Who Benefits from an Increase in Enfranchisement? Evidence from Brazil

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Abstract

We use the phased-in introduction of electronic voting in Brazil as an exogenous shock to lower-skilled and lower-income voters' enfranchisement. Using detailed employer-employee administrative data and a difference-in-differences design that exploits a distinct assignment rule in the implementation of electronic voting based on a population threshold, we document that an increase in enfranchisement increases labor earnings of disadvantaged groups. Lower-skilled and lower-income employees experience the greatest benefits. Exploring potential mechanisms, we find that enfranchisement improves outcomes through increases in public sector employment and wages. Moreover, we find spillover effects to the private sector, potentially driven by the expansion of public services, along with an increase in the probability of becoming entrepreneurs for lower-skilled and non-white individuals.

Keywords: Electronic Voting, Public Employment, Low-Skilled, Inequality, Entrepreneurship

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1 Introduction

Despite voting being the cornerstone of democracy, elections around the world are marked by steep declines in turnout rates and by people failing to vote (Hoffman et al., 2017). Consistent with positive theories of voting, extending the voting franchise to incorporate lower-income voters increases redistribution (Meltzer and Richard, 1981) and decreases income inequality (Mueller and Stratmann, 2003). Considering that the costs of participation in an election exhibit large disparities across socioeconomic, ethnic and racial groups (Hodler et al., 2015), the observed declines in turnout rates are particularly concerning by potentially translating into fiscal policies that are biased towards wealthier citizens (Lijphart, 1997; Bugarin and Portugal, 2015) and that subsequently sustain existing inequalities. To mitigate unequal participation in voting, governments have enacted several policies that aim to increase voting participation for socioeconomically disadvantaged individuals. While prior studies offer important insights into the electoral and turnout effects of policies that expand voting participation, there is limited empirical evidence on the real economic effects of policies that shift political representation.

Our paper attempts to establish direct systematic evidence on the real economic effects of voting enfranchisement by focusing on the labor market implications of a policy that increased the political power of socioeconomically disadvantaged voters. An important challenge into causally identifying the real effects of voting participation is that enfranchisement interventions tend to be deliberate and non-random, targeting specific geographic areas or demographic groups. In addition, exploring the effects of enfranchisement on voters' labor market outcomes requires to be able to observe the employment and earnings trajectory of individuals.

For our analysis, we draw insights from the voting process in Brazil, which provides a setting that allows us to causally estimate the impact of a policy that disproportionately increased the political representation of socioeconomically disadvantaged groups, and paint an exhaustive picture of the reallocation process of individuals in labor markets. Specifically, we combine a comprehensive administrative employer-employee linked dataset with the phased-in introduction of electronic voting (EV) in Brazil, which created a positive shock to lower-income and less educated voters' enfranchisement (Hidalgo, 2012; Fujiwara, 2015). Our dataset consists of the universe of formal employment in Brazil and provides detailed information on employee characteristics, contractual terms, inceptions and terminations. Consequently, we are able to follow employees over time and across employers and characterize the extent and direction of individual labor market outcomes following shifts in political power of specific socioeconomic groups. Importantly, we are able to explicitly isolate and distinguish among different types of labor decisions, namely transitions to public employment, employment in the private sector, and entrepreneurial entry.

To identify the causal effects of voting participation on individuals' labor market outcomes, we rely on temporal and spatial variation created by the introduction of electronic voting in Brazil. In the 1998 election, the Brazilian government adopted an electronic voting technology as a substitute for paper ballots, however, only for municipalities with more than 40,500 registered voters. The primary econometric challenge we face is that adoption of electronic voting is likely to be correlated with characteristics of municipalities that differentially affect individuals' labor market outcomes. For example, electronic voting was implemented by larger municipalities that are typically characterized by better-functioning labor markets and higher per capita income. Our identification strategy addresses any potential econometric concerns by relying on a critical feature of our institutional setting, namely the fact that implementation of electronic voting across municipalities is based on a plausibly exogenously-determined population threshold. Our identifying assumption is strongly supported by the following facts. First, the electoral court's decision on the 40,500 threshold of eligible voters was guided by the availability of voting machines in Brazil at time of the decision. Second, the assignment rule across municipalities was determined based on the number of registered voters in 1996 so that politicians were unable to manipulate the number of eligible voters and select into the adoption of electronic voting. To account for fundamental differences across municipalities driven by differences in size, we restrict our sample to municipalities within a narrow range around the registered voters threshold, hence allowing us to identify a set of municipalities likely to be valid counterfactuals.

Using a difference-in-differences methodology within the set of municipalities around the eligible voters threshold, we begin our analysis by examining the impact of voting participation on shaping individuals' earnings dynamics over the five-year post-adoption period. We find that the introduction of electronic voting in Brazil benefits socioeconomically disadvantaged groups by leading to relatively larger growth in earnings. Specifically, focusing on the effects across the skill distribution, electronic voting is followed by an economically large increase of 4.9 log points in earnings for individuals with at most five years of education, that is individuals who are illiterate or exposed only to elementary education. By contrast, individuals with at least twelve years of education, that is individuals who have at least completed high-school education, experience a relative decline in earnings of 3.2 log points in municipalities that implemented the new voting technology. If fact, in support of our hypotheses, the effect appears to be linearly decreasing with the level of education.

Likewise, investigating the effects for different demographic groups, we document that groups with historically lower labor force participation rates and earnings, that is female and non-white employees, benefit in the post-adoption period by experiencing a 2.4- and 2.7-log-point earnings increase, respectively. Overall, lower-income individuals in treated municipalities experience a post-adoption increase of 10 log points in earnings relative to

higher-income individuals and the set of employees in the control group. Importantly, across our groups of interest, we highlight that there are no statistically significant differences in the evolution of earnings between individuals in treated and control groups prior to the adoption of electronic voting. Overall, our findings point to a redistribution mechanism in labor markets towards the newly enfranchised groups following an increase in political representation.

We provide several extensions of our baseline findings. First, the observed increase in earnings is likely to reflect numerous (non-mutually exclusive) labor market adjustments. For example, an earnings increase is likely to be the result of an increase in wages, or an increase in the extensive and intensive margin of participation in the labor force, or both. The comprehensive nature of our administrative data set allows us to decompose our primary effects into a wage component and a labor market participation component. We find that, for the majority of our groups of interest, the observed effects are equally distributed between wages and employment months. The only exception is lower-income individuals where wage increases account for 80% of the rise in earnings. Second, an important concern in our setting is that the observed effects are likely to reflect municipality-level changes in the composition of labor force, rather than direct redistribution of resources toward the newly enfranchised groups who participated in the voting process. Employing a municipality-level analysis, we find no evidence of differential shifts in the composition of the workforce in municipalities that were affected, providing support for a redistribution channel.

Having established the causal relationship between voting participation and labor market outcomes, we proceed with characterizing the underlying economic mechanisms through which an increase in political representation potentially leads to higher earnings for lower-income individuals. Specifically, we evaluate the role of redistribution by examining the effects of electronic voting on transitioning into employment in the public sector, the potential for spillovers in the private sector, and the probability that treated individuals enter entrepreneurship and create firms. We find that the effects differ across socioeconomic groups.

