.

Our observations of elections confirmed the celebratory character of the event, which is common across different caste and societal groups. People living in one of Trivandrum's largest slums that we visited on the day of vote counting proudly showed us the ink mark on their finger which constitutes a proof of the vote. A community volunteer operating in slum colonies explained elections constitute a particularly important occasion for people of lower socioeconomic status:

> Who gets elected decides on important things such as social protection, food rations and other schemes, which are very important in the lives of the poor. Poor people queue for long hours on election day, to make sure they cast their vote.

One of the reasons for below-poverty-line people to engage with elections is hence that ruling parties take key decisions for their lives, such as determining the entitlements that they receive under the nation's anti-poverty agenda (Véron 2001). Also, as noted by the leader of a social service society in Trivandrum:

> [On election day] everyone, including poor people, can influence the politics of the state. This is the one day in which irrespective of their social condition, everyone has a say in how they are governed and by whom.

According to this view, poor people find in the voting a moment in which, in spite of low bargaining power towards the state, they have a role in determining the outcome of national politics.

In West Bengal, an academic expert of caste politics explained to us that people belonging to the lowest caste (*Dalits*), rather than being disengaged, are generally more engaged with

elections than the upper caste, due to the importance of political mobilisation for their collective rights. The caste factor thus adds to the state's long history of class mobilisation, which developed with particular strength during the 34 years of the Left Front's permanence in power. This has been particularly so in the state and *panchayat* elections of the last decade, in which an organisation of backward caste (Matua Mahasangha) has significantly influenced the electoral results.

In short, we cannot explain lack of protestation to Indian election outcomes as citizens' indifference. Indian citizens, particularly the very large number of poor and socially unprivileged, take a keen interest in elections, though for different reasons.

Intimidation

In regions with occurrence of violence, such as North Kerala and West Bengal, intimidation of voters by party loyalists, which prevents a free and fair election process from happening, is frequently reported. One form of intimidation happens when election results reveal voting distributions of polling stations, making it possible for candidates to retaliate based on how people voted. Interviewees noted that villages are often "punished" for voting in the "wrong" way, through denial of public assets such as roads or allocation of jobs in public work programmes.

But the Indian political context encourages alertness of multiple vocal election stakeholders. This is particularly so in our fieldwork states, both of which are characterised by high levels of political participation and propensity of ordinary citizens to engage in public protest. In West Bengal class mobilisation has been present since independence, often taking the shape of violent protest led under the aegis of the Left Front (Mallick 2007). In Kerala, a history of civic engagement has resulted in today's high frequency of public demonstrations: as powerfully summarised by a political party worker, "if Keralan citizens are at issue with the Government, they will take the streets just immediately".

Therefore, our study suggests that, in regions where there is no electoral violence, voters are not afraid to voice concerns about electoral malpractice. In regions where there is

electoral malpractice and turbulence prior to and during the election day, intimidation is unlikely to suppress public expression – voters do not remain silent after the election results.

Do protests and violence after the announcement of election results indicate lack of trust in e-voting?

We examined the violent protests that took place in West Bengal and North Kerala after the announcement of election results to detect whether they were an expression of suspicion to e-voting. We found no such evidence in the rhetoric of the protesters and the media commentators. The post-election turbulence was a continuation of election mobilisation clashes between political party supporters and between party supporters and law and order authorities. Such violence should be understood in relation to the rough political culture of India, where election candidates are often local power brokers affecting people's fundamental life conditions amidst ineffective state institutions (Corbridge et al. 2005).

As remarked by an election observer who served in states as diverse as Bihar, Madhya Pradesh, Tamil Nadu and West Bengal, it is common for politicians to exercise patronage relationships with voters. In regions where politics are defined by caste interests, election contestants, often with criminal records (Vaishnav 2017), command a mix of fear and respect as protectors and avengers for disadvantaged social groups. The stakes are high for winners and losers and their supporters. During election campaigns candidates dispense cash and promises for jobs and social welfare. Losing candidates and their election staff, having spent fortunes in election campaigns, continue clashing with their opponents and sometimes resort to murder (Vaishnav 2017).

Protests against e-voting exist, but they take the form of petitions by political party representatives and civil society activists (Herstatt et al. 2017) that become disputes between the ECI and petitioners – not demonstrations of public discontent. We found no evidence that such disputes affect public opinion about the trustworthiness of e-voting. None

of the voters we interviewed was even aware of them. One politician we talked with thought it conceivable that one of the powerful political party alliances might attempt to manipulate the e-voting technology, but this possibility was the least of her concerns – instead she was keen to describe the common malpractices of voter manipulation.

We therefore posit that, when post-election demonstrations or violence occur, they are a continuation of electoral first order malpractice and political clashes among contester supporters, or between party supporters and public authorities; there is no evidence that they express suspicion to voting maladministration or rigging.

STAGE 2: EXPLAINING TRUST IN E-VOTING

HYPOTHESIZING MECHANISMS EXPLAINING TRUST IN E-VOTING

Assuming that the observation of post-election public responses is evidence of the existence of trust in e-voting, in this section, we hypothesise mechanisms that explain how such trust is produced. Following the principle of retrodiction of critical realism, we draw mechanisms of trust creation in e-voting by analogy to the Brazilian and the Dutch cases and examine the extent to which and the manner they are active in the Indian electoral cycle and politics. Drawing mechanisms from the Brazilian and Dutch experiences for the explanation of trust in the Indian e-voting requires awareness of similarities and differences of the socio-technical e-voting system, that is, the technology in its organisational and broader context of elections.

The e-voting of Brazil, used successfully in all elections in the whole country since 2000, comprises EVMs which were designed and manufactured in the country by local industry in partnership with the Brazilian EMB (Frank et al. 2017). The Brazilian EVMs are similar to the EVMs used in India in terms of method of capturing and aggregating votes. But its digital component is in software form and is reprogrammed for the candidates and the specific conditions of each election. This requires different processes for systems maintenance, deployment and security. The Brazilian EMB is also different, composed of Supreme Court

judges. The arrangements of polling stations and the principles of anonymity, security and efficiency are very similar.

In the Netherlands, e-voting was introduced in the late 1980s using direct recording machines built by two private suppliers (Loeber 2008). By 2006, 90% of all votes in the nation were cast on the Nedap/Groenendaal ES3B machine, whose hardware was built by Nedap and software was written by Groenendaal (Oostveen 2010). Questions on the security and verifiability of e-voting remained sporadic till 2006. In that year, concerned security scientists started a campaign called *Wij vertrouwen stemcomputers niet* (We do not trust voting computers). They demonstrated that brief access to the machine by an external hacker could alter recorded votes, and radio emanations from one of the machines could be received at several meters distance and tell what is being voted, hence endangering the secrecy of the vote too. The study therefore concluded that EVMs were unsuitable for elections. The mistrust of security scientists towards e-voting quickly spread to the citizens, resulting in 'a complete shift in the way people thought about the election system in the Netherlands' (Oostveen 2010). As a result, the government set up two committees to examine security of the computerised electoral process. In September 2007, the Election Process Advisory Commission issued a report titled 'Voting with confidence', which highlighted critical flaws in the security of voting computers. In May 2008, the government decided that from then on elections would only be conducted using pencil and paper ballots, and a proposal of reintroducing voting computers was rejected.

We draw an initial set of mechanisms from Avgerou's (2013a) study of trust in e-voting in Beazil. Avgerou (2013) distinguished between initial formation of trust when it was first introduced in Brazil, and the sustenance of such trust in subsequent elections. Though different in their specific constituent processes, initial trust formation and subsequent sustenance were explained by three common mechanisms: ***associating e-voting with the strengthening of democracy; the intertwining of the success of e-voting with the reputation of the EMB; and the promotion in the country of a positive public attitude***

towards IT. We take these as 'portable' theoretical propositions (Falleti et al. 2009) that provide an initial set of hypotheses to be validated, refuted, extended or refined in the Indian e-voting case study. In addition to this, we hypothesise by retroduction a fourth mechanism related to trust creation in the context of turbulent Indian elections. Our empirical research suggests that a ***disposition of trust in e-voting is formed amidst first order electoral malpractice***.

ASSESSMENT OF HYPOTHESIZED MECHANISMS OF TRUST IN E-VOTING

Associating e-voting with the strengthening of democracy

The logic underpinning this mechanism is that citizens come to trust e-voting if they see it contributing to the conduct of fair democratic elections. In Brazil, e-voting was conceived and developed during the democratisation mobilisation of the country in the 1980s, following nearly 20 years of military rule. The process of democratisation provided the rationale for the use of technology in voting as means for increasing citizen participation in elections. E-voting came to be associated with the enfranchisement of illiterate citizens who found it difficult to vote by writing the candidates' names, as it was required by the prior paper ballot. Since its initial public acceptance, trust is maintained in the recurrent elections practice by the ongoing embedding of the upgrading and deployment of e-voting technology in key processes and institutions of democracy, including getting approval by parliament, involvement of political parties in the testing of system enhancements, and media attention.

No such mechanism is reported in the Dutch e-voting case. Oostveen (2010) concludes her analysis of the withdrawal of EVMs by noting that the introduction of e-voting in the country 'seemed to be driven by technological possibilities and bureaucratic convenience, rather than by democratically debated social utility' (p. 217).

In India, e-voting is widely perceived as a contributor to fair representation of people's choices. India was formed as an independent nation in 1947 and has since then established

a ‘sovereign, socialist, secular, and democratic republic’ (Corbridge & Harriss, 2000). But its history of elections has been fraught with violence since the 1970s (Quraishi 2014). The biggest problem faced in many states is the recurrence of episodes of booth capturing – a practice of ‘criminal groups, delegated by political parties, capturing a polling station and stuffing the ballot box with large numbers of votes for the favoured candidate’ (Herstatt et al. 2017). ECI’s efforts against this started well before computerisation, with the institution (in 1989) of election observers who would monitor each constituency in the run-up to the polling and on the election day.

When the first machines were commissioned to the companies BEL and ECIL, the declared intention was to combat the capture of polling booths (Verma 2009). To make it materially very difficult to “stuff” the ballot box, the system accepts only one vote every thirty seconds. One of the engineers who participated in the design of the first EVMs remarked:

> The machine has been built specifically to prevent booth capturing. If one tries to cast many votes, they would have to spend the whole day doing so, and by that time the police will be warned and intervene.

Many voters we interviewed drew comparisons between voting by the EVMs and paper ballots. A middle-aged voter told us:

> With paper ballots, armed people would storm into the polling stations and fill the ballot box with votes for their candidate. Because of that, citizens who wanted to vote freely as normal would be discouraged from going to the polling station. This is not possible now, because the machine has a time delay between votes (...) booth capturing simply cannot happen with EVMs.

This association of e-voting with addressing the problem of polling booth capturing was important for initial trust creation. It seems however that perception of the risk of ballot box stuffing and the association of e-voting with the alleviation of this risk continued beyond initial acceptance of e-voting. An analysis of post-poll survey data by Debnath et al. (2016) finds evidence of voters’ perception that e-voting reduced ballot box stuffing, suggesting that after the introduction of EVMs voters were ‘less likely to report that they did not cast their vote due

to fear of violence or vote capture, or that they were prevented from voting'. Comparisons with paper ballot were brought up in our interviews even by younger voters who participated in elections only after 2004, and hence had not experienced voting with paper ballots. During our stay at a university campus in Kolkata, a student confidently asserted that "whatever problem there may be with the EVMs, they will always be more secure than the paper system", justifying this with the machine's ability to combat booth capturing. Interviewees also drew comparisons in relation to vote counting, as in the case of a polling officer who had served in Delhi at the time of paper ballots:

> [Before e-voting was introduced], we would spend the entire night counting the ballots. If something odd was found, the recount would have to start again from the beginning. With EVMs there is no such problem, because it is the machine that does the counting.