We start by exploring the role of public sector in explaining the labor market gains experienced by the socioeconomic groups that particularly benefit from electronic voting. Previous literature has provided important insights regarding the relationship between enfranchisement and public spending (Cascio and Washington, 2013; Fujiwara, 2015; Aneja and Avenancio-Leon, 2019). Our evidence suggests that public sector employment expands following the adoption of electronic voting, and is subsequently used as a redistribution mechanism. There is a significant increase of 157% in total employment of temporary municipal employees, which is primarily explained by a 173% increase in the number of hirings. We find no effect for permanent municipal employees and federal government employees pointing to the distinct role of political discretion in employment

decisions for temporary positions in municipalities. To the extent that the expansion of the public sector manifests into an increase in employment and wages in the public sector, we expect the public sector to be a significant source of the labor market gains we document. Indeed, although there is no differential effect on entry into the public sector across socioeconomic groups, our estimates point to an economically large increase in wages for the socioeconomic groups that experience an increase in political power with the exception of non-white individuals. For example, public sector wages grow by 9.2 log points for less educated employees and by 11.6 log points for lower-income, respectively. Consistent with shifting public resources to fund increases for newly enfranchised groups, highly educated public employees experience a relative decline in wages of 6.6 log points.

In a second step, we continue our analysis by shifting our focus on the private sector. There are multiple direct or indirect channels through which reallocation to the private sector contributes to better labor market outcomes for newly enfranchised groups of employees. First, to the extent that expansion in public resources increase the availability of procurement contracts in sectors that disproportionately create vacancies that require lower-skilled tasks (e.g., construction), we expect an increase in employment or wages for less educated, disadvantaged socioeconomic groups. Second, in the absence of shifts in the composition of the labor force, the observed increase in labor demand in the public sector is expected to increase the outside option for the newly enfranchised groups in municipalities that adopt electronic voting, thus subsequently exerting upward pressure on wages in the private sector. Overall, while we find that the private sector is a contributing factor to labor market gains for the newly enfranchised groups, our estimates indicate that the effects are largely attributed to redistribution of resources in the public sector.

Finally, we examine the role of political empowerment in facilitating entrepreneurial entry by individuals from disadvantaged socioeconomic groups. An increase in political power is likely to increase entry into entrepreneurship through various non-mutually exclusive channels. First, to the extent that an increase in enfranchisement leads to redistribution of public resources, lower-income and less educated voters are likely to experience an increase in access to credit, particularly from government-controlled financial institutions, or government subsidies, thus facilitating entrepreneurial entry. Alternatively, the increase in earnings we observe from access to better-compensated employment is likely to facilitate entrepreneurship by allowing individuals to raise the necessary capital to establish a firm. We find that less educated and non-white individuals exhibit an economically and statistically significant increase in the likelihood of becoming entrepreneurs after the increase in voting enfranchisement. In addition, we examine the performance of newly created firms and find evidence–albeit limited in magnitude and statistical significance– that socioeconomically disadvantaged groups in treated municipalities tend to create firms that are less likely to survive and create employment, pointing to experimentation as the likely explanatory factor.

Our paper is related to two strands of literature. First, we contribute to the literature that examines the relationship between enfranchisement of lower-income voters and public spending. The seminar theoretical contribution by Meltzer and Richard (1981) introduces a model of electoral competition to argue that enfranchisement of lower-income voters increases public spending because, although no one is excluded from drawing utility from public goods, lower-income voters pay a relatively lower share of the tax revenue needed to finance the provision of public goods. A number of subsequent papers attempted to provide empirical evidence corroborating this theoretical model (Lindert 2004; Brown and Hunter 1999; Husted and Kenny 1997; Mueller and Stratmann 2003). Nonetheless, results are mixed and it has remained a challenge to identify the impact of enfranchisement that is biased towards lower-income voters. For example, Cascio and Washington (2013) relies on the enfranchisement of black voters in the U.S. and Fujiwara (2015) exploits the introduction of electronic voting in Brazil as positive exogenous shocks of lower-income voters' enfranchisement to provide evidence in support of redistribution, whereas Hoffman et al. (2017) and Hodler et al. (2015) report either muted or opposite effects. While our research design relies as well on the introduction of electronic voting in Brazil, we diverge from the literature by providing evidence on the real economic effects of an increase in the political representation of the newly enfranchised socioeconomic groups.

Second, we contribute to the literature investigating the efficiency of the choice of public policies in the presence of interests influenced by particular groups (e.g., defined by education, income, age). Becker (1983) develops a theoretical model to document that competition among interest groups is likely to result in efficient outcomes. However, as argued in Matsusaka (2009), the predominant view is that particular groups compromise democracy when their interests prevail at the expense of the majority. The author provides empirical evidence that direct democracy (i.e. initiative process) in the United States impacts public employment and wage policies at the local administration level. By allowing citizens to propose policies, direct democracy removes the agenda control of politicians and therefore, decreases the influence of interest groups. Matsusaka (2009) finds that direct democracy generates efficient outcomes by decreasing patronage hires and wages of public employees. Aneja and Avenancio-Leon (2019) provide an optimistic view of enfranchisement targeting one particular group. In their analysis of the 1965 Voting Rights Act, they find that the expansion of black voting rights contributed to advancement of their economic status and reduced the black-white wage gap. Our study corroborates this evidence by exploiting a non-targeted increase in enfranchisement that is exogenous to the political environment and, thus, overcomes endogeneity concerns in the targeted expansion of voting rights towards specific groups.

2 Institutional Setting

2.1 Elections in Brazil

Elections in Brazil occur typically biennially over a four-year cycle, and are comprised of municipal and federal elections. Mayors and local councils are elected in the former, whereas Governors, Senators, the President, and Federal and State Representatives are elected in the latter. Local councils are composed of Municipal Representatives with the number being proportional to the population of the locality, varying between 9 and 55. States have legislatures composed by State Representatives with the number being proportional to a municipality's population. Finally, the National Congress is composed by 81 Senators, which accounts for three Senators per state, and 513 Federal Representatives with a state's population determining the number of Federal Representatives per state.

Legislative elections in Brazil follow the open list proportional representation system, with the exception of Senatorial elections. For local councils and the State Congress, there are no districts and each voter has the same political weight. However, for the National Congress, each state acts as a multi-member district having between 8 and 70 seats in the Congress according to population size. Nonetheless, due to malapportionment, voters have different weights across Brazil in federal congressional elections (Snyder and Samuels, 2004).

2.2 Adoption of Electronic Voting in Brazil

The phased-in introduction of electronic voting in Brazil is an essential feature for our study. Figure 1 provides a timeline of the federal elections along with the voting medium used. Electronic voting was first introduced in the municipal elections of 1996, however, at a limited scale, as only 57 municipalities were able to use the technology.[1] Brazil was able to considerably expand the production of voting machines in the federal election of 1998. However, the supply of voting machines remained limited,[2] and close to 500 municipalities were able to adopt electronic voting based on the following set of assignment rules. First, the states of Alagoas, Amapá, Roraima, and Rio de Janeiro adopted electronic voting across the entire set of municipalities. Second, electronic voting was used by any municipality across the country with a number of eligible voters greater than 40,500 based on registration records in 1996. Figure 2 provides a map with the municipalities that implemented electronic voting.