Also, as in Brazil, India's e-voting is associated with the enfranchisement of the illiterate and people with various disabilities. Although no literacy was required for the paper ballot, as voters had to stamp the paper next to their preferred party or candidate symbol, often stamps were misplaced and the votes rejected. The e-voting solved the problem of rejected votes – all votes are unambiguously recorded and counted. Debnath et al.'s analysis (2016) estimated a significant reduction in the residual vote rate, leading to a 2.7 percent increase in the number of valid votes (Debnath et al. 2016). It also found that the ability of vulnerable citizens (illiterates, females, 'scheduled castes and tribes')[xv] to cast their vote improved significantly after the introduction of the EVMs. Such improvements, experienced by voters and regularly confirmed by other election stakeholders, such as election observers and the media, created a widespread belief that e-voting is part of the striving of ECI for the improvement of democracy. So, at least for those who do not doubt that the EVMs accurately record cast votes, e-voting is a democratic improvement of elections.

E-voting may have other benefits too, such as reducing costs of running elections or generating income for the country from selling home-developed technology to other

countries, but we did not find evidence that these create trust. On the contrary, election stakeholders may suspect that economic motives may compromise electoral integrity.

Intertwining of the success of e-voting with the reputation of the EMB: Active trust building by the ECI

Studies of e-voting tend to emphasise the significance of the competence of the country's EMB for managing the processes of deployment and use of the technology and, more specifically, for putting in place measures that address security risks (IDEA 2011; IFES 2013; McCormack 2016). From a socio-technical perspective of e-voting, the dependence of successful technology use on the competence of the EMB is only one part of the relationship – the other part is the dependence of the status of the EMB as a credible political institution on the technologies it mobilises to conduct election tasks. The ability of each of these two entities - the EVM technology and the EMB organisation - to enable the other to fulfil its tasks determines the continuity of their existence. Public opinion about the technology or organisational arrangements of e-voting inexorably affects confidence in the EMB. From this perspective, as the study of e-voting in Brazil suggests, trust in e-voting is actively created by an EMB as part of caring for its own status and reputation as a core institution of democracy. Furthermore, the experience of the Netherlands suggests that detachment of the procedures of e-voting from the EMB's responsibilities and activities breeds public suspicion, protest, and ultimately rejection of e-voting.

In the Brazilian case, IT innovation in elections was associated with the efforts of the EMB – the *Tribunal Superior Eleitoral* (TSE) - to establish itself as a competent political institution and a guarantor of democracy. A mutual reinforcement was found between the success of the technology component of e-voting and the success of the organisation responsible for and dependent on it to perform its mission. The TSE took the initiative in the 1990s to examine the feasibility of introducing computers for voting in order to stop voting fraud and to strengthen political participation and inclusion. Lacking itself adequate IT expertise, it invited technical experts from Federal ministries to define the system's technical requirements and

specification. Subsequently, the system was developed in partnership with private IT companies. Even after the successful introduction of e-voting throughout the country, the TSE continues to cultivate a positive reputation as a competent government agency by ongoing publicly visible processes for the improvement of e-voting software and e-voting processes, widely publicised testing 'ceremonies' and public confrontation with doubters of the system trustworthiness to address their arguments of system vulnerabilities.

No such link between the EMB in the design and management of e-voting was cultivated in the history of e-voting in the Netherlands. One of the main findings of the analysis of the causes of public suspicion that led to the withdrawal of the system was the loss of control over the elections by delegating not only the development of the technology but also the voting operations and the counting of votes to private companies (Loeber 2008; Oostveen 2010). Lacking in house IT expertise, the Dutch EMB – the Ministry of Interior and Kingdom Relations – did not adequately participate in the determination of either the technical or legal requirements for the security features of the machines and the voting process through them. The technology was developed in the 1980s by private IT companies, certified by a private company and, since then, it was owned, maintained and enhanced by the technology manufacturers. The EMB had no property rights over the machine and could not access its software code. The companies owning the machines were also responsible for their deployment and operations during elections, in effect having full control of the voting process and the production of election results.

In India, the success of e-voting has become a core characteristic of the identity of ECI as carer of fair and free elections. Elections in a country of subcontinental dimensions, a CEC argued, 'cannot be done easily without the application of user-friendly technology' (Quraishi 2014). The ECI, lacking in house IT expertise, entrusted the overseeing of the design, security and technical integrity of the machines to an experts' committee comprising staff from the Ministry of Defence, the state Indian Institute of Technology, academics and technology professional of the India IT industry.

Yet, the EVMs have repeatedly been subject to controversy, mainly over whether the machines are tamperable by outsiders or insiders to the election process. Against such challenges, the ECI has actively undertaken to demonstrate the trustworthiness of e-voting and defend it when it is challenged, in two ways. First, it has developed elaborate procedures for checking security and correct functioning of the machines at various stages of their deployment for elections, with the presence of political party representatives. The procedures do not completely satisfy the voting technology experts, who note that several security measures, such as the multiple means of sealing, are not particularly robust (Herstatt et al. 2017). Nevertheless, these procedures publicly demonstrate to voters, journalists and observers the ECI's vigilance against tampering.

Second, the ECI has turned criticisms of security shortcomings to demonstrations of engagement and control of the voting process. . As a senior electoral officer pointed out, such engagement was conducted at the state level too:

> [When serving as CEO of Karnataka] I had a billboard in my office, inviting whoever found any problems with the EVMs to come and talk to me about it. The announcement was in the newspapers too, it was published every time an election took place. But nobody, for my whole time in office, ever raised an issue with the functioning of the machines.

By repeatedly engaging with the Supreme Court of India and High Courts of various states, teams of IT experts, civil society, and the media to address disputes over the security of the EVMs, the ECI confirms its identity as the guardian of electoral integrity either by enhancing electoral technology or by rebutting accusations of election rigging by EVM tampering. A decisive enactment of the former is the decision to introduce Voter Verified Paper Audit Trail (VVPAT) taken in 2010 after pressure from voting technology experts and political parties. VVPAT has been developed in response to concerns for lack of a tangible proof of the vote. It adds to the EVM a printer producing a physical record of the vote, visible to voters and usable for re-counting in the event of a dispute. Another enhancement of the EVMs that is being discussed by the ECI, which reaffirms its willingness to continue developing the

technology in response to perceived problems, called a *totaliser*, aggregates results across polling stations, without disclosing them boothwise to prevent risk of retaliation based on voting behaviour.[xvi]

An example of the latter is the invitation to challengers of the non-tamperability of the EVMs to demonstrate how the EVMs might be tampered. In 2009, the ECI invited the challengers to a public demonstration of their claims, organising access to 100 randomly chosen machines. The challengers did not demonstrate malfunctioning or tamperability, but they remained unsatisfied with the opportunity they were given because they were not allowed to inspect the design of the machine. Opening up the EVM, according to the ECI and the manufacturers, would allow for reverse engineering and violate property rights (Herstatt et al. 2017). A hackathon was also organised in June 2017 after a petition challenging the integrity of EVMs in the Utter Pradesh state legislative elections. As in earlier such incidents, this hackathon too failed to prove tamperability of the machines but left the challengers unsatisfied because of restricted access to hardware (Herstatt et al. 2017). Secrecy of the design and the source code is deemed by the ECI and the manufacturers of the EVMs necessary for the security of e-voting. The media however drew attention to the as yet another 'victory' for the EVMs, giving the Election Commissioner the opportunity to reinforce the claim that the system cannot be hacked.[xvii]

Promotion in the country of a positive public attitude towards IT

A third mechanism contributing to the creation of trust in e-voting is citizens' attitude towards IT. Social groups, and indeed whole countries, differ about the significance of potential benefits or risks attributed to IT innovation, an attitude that is generally known as 'IT culture' (Leidner et al. 2006). In some countries the prevailing attitude is welcoming of the diffusion of IT as an improvement of individual and public life while in others there is widespread concern about various negative effects of IT. In many developing countries in the 1980s and 1990s computerisation was associated with the erosion of industrialisation and cheap labour advantage and was discouraged by government policies that taxed the import of computers

as luxuries. In advanced industrialised countries, where IT innovation has for more than three decades been considered necessary for competition and growth in a global open economy, there are widespread concerns about concomitant risks of security and loss of privacy.

In Brazil, citizens across social groups came to associate IT with improvement of economic outlook and quality of services. Several government policies contributed to a perception of IT innovation as a positive force, the most prominent of which were policies promoting an indigenous IT industry as an engine of economic growth in the 1980s (Evans 1986; Evans et al. 1992). The ongoing cultivation of a positive attitude towards IT continued with government policies to bridge the digital divide and the promotion of e-government which spread the belief that IT is necessary for effective public services. Innovative uses of IT in business sectors such as banks associated it with service quality improvement and created expectations for the diffusion of IT in government services too. In short, IT came to be seen as a right to strive for rather than a change that should be resisted.

In the Netherlands people are used to continuous IT innovation. Pioneering projects brought IT into the public spaces of the country. The importance of IT infrastructures for public services has been actively promoted by Dutch e-government initiatives and through multiple European Union projects. Dutch citizens have willingly participated in pioneering initiatives for the use of IT in public domains. Indicative of such public sensitising to the potential of IT is the ‘Amsterdam Digital City’ initiative that started in 1993. Van den Bessalaar and Beckers (2005) traced the various meanings attributed to the ‘digital city’ as a node of the global economy, a space of improved public services and a community network empowering people in their local context. They also analysed its ultimate decline as a non-profit model and abandonment. With exposure to such bold IT innovation, Dutch citizens have been sensitized to some of the most intractable dilemmas of the digital era, including issues concerning business models of digital services, privacy and security. In his analysis of the withdrawal of the Dutch e-voting system, Loeber (2008) notes a trend of declining trust in IT

solutions in the public domain, using as an example the debates opposing a government initiative to introduce a scheme of electronic payments in the public transportation system. The Dutch citizens are not technophobes, but they are highly alert to potential risks from IT infrastructures.

In India, as in Brazil, two complementary dynamics have concurred to the formation of a positive attitude towards IT. The first pertains to policies developed with the aim of launching the country's IT industry, programmatically inscribed in the nation's development plans since the early 1970s (Evans 1992). The second, started in the late 1990s, pertains to computerisation of many aspects of government and particularly of public service provision. E-government has become an integral part of subsequent governments' efforts to provide more accountable services, tackling the numerous problems of the nation's complex bureaucracy. Significantly, issues of government service provision have historically hit the poor and marginalised (Conge 1988). Large numbers of Indians come to experience IT as tools for anti-poverty programmes, such as the Public Distribution System (PDS), which constitutes the largest food security scheme in the nation, and the National Rural Employment Guarantee Scheme (NREGS).

In India, national policies affect states differently and we need to consider also state level policies. While different in their contextual specificities, both states we studied have had historical paths in which the IT industry has moved from a marginal role to one of core socio-economic significance. In Kerala, a development model that strongly prioritised redistributive policies to economic growth was abandoned in the 1990s giving rise to policies that promote industrial growth and openness towards private sector. Resulting from these changes, the 'new' Kerala development model (Véron 2001) reconciled social and productive goals, opening up to the IT industry at the same point in time when elections were becoming computerised in the whole nation. Developments in the IT industry have been leveraged by the Kerala government to generate employment opportunities for vulnerable groups. For example, in pursuit of its poverty eradication policy, in 1998 the Kerala state government

created Kudumbashree, a community organisation of women's self-help groups working as local 'social enterprises'. Many of these belong to the IT sector, and outsource IT-related jobs to below-poverty-line women members (Heeks et al. 2010). Developed in concomitance with the greater openness of the state to industry, the Kudumbashree model of outsourcing became central to the anti-poverty action of the state, presenting the government's stance on IT as generator of durable employment for people belonging to lower socio-economic strata. Similarly to Kerala, in West Bengal, setbacks suffered as a result of low industrialisation and hostility to the private sector in the 1980s and 1990s triggered changes in the government's attitude towards the IT industry. Opening up to large Indian and international software companies, successive governments prioritised the IT industry as a main engine for the state's development.