Leveraging the second assignment rule and employing a regression discontinuity design that relies on the number of registered voters in 1996 as the running variable, previous studies have provided strong support that the adoption of electronic voting was followed by a substantial increase of around 33% in the number of valid votes to turnout ratio in

[1] Electronic voting was used in state capitals and municipalities with more than 200,000 voters.
[2] Brazil is comprised by around 5,395 municipalities over the period of study.

the 1998 election (Hidalgo, 2012; Fujiwara, 2015). Prior to the adoption of electronic voting, voters were required to manually write the candidates' respective numbers or names accurately in paper ballots. As Hidalgo (2012) argues, voting using a paper ballot is a non-trivial task for an electorate in which one-third of voters was illiterate. Critically, following the introduction of electronic voting, voters are required instead to type the candidates' number in a keypad as displayed in Figure 3. As the electronic voting technology no longer requires individuals to be literate to be able to cast a vote, the observed de facto increase in enfranchisement was concentrated among the less educated, lower-income voters. Consequently, electronic voting induced a shift in the median voter toward the left of the political spectrum.

2.3 Linking Federal Elections to Municipality-Level Outcomes

Our empirical methodology relies on the phased-in introduction of electronic voting that occurred at a federal election. However, our analysis focuses on labor market outcomes of employees at the municipality level. Therefore, linking the increase in enfranchisement in a federal election to public spending and labor market decisions at the municipality level is critical, albeit far from straightforward.

Nonetheless, we find support in the literature that highlights the connection between representatives and mayors in Brazil to formulate our primary argument. In particular, Novaes (2018) demonstrates that, in our setting, mayors tend to act as agents for congressional candidates. The seminal study of Ames (2002) discusses the quid pro quo relationship between the central government and local governments, and provides evidence that mayors act as vote brokers for Federal Representatives in exchange for discretionary transfers. That is, mayors significantly contribute to the election of Federal Representatives, and Federal Representatives, in response, grant discretionary transfers that benefit the respective local governments and subsequently increase the likelihood of getting re-elected.

The link between municipality-level outcomes and the outcomes of federal elections is therefore explained by the ability of Federal Representatives to allocate part of the federal budget to local authorities, that is routinely motivated by political reasons. The selection process occurs through a federal budget amendment (*Emendas Parlamentares*) in the middle of the year prior to the budget implementation (Baerlocher and Schneider, 2021). Representatives are limited to a certain amount of budget amendments[3], thus discretionary transfers tend to be allocated strategically. In fact, the literature documents that Federal Representatives allocate budget amendments to municipalities in which they experience the largest political support (Ames, 2002; Firpo et al., 2015).

[3]Currently, Federal Representatives are allowed to allocate close to $4 million per year into, at most, 25 different budget amendments.

Electronic voting increased the number of eligible votes in a municipality, thus increasing mayors' bargaining power in negotiating for discretionary transfers with Federal Representatives. In fact, Schneider et al. (2020) provide evidence that Federal Representatives allocate budget amendments in a way that prioritize municipalities that used electronic voting, subsequently increasing the allocation of grants by 76%.

3 Data and Empirical Methodology

3.1 Data Sources

Information on linked employer-employee relationships is obtained from RAIS, which is collected by the Brazilian Ministry of Labor (*Ministério de Trabalho e Emprego, or MTE*). RAIS is a longitudinal administrative dataset compiled at an annual basis from information collected directly by formally-registered, public or private firms, and includes comprehensive information on labor contracts that were active for at least part of the calendar year. The objective of RAIS is to administer and monitor access to unemployment insurance and payment of benefits to eligible employees. Firms have thus strong incentives to provide comprehensive and accurate information. Furthermore, control mechanisms are in place to ensure mandatory compliance with the respective requirements. MTE estimates that RAIS includes over 95% of formally employed individuals in Brazil.

The unit of observation is a job entry that is identified by an employee-level identifier (PIS) and an establishment-level identifier (CNPJ) that enable us to follow individuals over time and across firms. The firm-level identifier is extracted in a systematic manner by the establishment-level identifier and is used to identify a firm's founders at the year the firm is established. RAIS includes information on the start and end date of the specific job entry, occupation type, wage level, demographic characteristics. However, whereas the start date is precisely reported at the day level, for the end date, only the separation month is available in a given year. The occupation type is coded according to the 2002 Classificação Brasileira de Ocupaçc̃oes (CBO).

At the establishment level, RAIS contains information on the organization type, the geographical location and the sector in which the specific establishment operates. Thus, we are able to identify and classify public sector entities into federal, state, and municipal status. At the individual level, the available demographic characteristics are gender, age, race, and education. We restrict our sample to the years from 1996 to 2004 so that employee-level information of at least three years before and five years after the adoption of electronic voting is included.

Finally, we obtain data on discretionary transfers from the federal government to municipalities from the Controladoria Geral da União (CGU) database. The dataset includes information on the entity that grants the discretionary transfer, the recipient entity, the value, and the date of the transfer.

3.2 Empirical Methodology

Our objective is to estimate the causal effect of an increase in voting participation on employees' labor market outcomes and identify the groups of employees that benefited from the adoption of electronic voting. The primary econometric challenge we face is that the adoption of electronic voting is likely to be correlated with characteristics of the municipalities that are expected to differentially affect employees' labor market outcomes. For example, voting participation is likely correlated with individuals' socioeconomic status. Likewise, the size of a municipality is likely to influence employment and wage dynamics differently. In fact, electronic voting was disproportionately adopted by larger municipalities that are typically characterized by better-functioning labor markets, suggesting that any differences in employees' outcomes are plausibly driven by differences in the type of available employment opportunities.

To address the potential econometric challenges, our identification strategy relies on a critical characteristic of our institutional setting, namely, the fact that the implementation of electronic voting across municipalities is based on a plausibly exogenously-determined population threshold. Our assumption is strongly supported by the following facts. First, the electoral court's decision on the 40,500 eligible voters' threshold was guided by the availability of voting machines in Brazil at time of the decision. Second, the assignment rule across municipalities was determined based on the number of registered voters in 1996 so that politicians were unable to manipulate the number of eligible voters and select into the adoption of electronic voting. Consequently, our identifying assumption is that municipalities using electronic voting were randomly selected, thus allowing us to causally identify the impact of the newly adopted voting technology on individuals' labor market outcomes.

Our baseline analysis focuses on the period from 1997 to 2004. Notice that our study relies on the implementation of electronic voting in the 1998 federal election. However, the newly-elected representatives were only able to affect the allocation of the federal budget in 2000, since the budget for the fiscal year of 1999 had already been decided in mid-1998 prior to the election by the representatives who were already in office.

For our analysis, we estimate the following difference-in-difference-in-differences event-study specification:

$$Y_{imt} = \alpha_{mt} + \alpha_{mg(i)} + \gamma EV_{mt} \times I^{g(i)=1} + \beta X'_{imt} + \varepsilon_{imt}, \tag{1}$$

where Y_{imt} is an outcome variable for the individual i in calendar year t employed in municipality m. The indicator variable EV_{mt} is equal to one for employees in municipalities that adopted electronic voting in a given year, and zero otherwise. The indicator variable $I^{g(i)=1}$ is used to denote employees that are part of a specific skill or demographic group g. Our baseline specification incorporates municipality-by-year fixed effects to absorb un-

observable time-varying differences across individuals in a municipality, and municipality-by-group fixed effects to absorb group-specific differences across municipalities that are constant over time. Finally, X'_{it} represents time-varying employee characteristics, including age and age squared to account for non-linear effects.

To account for fundamental differences across municipalities driven by differences in size, we restrict our sample to municipalities within a narrow range around the registered voters' threshold, hence allowing us to identify a set of municipalities likely to be a valid counterfactual. Specifically, our baseline analysis relies on the set of municipalities with a population of eligible voters in 1996 ranging from 30,500 and 50,500, that is within a 10,000 range around the adoption threshold. Finally, we exclude from our sample the states that implemented electronic voting statewide. Consequently, the coefficient of interest (γ) captures the average difference in the outcome variable between employees in municipalities just above and just below the threshold. The standard errors are clustered at the municipality level.

3.3 Final Sample and Summary Statistics

We start with the universe of employees in Brazil included in the RAIS dataset for the period from 1997 to 2004. We only include employees that are within the ages of 18 to 65 and are employed at the end of the calendar year in municipalities with an eligible voters' population in 1996 within a 10,000 range around the 40,500 adoption threshold. Our final sample includes 229 municipalities and around 5.1 million individuals leading to a final sample of roughly 15.8 million observations.

Although the unit of analysis is an employee, the unit of treatment is at the municipality level. Table 1 provides descriptive statistics of the composition of labor force at the municipality level in the year prior to the adoption. Column (1) reports average values of several labor force characteristics for the total sample, whereas Columns (2) and (3) separately for treated and control municipalities. Overall, there are no significant differences in the composition of employee characteristics across municipalities around the assignment rule in the year prior to the adoption.

[Insert Table 1 Here]

The average wage at the monthly level is 510R$ with employees in treated municipalities displaying a slightly higher wage, albeit statistically indistinguishable relative to the wage for employees in control municipalities. Female employees account for 36% of the labor force, while 3% of employees are illiterate and 50% are non-white. On average, employees are 34 years old and have a tenure in the current employer of 55 months. The largest part of the labor force are blue-collar employees (43%) and are employed in the manufacturing sector (26%). Interestingly, a substantial fraction of the labor force is employed in the public sector, and in particular in municipality-related entities.

4 Impact of Electronic Voting on Individuals' Labor Market Outcomes

4.1 Who Benefits from an Increase in Enfranchisement?

We begin our analysis by examining changes in employees' earnings across different skill and demographic groups. We estimate earnings as the logarithm of an individual's aggregate earnings over a year across employers–if the individual is employed at more than one firms during a year.[4] Our objective is to characterize the distributional effects of an increase in enfranchisement on socioeconomically-disadvantaged voters. The selection of the conditioning characteristics is motivated by the fact that the new technology primarily increased participation among the less educated, lower-income voters. Consequently, we examine the labor market response across treated and control municipalities by exploiting cross-sectional employee-level variation across skill levels and demographic characteristics. The results are presented in Table 2.

[Insert Table 2 Here]

Columns (1) and (2) report the coefficient estimates for individuals with different levels of educational attainment. To the extent that the increase in voting participation is followed by a rise in political power for less educated individuals, we expect earnings to respond positively the lower an individual's education attainment in municipalities where electronic voting was implemented. The direction of our coefficient estimates confirms our hypothesis. Specifically, electronic voting is followed by an economically large increase of 4.9 log points in earnings for individuals with at most five years of education, that is individuals who are illiterate or exposed only to elementary education. By contrast, individuals with at least twelve years of education, that is individuals who have at least completed high-school education, experience a relative decline in earnings of 3.2 log points in municipalities that implemented the new voting technology. Interestingly, Table A1 in the Appendix demonstrates that there is a linear response by educational attainment. Illiterate individuals exhibit the largest increase in earnings (7.5 log points), followed by individuals with elementary education (who report a sizeable increase of 4.5 log points). The earnings effect is attenuated for individuals who were unable to complete high-school education, and sharply decreases for high-school graduates.

In Columns (3) to (5), we examine the earnings trajectory of socioeconomically-disadvantaged demographic groups. Female and non-white employees historically report

[4]Earnings include labor compensation, bonuses, tips, commissions, allowances for commuting costs, and contributions to social security, pension plans, healthcare, and unemployment insurance. Private benefits offered by firms (e.g., private retirement plans, private healthcare plans, or life insurance plans) are unobervable, thus excluded. Earnings have been deflated using the Brazilian CPI and represent Brazilian Reals in 2000 prices.

the lowest voting and labor force participation rates in Brazil along with sustaining substantial wage gaps (Gerard et al., 2021; Morchio and Moser, 2024). Column (3) reports that female employees experience a 2.5-log-point increase in earnings after the adoption of electronic voting relative to benchmark earnings in the period prior to the adoption and to the set of female employees in control municipalities. In Column (4), we document that an increase in enfranchisement in municipalities that implemented the new technology is followed by a sizeable increase of 2.9 log points in earnings for non-white employees. Finally, the coefficient estimates in Column (5) indicate that low-income individuals[5] benefit from an increase in voting participation by experiencing a 10.2-log-point increase in earnings.

Overall, our estimates are consistent with the view that a rise in voting enfranchisement and political empowerment is accompanied by substantial gains in the labor market for the socioeconomic groups who experience an increase in political representation.

4.2 Dynamic Effects

In Figure 4, we extend our baseline analysis by evaluating the evolution of earnings over time around the implementation of electronic voting. Examining the timing of our observed effects for the different groups of employees is critical to evaluate the validity of the identifying assumptions of our empirical design. Consequently, we augment our baseline specification to include event-time indicators as follows:

$$Y_{imt} = \alpha_{mt} + \alpha_{mg(i)} + \sum_{p=-2}^{p=+5} \delta_p d_{imt}(p) \times EV_{mt} \times I^{g(i)=1} + \beta X'_{imt} + \varepsilon_{imt}, \tag{2}$$

where p is used to index normalized time expressed in years relative to our event year and ranges from -2 to +5. The indicator variable $d_{imt}(p)$ is equal to one if $d_{imt}(p) = p$ and is used to identify leads and lags around the time of the event. The coefficients of interest (δ_p) capture the average difference in the outcome variable between employees in treated and control municipalities when $d_{it}(p) = p$ and are normalized to zero at p = -1. The standard errors are clustered at the municipality level.

The magnitudes of the impact of electronic voting on the earnings dynamics are reported in Figure 4, which plots the estimated δ_ps from Equation (2) along with 95% confidence intervals for different groups of employees. The vertical line in Figure 4 represents the time of our event, that is the year after the election.

[Insert Figure 4 Here]

As illustrated in Figure 4, in support of the parallel-trends assumption, no statistically significant difference exists in the earnings trajectory between treated and control

[5]We define as low-income any individual who earns a wage that is lower than the median wage in our sample.

employees prior to the adoption of electronic voting, implying our identification strategy is potentially effective in mitigating concerns related to selection bias. However, relative to the control group and across the different socioeconomic groups, employees in treated municipalities who are expected to benefit from an increase in voting enfranchisement experience a statistically significant and persistent increase in earnings over time. In particular, across the majority of our groups of interest, treated employees' earnings increased gradually in the short run with the largest responses materializing in the long run, three to four years after the adoption. Earnings never returned to the pre-adoption level in the period under study, persistently remaining at a higher level.