Also, in both states, governments have leveraged IT to put forward the principles characterising their development models, creating citizen-centric services, with special attention to the weaker strata of their population. For example, the Kerala State Information Technology Mission (KSITM) has been promoting IT use throughout the state. 'Single Window' schemes for IT-enabled tax collection and bill payments benefited middle class citizens, facilitating their transactions with a highly dysfunctional state bureaucracy. Telecentres brought IT literacy and computerised government services to poorer people in remote areas. Indicatively, in the early 2000s, the Akshaya telecentre project, piloted in the Malappuram district, a relatively backward area of north Kerala, provided computer training to one member of every household, thus creating basic IT literacy (Madon 2005). Reaching out to the most remote areas of the state, Akshaya exemplified the leveraging of IT for the objectives of inclusion and social protection characterising the Kerala development model. Similarly, the government of West Bengal launched the 'information technology policy of government' in 2000, which triggered its engagement with the computerisation of citizen services. In 2006 it launched E-District, a project aimed at making the State's services

available to citizens through CSCs (Common Service Centers) or the internet. Like Akshaya, E-District is based on e-kiosks that replace the state's complex paper-based procedures.

Older e-government initiatives, based on computerisation of government offices and citizen services, have more recently been combined with the state-level uptake of the Digital India campaign. Launched in 2015, the campaign is set to 'transform India into a digitally-empowered society', using digital technologies to extend the benefits of ICTs to the poor and vulnerable. Central to Digital India is the combination of the Pradhan Mantri Jan Dhan Yojana (a central-level flagship programme for financial inclusion), Aadhaar (a biometric database for unique identification of all enrolees), and mobile technologies, increasingly used in the delivery of services. Known as 'JAM Trinity' from its acronym (Jan Dhan Yojana – Aadhaar – Mobiles), this combination sets to produce a radical transformation of service delivery, especially seeking to transform the country's anti-poverty system, based on the provision of in-kind subsidies, into a system based on direct cash transfers (Government of India 2015).

The effectiveness of Digital India campaigns for anti-poverty programmes such as PDS and NREGS is debated at the national and state level (Drèze et al. 2017; Masiero 2015). For the purposes of our analysis, however, it is important to note the association of IT in the states of Kerala and West Bengal with a sequence of policies mirroring their historical focus on strong social protection systems that seek to minimise exclusion, and therefore cultivating a view of it as an instrument of development - a climate in which e-voting is framed as a 'natural' interface for the conduct of elections.

<u>An additional mechanism: Trust disposition to e-voting formed amidst first order electoral malpractice</u>

Trust in e-voting in areas where electoral politics are turbulent, such as in West Bengal and North Kerala, requires particular attention. We argued above that protests and violence witnessed in these areas do not express discontent with e-voting; they are generated by malpractice of contesting candidates and their election campaigns. At this point we suggest

that in such cases, e-voting enjoys trust as an orderly, free of violence voter experience in contrast to prior stages of the electoral cycle.

Voters' attitude to e-voting is formed as part of the overall experience of the electoral cycle and the broader institution of democracy, such as the Houses of Parliament and the state legislative assemblies. First and second order electoral malpractices are tangible and frequent in Indian elections. The most visible first order malpractice is the 'buying' of votes by political parties. Several of our interviewees in Trivandrum told us that they received money from election candidates. The problem is well known to India and those who study the state of the Indian democracy.

> Currency notes come into the election bazaar first in container and cargo quantities, then in truck loads, going into wholesale, small retail and finally in attachés, thailas, jholas and jeb-sized portions, every five years at the least and often oftener than that. They originate either legally, through licit company donations or come from a myriad sources which […] necessarily and unavoidably go back to our natural resources such as mines, forests and land. Illegal transactions in all these yield harvests of black cash. (Gopalkrishna Gandhi, Indian Administrative Service officer, ex-Goverrnor of West Bengal;2014)

Even in areas where there is no first order electoral malpractice, e-voting may stand out in comparison to voters' experiences in prior election-related activities. Many voters in India experience second order malpractice in gross irregularities of electoral rolls with consequences for their authentication at the polling stations. Unlike voting, computerisation of electoral rolls is uneven across the nation. The rolls are often found to be incomplete and inaccurate, resulting in denial of the right to vote for those affected. As highlighted by a civic activist interviewed in Bangalore,

> Voter registers are ridden with errors and mismatches, resulting every year in thousands of eligible voters being unable to cast their vote – either because they are registered in the wrong constituency, or because their name is simply missing from the rolls [...] only Kerala has computerised voter registration, so that voters can check their enrolment online. In other states, it is all too frequent for voters to turn up on election day to find out their name is not in the list.

Inaccurate electoral rolls also entail opportunities for impersonation. Voters in both states of our research talked to us about the risk that someone may vote in their place in case of absence on election day. The problem was brought up by students at local universities, who could not arrange to return to the state of origin in the occasion of the latest general elections.

Relative to such problematic aspects of the election experience, e-voting is experienced as one of the least problematic and dangerous. When reaching the polling booth, is less likely to face problems than when registering or being authenticated and allowed to vote. Thus, we suggest that an additional mechanism for the development of trust in e-voting is the accumulated voter experience of election up to the point of voting. Voters develop a positive attitude of trust towards e-voting by comparison of their experience of voting with other negative experiences during elections.

THEORETICAL STOCK TAKING

India's e-voting is a remarkable achievement, formed in the historical context of the country's political and socio-economic development. Yet, our analysis shows that the development of trust in e-voting in that country involves causal mechanisms which are also detected in the development of public attitudes towards e-voting in other countries, Brazil and the Netherlands. In this section we put together a causal assessment of trust/suspicion in e-voting and an explanation of the formation of trust/suspicion in e-voting in concepts that are relevant across national contexts. The proposed explanation is in the form of a set of interrelated causal processes that might produce trust in e-voting.

Our theorising adopts a concept of e-voting as a socio-technical system embedded in a country's electoral cycle and the national political and socio-economic context of a country and a concept of trust as an enacted cognitive state of voters, which results from the ongoing actions of multiple actors, including the voters themselves (Weick 1988). Trust in e-voting, therefore, is not a direct effect of the artefacts of voting, or inherent in individuals' psychology. Nor can it be explained as individuals' perceptions of direct impact of their

interaction with IT on their interests (Markus 1983). Perceptions of risk and trustworthiness of e-voting are produced and reproduced in the practice of voting in relation to the broader voter experience of elections, such as election campaigns and elections administration, as well as the consequences of elections, such as peaceful transition to a new government or violent protests, etc.

A fundamental question in research on trust in e-voting is how trust can be detected, given that it is not an observable entity. From the perspective of trust as an enacted cognitive state, trust is manifested in voters' actions. The general model of the electoral process (Figure 1) suggests that voters' trust or suspicion may be manifested in various ways. They may choose to participate or not participate in voting and perhaps protest prior to the election day about the untrustworthiness of voting arrangements. They may accept election results or challenge them and protest after the election day. In our research of the Indian elections we sought to identify trust in e-voting by analysing voter responses to election results because voting participation in the states we studied is high despite widespread election malpractice.

Overall, from the analysis of alternative explanations of observed post-election responses, we concluded that e-voting is widely trusted in the Indian states we studied. This conclusion cannot be generalised. Indifference to elections and intimidation are possible mechanisms affecting voters' responses to election outcomes in other country contexts. Also, as in India, protests observed in other countries are likely to be unrelated to voting arrangements. But the relative weight of these mechanisms need to be analysed in relation to a country's circumstances.

Having ascertained the existence of widespread trust in e-voting, we then traced mechanisms producing such trust, building first on existing theoretical propositions and empirical evidence from studies in other countries where e-voting systems similar to India's have been used. Our study of India's e-voting finds evidence for the validity of the mechanisms identified in the Brazilian e-voting, albeit in different manifestations. Brazilian

citizens initially identified the democracy enhancing value of e-voting in its enfranchising impact for illiterate voters. In India, democracy-enhancing effects were associated with the curbing of booth capturing and ballot box stuffing. After the initial trust formation, the caring for the integrity of voting by their highly trusted EMBs has in both cases been pursued by a combination of publicly visible elaborate procedures of e-voting technology deployment, technology enhancements, and rebuttals of challengers of EVMs. Unlike the Indian EVMs, the software of the Brazilian system is continuously enhanced in between elections, but so far, the TSE has resisted pressures to introduce VVPAT. Both countries have similar histories of industrial policies for harnessing IT innovation for socio-economic development. They have also pursued policies for addressing the digital divide which created an understanding of IT as a technology of progress, to be embraced rather than avoided. Electoral malpractice, in comparison to which Indian voters come to value their trouble-free experience of voting, is more prevalent in India, but it is not absent in Brazil. Elections in that country have been increasingly overshadowed by allegations of corruption. It seems that the perception of trustworthiness of e-voting overseen by an EMB that is independent from the government and party politics is enhanced by a comparison to party political campaigns widely considered to be marred by corruption.

E-voting in the Netherlands is a contrasting case which strengthens the validity of the proposed mechanisms as trust producing processes. It indicates that the lack of these mechanisms may breed suspicion. In the Netherlands, e-voting was introduced in a democracy confident about the integrity of its existing means of voting; voters could neither see any democracy enhancing effects from e-voting, nor see it as more trustworthy in comparison to more troubled aspects of the election cycle. Suspicion towards the trustworthiness of e-voting was fuelled by entrusting its administration to an IT service provider. While citizens of European countries are familiar and generally comfortable with IT innovation as a force of socio-economic betterment, they are concerned about privacy and security, particularly in the use of technology by state institutions.

Two of the four mechanisms are socio-technical processes occurring in the unfolding of the electoral cycle. These are the perception of trustworthiness of voting with the EVMs comparatively to the experience of socio-material practices in other stages of the electoral cycle, and through the active trust cultivation by EMBs reputation as effective innovator to improve the quality of elections. The other two mechanisms concern voter experiences that occur in the broader politico-economic development of the country, namely the impact of the new technology mediated means of voting for the country's representativeness of democracy and the way IT is understood to impact life conditions.

Taken together, the four mechanisms we identified provide a plausible explanation for trust in e-voting observed in India and Brazil. Their absence or relative weak existence explain also the suspicion to e-voting in the Netherlands that led to its withdrawal. Each of them is adequately abstract to be recognised in the election context of most modern nation states. Therefore, they may explain manifestations of trust in e-voting in other countries too. It needs to be stressed, however, that mechanism-based explanations are inherently incomplete and indeterminate (Avgerou 2013b). Social phenomena are too complex to be explained by a set of generic causal processes. The presence of the same mechanisms does not guarantee the same effects across countries, or even across states in federal countries, such as India and Brazil. Moreover, as our effort to ascertain the existence of trust in e-voting from public responses to election outcomes demonstrates, mechanisms and their effects may differ in terms of strength. As a mechanism explaining acceptance of election results, voters' trusting of e-voting may coexist with voter intimidation and, in such cases, their combined effects depend on their relative strength. Also, each of the four mechanisms contributing to the creation of trust may vary in terms of strength. The effect of the combination of the four mechanisms is not a binary trust or suspicion, but a position on a continuum between absolute trust and deep suspicion, better expressed as a trusting or suspicious disposition.

CONCLUSIONS

Our research combines prior knowledge on processes and conditions generating or inhibiting trust in e-voting with a case study of e-voting in two Indian states to construct a socio-technical causal explanation of citizen responses to the use of e-voting. Our contribution is threefold. First, we problematize the detection of trust in e-voting and explore its existence in the post-election actions of voters. Second, we extend existing theory on causal mechanisms explaining trust in e-voting, elaborating on the form they may take and adding a new mechanism. Third, methodologically, we combined principles of retroduction and retrodiction to build theory comparatively and incrementally by adding insights from an in-depth country case study to research findings in other countries. We thus pursued a cross-country comparative approach to incrementally refine/enrich theoretical propositions that are expressed in concepts that are generally relevant but sensitive to country-context specific historical circumstances.