Overall, the findings support the identifying assumption that earnings in treated and control municipalities were following parallel trends prior to the new technology and that the effects only materialize after electronic voting was implemented.

4.3 Changes in Prices or Quantities?

The observed increase in earnings is likely to reflect numerous (non-mutually exclusive) labor market adjustments across the different groups of employees. For example, an earnings increase is likely to be the result of an increase in wages, or alternatively an increase in the extensive and intensive margin of participation in the labor force, or both. To shed light on the drivers of the observed earnings adjustment, we leverage the granularity of the RAIS data and decompose earnings into a wage component and a component that reflects labor market participation. The wage component captures any adjustment driven by changes in average monthly wages. The labor market participation component captures any changes in the number of months of employment in a given year. We use month as the appropriate unit for the decomposition because RAIS reports only the month of the contract termination. The decomposition results are presented in Panel A and B of Table 3.

[Insert Table 3 Here]

The estimates suggest the observed earnings increase for the socioeconomic groups that stand to benefit from an increase in enfranchisement is driven by an increase in both wages and employment months, with the only exception being the group of female employees.

Specifically, the estimates in Column (1) and (4) suggest that increases in wage and employment equally account for the increase in earnings for the least educated group and the set of non-white employees. Likewise, the earnings decline for the highly-educated group is equally divided between a decline in wages and employment months as reported in Column (2). Column (3) of Panel B documents that female employees are the only group that records a decline in employment months. However, the magnitude of the wage

increase in Column (3) of Panel A is substantially larger leading to an overall increase in earnings. Finally, in Column (4) we find that the relative increase in earnings for low-income employees in municipalities that adopted electronic voting largely materialize due to an increase in wages. Overall, our findings suggest that political empowerment increases both the relative compensation and the relative labor supply of socioeconomic groups in our sample.

4.4 Changes in the Composition of Municipalities' Labor Force?

An important concern in our setting is that the observed effects are likely to reflect municipality-level changes in the composition of labor force, rather than direct redistribution of resources toward the newly enfranchised groups who participated in the voting process. To address the concern, we transition to a municipality-level analysis and examine changes in the composition of labor force using the following difference-in-differences specification:

$$Y_{mt} = \alpha_m + \alpha_t + \beta EV_m + \varepsilon_{mt}, \tag{3}$$

where Y_{mt} is an outcomes at municipality m in year t, and EV_m is an indicator variables that is equal to one in a any year a municipality has adopted electronic voting. The coefficient of interest (β) captures the average difference in the outcome variable between treated and control municipalities. The standard errors are clustered at the municipality level. The results are presented in Table 4.

[Insert Table 4 Here]

We consider the following time-varying characteristics: (i) the average number of employees' years of education in a municipality education, (ii) the sum of the share of illiterate employees and employees who have only exposed to elementary education, (iii) the share of employees who have completed high-school education, (iv) the share of female employees, (v) the share of non-white employees, and (vi) the share of low-income employees. Overall, we find no evidence of differential shifts in the composition of the labor force in municipalities that implemented electronic voting. The effects are close to zero in magnitude and statistically insignificant, suggesting that compositional changes play no role in explaining our observed earnings changes.

5 Mechanisms

The previous analysis documents that an increase in voting enfranchisement is followed by significant distributional effects as the socioeconomic groups that particularly benefit from the new voting technology experience substantial gains in the labor market. In

this section, we attempt to characterize the underlying mechanisms associated with the increase in earnings by focusing on the characteristics of firms at which individuals are employed. Specifically, we assess the role of redistribution by examining the effects of electronic voting on employment in the public sector, the potential for spillovers in the private sector, and the probability of creating firms.

5.1 Employment in the Public Sector

We start by exploring the role of public sector in explaining the labor market gains experienced by the socioeconomic groups that particularly benefit from electronic voting. Previous literature has provided important insights regarding the relationship between enfranchisement and public spending. For example, Cascio and Washington (2013) and Aneja and Avenancio-Leon (2019) exploit the enfranchisement of black voters in the U.S., and Fujiwara (2015) and Schneider et al. (2019) use our experiment as a positive exogenous shock to low-income voters' enfranchisement to provide evidence supporting expansion of public resources. Therefore, to the extent that public spending manifests into an increase in wages and employment in the public sector, we expect the public sector to be a significant source of the labor market gains we document. Tables 5 and 6 presents our findings for the different educational and demographic groups respectively.

[Insert Table 5 Here]

[Insert Table 6 Here]

We focus on three margins of public sector employment. First, we assess the post-adoption response in terms of the extensive margin of employment in the public sector using an indicator variable that is equal to one for individuals that are employed in the public sector. Second, we restrict our analysis only on the sample of public sector employees and estimate the effect of electronic voting on the intensive margin of employment in the public sector, that is we separately estimate the effect on wages and employment months.

Columns (1) and (2) of Table 5 and Columns (1) to (3) of 6 report estimates for the probability of being employed in the public sector. Note that we only consider the probability of public sector employment under a temporary contract. The reason is that the hiring process for permanent contracts in the public sector in Brazil is both rigid and non-discretionary. Specifically, Brazil is an example of a meritocratic civil service system where candidates are evaluated based on a civil service examination (Concurso Público), and the selection process relies on the subsequent ranking of candidates to fill the number of vacancies available a specific position (Colonnelli et al., 2019). Public employees hired through the formal process are guaranteed tenure after three years of employment.

However, politicians in Brazil are able to circumvent the formal process by offering temporary contracts for public sector positions that do not require public examination nor provide tenure and, in addition, are accompanied with full discretion over the hiring decision. Hence, temporary contracts enable politicians to respond quicker to voters' demands (e.g., as a response to the enfranchisement of specific socioeconomic groups) and exercise influence through patronage hiring. In fact, Tables A4 and A5 provide evidence at the municipality level that electronic voting was followed by an increase in employment at the municipal temporary sector. Across the different socioeconomic groups of interest, we find that only female employees are associated with a 1.3-percentage-point increase in the probability of employment at the public temporary sector. The effect is statistically significant at the 1% and represents an economically sizeable increase of 6.8% relative to the incidence of temporary public employment.

To further understand the underlying channel behind the fact that the effect is exclusively concentrated on female employees, Table A3 in the Appendix lists the occupations where the entry of temporary employment occurred in treated municipalities after the implementation of electronic voting. As demonstrated, around 45% of the entry is concentrated on occupations that are typically dominated by female employees, including administrative personnel, teachers, and nurses. In fact, in Table A6 in the Appendix we use information provided by the Comptroller General of Brazil (CGU) on discretionary intergovernmental transfers from Federal Representatives to local administrations to validate our conjecture that electronic voting is followed by an increase in government funding. We find that municipalities that adopted electronic voting exhibit an increase in the log amount of intergovernmental transfers particularly from the Ministry of Education, providing further support for our findings that the incidence of employment is concentrated on female employees.