Our research findings offer insights that can inform decisions and actions for the introduction of e-voting in countries across the world. As the EMBs of several countries in Asia, Africa and Latin America are contemplating the introduction of e-voting, questions arise about the suitability of e-voting for new democracies with yet unsettled electoral politics. International thinktanks on elections offer practical advice (IDEA 2011; IDEA 2015; IFES 2013) most of which is supported by our research. Particularly important is the significance attributed to the competence of the EMB and its ability to manage the deployment of the e-voting technology and to work out effective voting procedures. In addition to this, our study suggests the importance of convincing citizens that e-voting is introduced to strengthen the integrity of elections for democratic outcomes. Other objectives, such as cost efficiency or technology innovation for the modernization of state institutions, while important for public management, are unlikely to boost voter trust in election results. On the contrary, they may raise suspicion of ulterior motives of the policy makers that may compromise the imperative of fair elections.

Our research suggests that a distinction needs to be made between technology expert views on the trustworthiness of the e-voting technology and public trust in e-voting. Technology scrutiny from computer and political scientists is crucially important, highlighting technology vulnerabilities and institutional shortcomings and providing technical solutions to ameliorate security risks inherent in technology design. VVPAT is a clear example of a technical enhancement that has the potential to improve confidence in casting votes in the 'black box' of an EVM. But our research shows that voters' trust is cultivated or damaged by their experience with the whole process of EVMs-mediated elections rather than the EVM artefacts alone. Well-designed artefacts may not enjoy voter trust if the processes of technology maintenance, deployment and use management are perceived to be obscure and vulnerable to insider or external fraud. And, on the contrary, security weaknesses pointed out by technology experts may not lessen voter trust if they are confident about the integrity and competence of the EMB. Both Brazil and India provide examples about this mismatch between technology weakness arguments and voters' trust. The demonstration of EVMs' security vulnerability in India has given ground to losing political parties to challenge election results, but did not mobilise public protests. In Brazil, the TSE has resisted pressure from computer security experts to introduced VVPAT, without evidence so far of compromising voters' trust. In both countries the EMBs compensate for security risks by publicising and following elaborate procedures of EVM deployment management. Nevertheless, the change of public attitude about the significance of EVM security risks in the Netherlands suggests that voters' trust cannot be taken for granted. Even without major incidents of machine or process security breaches and fraudulent tampering, public attention can be sensitised by the arguments of technology experts, particularly if they are supported by pro-democracy activists.

Another question about the diffusion of e-voting across countries concerns the importance of technology ownership and control. In both India and Brazil, the EVMs were designed and manufactured by their local IT industry. In Brazil the TSE was closely involved in the design

of both hardware and software and continues to oversee technology enhancements in between elections. In India the ECI relies on an advisory committee of technology experts, mostly from government agencies, and the EVMs are manufactured by state corporations. Although in both cases EVMs have technology components produced by foreign corporations, and therefore requiring a degree of trust in actors outside the national state agencies, EMB and public confidence about indigenous ability to retain control of technology remains high (Herstatt et al. 2017). Most developing countries, however, acquire e-voting technologies from the international market, often as turn-key systems. India and Brazil for example are selling their systems, as well as advice on the conduct of e-voting, to other countries. Research is needed to understand such cases. The contrasting case of e-voting reversal in the Netherlands amply demonstrates the heightened perception of risk when not only voting technology is purchased from the market but the conduct of voting through it is outsourced (Oostveen 2010). One could speculate that new democracies lacking technology and public management capabilities may benefit from partnerships with private IT services providers. But our case studies show the importance of citizen confidence that the EMBs have capabilities to supervise private service providers and retain control of technology-mediated elections. These need to be tested in further comparative research.

Finally, a question that requires attention is the suitability of e-voting in countries with turbulent political cultures and gross first order elections malpractice. Our study of e-voting in India suggests that trusted e-voting may indeed be possible and have positive effects on voters' perception of the trustworthiness of election results. This surprising finding needs to be qualified. It was made possible in India by two of the generative mechanisms identified in our research: the perception of e-voting as a solution to a specific malpractice, booth capturing; and the active trust cultivation by the ECI which is already highly trusted for its commitment to fighting electoral fraud. If such mechanisms are not present in countries where elections involve malpractice and violence, introducing e-voting is highly likely to worsen citizen suspicion as another area of fraudulent practice.

Our theoretical contribution, in the form of a set of mechanisms for the formation/loss of trust in e-voting, has potential for explaining also trust in other techno-organisational arrangements in the public sphere of contemporary democracies. The withdrawal of e-voting after many years of use in unproblematic elections to paper ballot is an extreme case of reversal of installed government digital infrastructure to manual systems. It nevertheless bears lessons for the use of IT in other key information infrastructures of democracies currently being introduced in various countries, as for example digital citizen identification systems (Hosein et al. 2010; McGrath 2016; Whitley et al. 2007). Such systems entail controversies among government administrators and technology experts about security and privacy risks similar to those about e-voting. Our research shows that to become part of the fabric of modern government and society such infrastructures need to gain and sustain public trust. While influenced by experts' analyses, public trust is developed or destroyed by generative mechanisms associated with events, processes and conditions in the political and socio-economic context.

Extending the theoretical explanation of trust in e-voting to other population-wide public digital infrastructures of government, we postulate that they are likely to enjoy citizen trust if: a) They are introduced as part of broader government efforts for developing state/citizen relationships suitable for modern democracies, producing visible social welfare benefits; neither efficiency gains nor arguments about technological progress are adequate trust engendering justifications of large scale state infrastructures. b) They are actively championed by and identified as core components of the tasks of authorities of unblemished reputation. c) They are introduced in a context where IT is positively perceived as a driver for socio-economic development, with policies that effectively address public concerns about risks associated with IT, such as unemployment or loss of privacy. d) In countries with turbulent political cultures they are not implicated in corruption and create spaces of orderly exercise of citizens' rights. The validity of these mechanisms of trust creation need to be

tested and further developed with research on public acceptance of digital infrastructures in various countries, such as India's Aadhaar.

APPENDIX: DATA SOURCES

Field trips, dates and locations

Visit	Locations
1st	Bangalore, 9-28 April 2015 Trivandrum, 18-21 April 2015
2nd	Bangalore, 14 August-2 September 2015 Trivandrum, 20-24 August 2015
3rd	New Delhi, 3-4 May 2016 Nandigram, 5 May 2016 Kolkata, 6-7 May 2016 Bangalore, 8-11 May 2016 Trivandrum, 12-20 May 2016

Interviews and subjects discussed

Interviews	Subjects Discussed
Former Chairman and Managing Director (CMD) at Bharat Electronics Limited (company producing EVMs) (3)	Technical features of EVMs, history of system development, evolution of EVMs through the years, potential security issues and solutions to them
State-level politicians (9)	Involvement of politicians in e-voting, public attitudes towards it, perceived risks of electoral fraud, ECI's role in guaranteeing electoral integrity, perception of ECI by political parties
Technology developers and security scientists (9)	Roles of technology in the electoral cycle, trustworthiness of the e-voting system, computer security issues with EVMs, reported fragilities in the electoral rolls, potential and reported consequences on election processes
Polling officers (6)	Their duties on election day, their perception of the system's security, the logistic organisation of elections
Political activists campaigning for elections (5)	Perception of electoral fraud by voters, roles of activism in guaranteeing transparency of election processes, the ongoing State Assembly elections, history of elections in Kerala, expected outcomes of the ongoing election
Members/former members of electoral management bodies (3)	Legal and organisational processes of elections, changes of the electoral process associated with EVMs, issues of vote buying and other forms of malpractice, the ongoing election and the expected issues and outcomes
Voters (18)	Their experience of voting, their perception of elections and the election results, comparison with elections before e-voting, perceived diffusion of malpractice in Indian elections
Academic researchers (political scientists, e-governance researchers) (8)	The role of technology in the electoral cycle, the ongoing elections and public perception of them, trustworthiness of the e-voting system, diffusion of electoral violence, caste politics and their influence on elections
Staff at NGOs working with marginalised groups (10)	Perception of elections by the poor and vulnerable, voting processes experienced by slum dwellers and marginalised citizens, comparison with elections before e-voting, perception of malpractices in Indian elections
Total Interviews: 71	

Web Sites, Blogs and Surveys

Elections in India:

Election Commission of India: http://eci.nic.in

State Election Commission of West Bengal: http://www.wbsec.gov.in

State Election Commission of Kerala: http://sec.kerala.gov.in

Electoral Integrity Project: https://www.electoralintegrityproject.com/

Lokniti – Programme for Comparative Democracy: http://www.lokniti.org/

The Indian Election Blog: https://theindianelectionblog.wordpress.com/

PG's Pensieve (blog on fragilities in Indian electoral rolls): https://pgbhat.wordpress.com

Ideas for India: http://www.ideasforindia.in/

Economic and Political Weekly: http://www.epw.in/

Times of India: http://timesofindia.indiatimes.com/

Indian Express: http://indianexpress.com/

State of Democracy in South Asia: http://www.lokniti.org/democracy-south-asia.php

ECI's Manual on Vulnerability mapping:

http://eci.nic.in/eci_main/ElectoralLaws/HandBooks/Manual_on_VulnerabilityMapping_27052016.pdf

E-voting – international agencies:

- International Institute for Democracy and Electoral Assistance (IDEA) – Introducing Electronic Voting: Essential Considerations: http://www.idea.int/publications/catalogue/introducing-electronic-voting-essential-considerations
- International Foundation for Electoral Systems (IFES) – Implementing and Overseeing Electronic Voting and Counting Technologies: http://www.ifes.org/publications/implementing-and-overseeing-electronic-voting-and-counting-technologies
- Caltech/MIT Voting Technology Project: https://vote.caltech.edu/
- Atlantic Council – Democracy Rebooted: The Future of Technology in Elections http://www.atlanticcouncil.org/events/webcasts/democracy-rebooted-the-future-of-technology-in-elections
- Electoral Integrity Project - https://www.electoralintegrityproject.com/

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[i] Our definition of e-voting does not include online casting of votes, usually referred to as internet voting or i-voting. Except for Estonia that allows internet voting as an option, few countries consider internet voting for national or provincial elections because of high fraud and voter coercion risks.
[ii] http://vote.caltech.edu/

[iii] Without official or well documented media sources, we draw data on violence from many blogs, especially blogs that attack the CPI-M: https://thinkprogress.org/west-bengal-election-result-1b9ae49781e.
[iv] http://indianexpress.com/article/india/india-news-india/prestige-battle-for-trinamool-as-civic-polls-underway-in-bengal/
[v] http://indiatoday.intoday.in/story/violence-paves-way-for-2016-bengal-elections/1/557722.html
[vi] The Rashtriya Swayamsevak Sangh (RSS) is a paramilitary volunteer organisation, ascribing to Hindu nationalism and closely linked to the BJP (Corbridge and Harriss 2000).
[vii] https://scroll.in/article/810297/its-bloody-business-as-usual-in-kannur-but-will-the-kerala-cm-be-the-one-to-end-it
[viii] Kerala has also intensively promoted Aadhaar, India's system for biometric identification of residents, as a means to deliver social benefits to the poor: http://www.acleddata.com/wp-content/uploads/2016/09/ACLED_Asia_TrendReport_September2016.pdf
[ix] CPM is another Acronym for Communist Party of India-Marxist, most commonly referred to as CPI(M).
[x] http://indianexpress.com/article/elections-2016/india/india-news-india/west-bengal-elections-post-poll-violence-cpim-left-parties-biman-bose-2799552/
[xi] Indicators about multiple aspects of Indian elections can be found in the surveys of views of election experts collected by the Electoral Integrity Project, see for example https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/EWYTZ7 for the May 2017 survey data.
[xii] https://indiaevm.org
[xiii] http://www.ceo.kerala.gov.in/home.html;jsessionid=8A69DC57CE1B496E2F5B6EA58A5B7D14.
[xiv] https://www.electoralintegrityproject.com/
[xv] Scheduled Castes and Scheduled Tribes are various groups of historically disadvantaged people in the Indian society. Terms for their recognition are set in the Constitution, and a system of reservations is in place for them.
[xvi] http://blogs.lse.ac.uk/southasia/2017/01/17/blocking-the-introduction-of-the-totaliser-is-not-good-for-the-secret-ballot-in-india/.
[xvii] http://blogs.timesofindia.indiatimes.com/toi-editorials/evms-win-politicians-making-wild-allegations-against-evms-totally-fail-to-back-these-up/