Columns (3) and (4) of Table 5 and Columns (4) to (6) of Table 6 report estimates for wage changes in the public sector, whereas Columns (5) and (6) of Table 5 and Columns (7) to (9) of Table 6 present evidence on changes in employment months. We find that employees in treated municipalities who benefit from an increase in voting enfranchisement and are employed in the public sector experience a substantial increase in wages relative to the set of public employees in control municipalities. By contrast, the magnitudes on employment months are generally attenuated. Specifically, Columns (3) and (4) of Table 5 document that the least educated public sector employees experience a 9.2-log-point increase in wages, whereas highly-educated public sector employees are adversely affected by experiencing a 6.6-log-point decline in wages. Likewise, the estimates in Columns (4) to (6) of Table 6 indicate a large wage increase for female and low-income employees of 8.1 and 11.6 log points, respectively. Interestingly, although female employees benefit from an increased employment probability in the public sector, they appear to be employed less months, suggesting the potential for employment in shorter-term contracts. Overall,

our findings highlight the role of public sector as a critical factor contributing to the distributional effects associated with an increase in voting enfranchisement.

5.2 Employment in the Private Sector

We continue by shifting our focus on the private sector. Private sector is possible to contribute to better labor market outcomes for newly enfranchised groups of employees either indirectly or directly. For example, electronic voting has been associated with an expansion in public financing. To the extent that intergovernmental transfers increase the availability of procurement contracts in sectors that disproportionately create vacancies that require low-skilled tasks (e.g., construction), we expect an increase in employment or wages for less educated, disadvantaged socioeconomic groups. Relatedly, in the absence of migration, the observed increase in labor demand in the public sector employment is expected to increase the outside option for the groups of interest in municipalities that adopt electronic voting, thus increasing wages in the private sector. Alternatively, in the presence of corrupt practices in the allocation of procurement contracts, private firms may increase employment and wages for the newly enfranchised groups as an exchange of favors with the politicians.

While we are unable to provide direct evidence and distinguish among the different underlying channels, we report our findings in Tables 7 and 8.

[Insert Table 7 Here]

[Insert Table 8 Here]

Columns (1) and (2) of Table 5 and Columns (1) to (3) of Table 6 report estimates for the probability of being employed in the private sector. Our estimates indicate that there is no effect across the different socioeconomic groups of interest. Turning to the impact on the intensive margin in terms of wages and employment, Columns (3) to (6) of Table 5 and Columns (4) to (9) of Table 6 provide evidence of a positive response; however, the magnitudes are limited compared to the estimates in the public sector with the exception of low-income employees. Overall, while there is evidence suggesting that the private sector contributes to the labor market gains of the newly enfranchised groups, the effects are largely attributed to redistribution of resources in the public sector.

5.3 Entrepreneurship

Finally, we examine the role of political empowerment in facilitating entrepreneurial entry by individuals from disadvantaged socioeconomic groups. There are multiple non-mutually exclusive channels through which an increase in political power allows the creation of firms by the groups that disproportionately benefit. First, to the extent that an

increase in enfranchisement leads to redistribution of public resources, lower-income and less educated voters are likely to experience an increase in access to credit, particularly from government-controlled financial institutions, or government subsidies, thus facilitating entrepreneurial entry. Alternatively, the increase in earnings we observe from access to better-compensated employment is likely to facilitate entrepreneurship by allowing individuals to raise the necessary capital to establish a firm.

While we are unable to provide direct evidence and distinguish among the different underlying channels, we are able to observe whether individuals from disadvantaged socioeconomic groups exhibit an increase in the probability of founding a firm. Specifically, using information on the occupations performed by employees in RAIS, we are able to identify individuals who hold managerial positions in firms, as well as lower-ranked employees. We follow the standard practice in the entrepreneurship literature (e.g., Azoulay et al., 2020; Babina, 2019) and we define an entrepreneur or founder as the highest-compensated manager or employee of a firm at the year of founding. Azoulay et al. (2020) provide evidence that in 90% of the cases in the U.S., the highest-compensated employees in the firm at the year of founding are typically the founders. While there is certainly a degree of inaccuracy in the identifying a firm's founders, we expect our methodology to be well-suited for our setting, especially given that only a minor part of firm creation is in the high-tech sector. The results from estimating Equation (1) with an indicator variable equal to one for individuals who found firms as the dependent variable are presented in Table 9.

[Insert Table 9 Here]

The coefficient estimates suggest that less educated and non-white individuals in particular exhibit a statistically significant increase in the likelihood of becoming entrepreneurs. The magnitudes are economically large relative to the average probability of founding of 1.17%. Specifically, individuals in treated municipalities with at most five years of education are 20% more likely to found a firm after the adoption of electronic voting. Likewise, the economic effect for non-white individuals is 7.7%. Interestingly, female employees in treated municipalities are less likely to establish a firm, suggesting the presence of a crowding-out effect of public employment.

Finally, we analyze the performance of newly created firms. If political representation of socioeconomically disadvantaged groups primarily alleviates frictions associated with entrepreneurial entry, newly created firms are more likely to survive, grow, and create jobs. Alternatively, shifting resources to disadvantaged socioeconomic groups likely lowers the costs of experimenting with entrepreneurship allowing founders to incur greater risks leading to higher failure rates. Finally, if entrepreneurial talent is homogeneous, we expect the observed shift in the composition of entrepreneurs towards lower-income and less educated groups to be associated with no effect on firm outcomes. We estimate the

following specification at the firm level:

$$Y_{j(i)} = \alpha_m + \alpha_s + \alpha_t + \gamma EV_m \times I^{g(i)=1} + \beta X_i^{'} + \varepsilon_j, \tag{4}$$

where $Y_{j(i)}$ is an outcome for firm j founded in year t by individual i located in municipality m and operating in industry s. We examine performance in years one and three after a firm is started. The indicator variable EV_m is equal to one for firms created in municipalities that adopted electronic voting in the founding year, and zero otherwise. The indicator variable $I^{g(i)=1}$ is used to denote founders that are part of a specific skill or demographic group g. Our baseline specification incorporates municipality year fixed effects (α_m) to absorb unobservable time-invariant differences across municipalities, founding year (α_t) and industry fixed effects (α_s) to capture time-invariant heterogeneity in the local economy and industry, respectively. Standard errors are clustered at the municipality level. Finally, $X_i^{'}$ represents founder characteristics at the founding year, including age and age squared to account for non-linear effects.

[Insert Table 10 Here]

Our findings are reported in Table 10. We focus on the heterogeneous response of lower-skilled founders in Columns (1) to (4), and of non-white founders in Columns (5) to (8) given our findings in Table 9. In Columns (1), (2), (5) and (6) we evaluate the effects on firm survival, whereas in Columns (3), (4), (7) and (8) our outcome of interest is an indicator variable that is equal to one if the firm employs more than five employees in a specific year. We follow firms over time and report estimates in years one and three after a firm is created. Overall, our coefficient estimates suggest that lower-skilled and non-white founders in treated municipalities tend to create firms that are less likely to survive and create employment, pointing to experimentation as the likely explanatory factor. However, the effect sizes are economically limited. For example, non-white entrepreneurs in treated municipalities exhibit 0.9 percentage points lower likelihood of survival (which corresponds to only 1.5% decrease relative to the sample mean), whereas there is no differential effect on the likelihood of generating high rates of employment both one and three years following the adoption of electronic voting, respectively. The effects are relatively larger for low-skilled individuals.

Having said that, our findings that socieconomically disadvantaged groups fare better in terms of earnings suggest that the even failed entrepreneurship is potentially beneficial in facilitating human capital formation. Altogether, our results on mechanisms demonstrate that an increase in voting enfranchisement improves the labor market outcomes of individuals who stand to benefit by increasing redistribution of public resources and inducing entrepreneurial activity.

6 Conclusion

Political representation has important labor market consequences. We use detailed administrative employer-employee data for the universe of labor force in Brazil along with the phased-in introduction of electronic voting to study the effects of voting enfranchisement on the earnings and employment trajectory of individuals. Overall, our findings are consistent with the view that a rise in voting enfranchisement and political empowerment is accompanied by substantial gains in the labor market for the socioeconomic groups who experience an increase in political representation. We find that the introduction of electronic voting in Brazil benefits socioeconomically disadvantaged groups by leading to relatively larger growth in earnings. Decomposing the effect into a wage and labor market participation component, we document that the growth in earnings is equally distributed between wages and employment months. We find no evidence of differential shifts in the composition of the workforce in municipalities that were affected, providing support for a redistribution channel.

Examining potential underlying economic mechanisms through which an increase in political representation potentially leads to higher earnings for lower-income individuals, we evaluate the role of redistribution through transitioning into employment in the public sector, the potential for spillovers in the private sector, and the probability that treated individuals enter entrepreneurship and create firms. We find that the effects differ across socioeconomic groups. Our evidence points to an expansion of the public sector employment following the adoption of electronic voting, that is subsequently used as a redistribution mechanism as wages increase significantly for the socioeconomic groups that experience an increase in political power. The private sector contributes to labor market gains for the newly enfranchised groups, however the effect is limited compared to the public sector. Finally, we examine the role of political empowerment in facilitating entrepreneurial entry by individuals from disadvantaged socioeconomic groups and find that less educated and non-white individuals exhibit an economically large increase in the likelihood of becoming entrepreneurs after the increase in voting enfranchisement. While newly created firms tend to fare worse, we argue that even failed entrepreneurship is potentially beneficial in facilitating human capital formation for socioeconomically disadvantaged groups.

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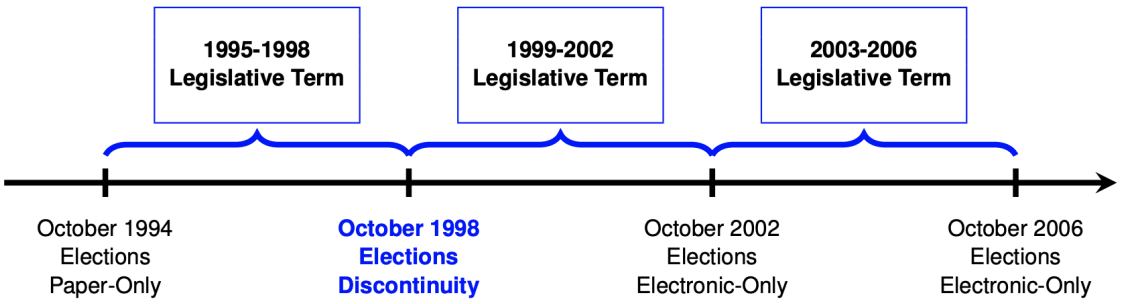
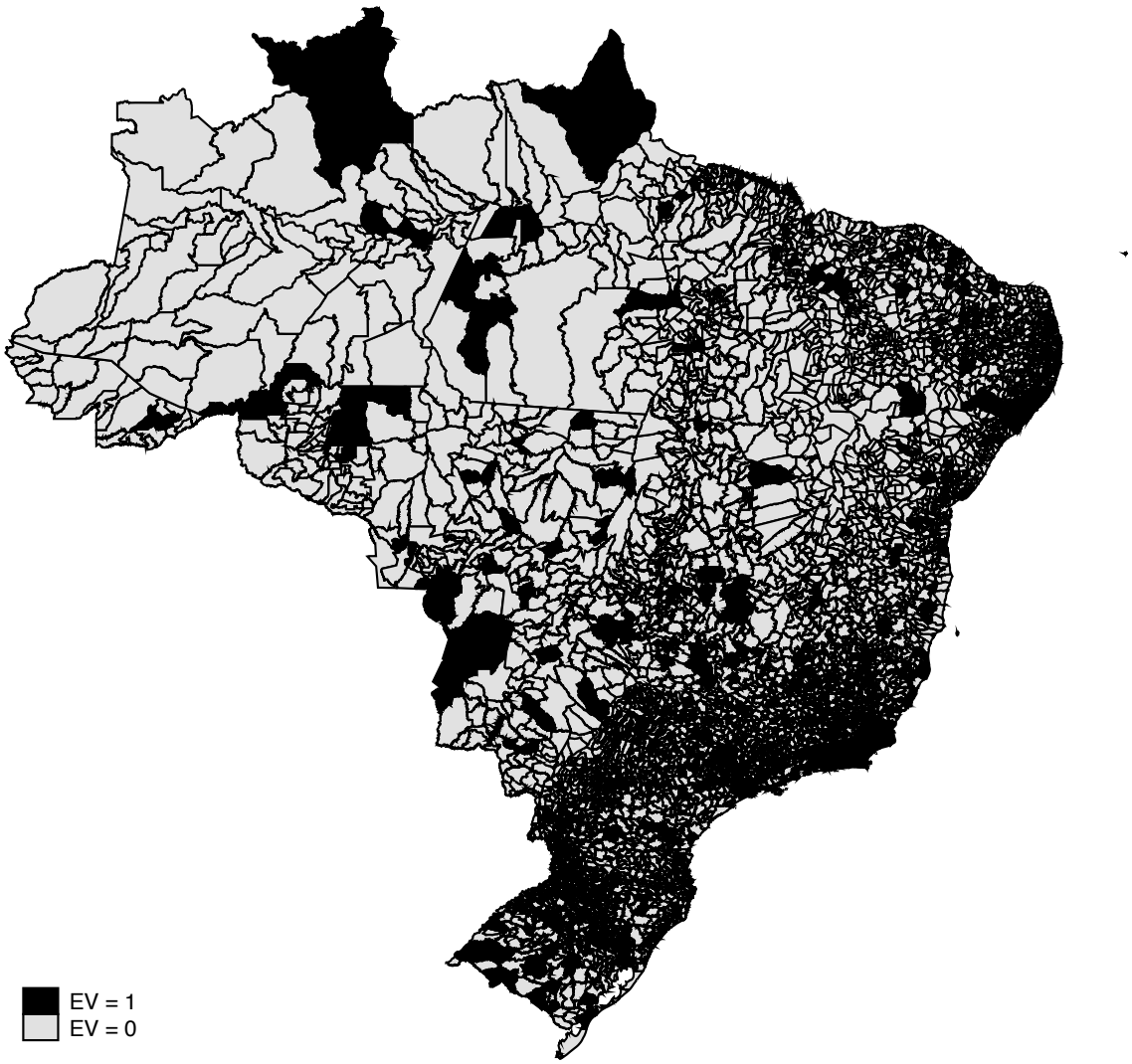
Figures

Figure 1: The Timeline of Elections in Brazil



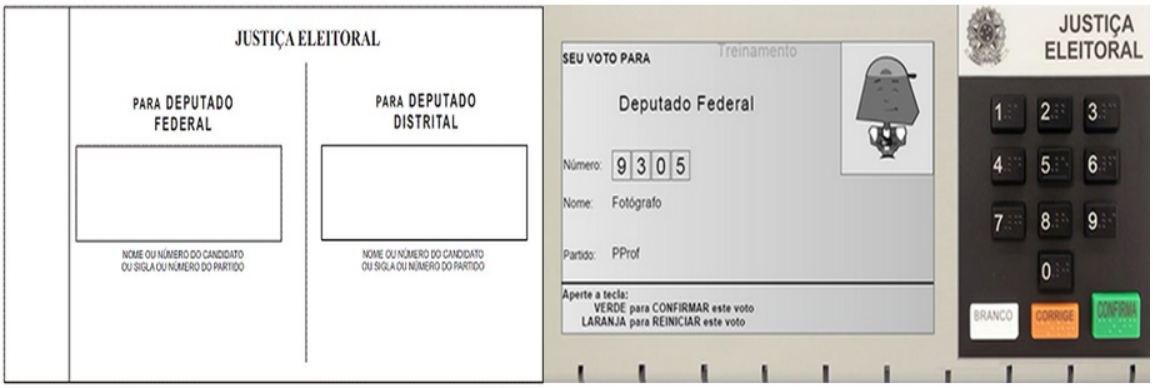
Notes: The figure reports the timeline of elections in Brazil.

Figure 2: Geographical Distribution of Electronic Voting Adoption



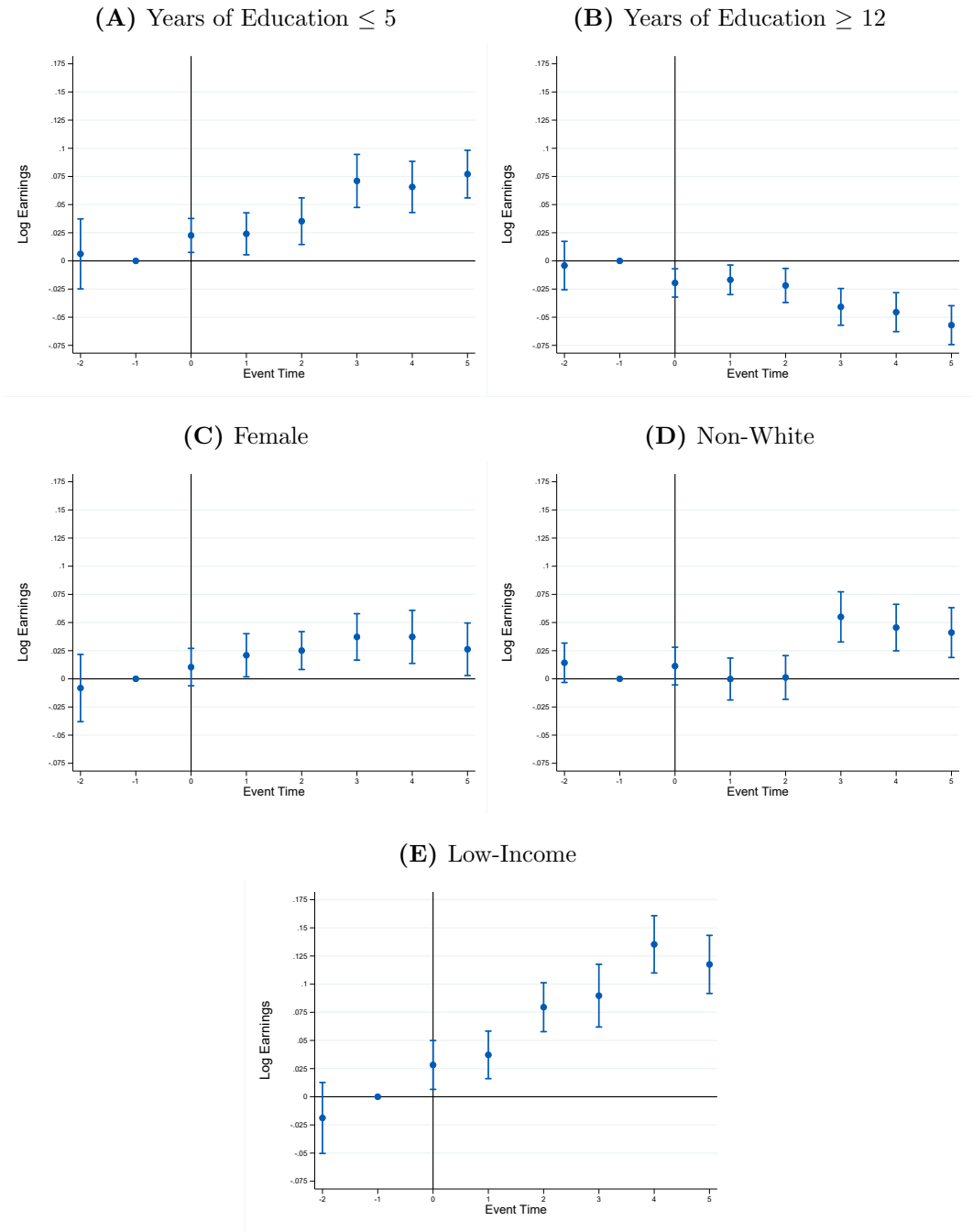
Notes: The figure reports a map with the adoption of electronic voting across municipalities in Brazil.

Figure 3: Paper Ballot Versus Electronic Voting



Notes: The figure reports examples of voting technology in Brazil. On the left panel, a paper ballot is presented, whereas on the right panel, an electronic voting ballot is presented.

Figure 4: Dynamic Effects of Electronic Voting Adoption



Notes: The figure reports estimates from Equation (1) using as dependent variables the log of an employee's earnings. Panel A provides estimates for individuals with at most five years of education. Panel B provides estimates for individuals with at least twelve years of education. Panel C provides estimates for female employees. Panel D provides estimates for non-white employees. Panel E provides estimates for low-income employees.

Tables

Table 1: Summary Statistics of Municipalities using Paper and EV Ballot

	(1)	(2)	(3)	(4)
Variables		**Mean**		**P-Value**
	Total Sample	**EV = 1**	**EV = 0**	
Wage (R$)	510	543	494	[0.57]
Log Wage	5.84	5.92	5.80	[0.65]
Years of Education	9.56	9.76	9.46	[0.92]
Illiterate Share	0.03	0.02	0.03	[0.49]
Female Share	0.36	0.36	0.37	[0.46]
Non-White Share	0.50	0.49	0.51	[0.84]
Age	33.50	33.32	33.58	[0.94]
Tenure (in Months)	55.40	53.71	56.25	[0.71]
Blue Collar Share	0.43	0.44	0.43	[0.41]
White Collar Share (Clerical)	0.18	0.18	0.18	[0.50]
White Collar Share (Professionals)	0.37	0.36	0.37	[0.11]
Agriculture Share	0.08	0.07	0.08	[0.40]
Construction Share	0.04	0.05	0.04	[0.30]
Manufacturing Share	0.26	0.27	0.25	[0.41]
Services Share	0.14	0.14	0.14	[0.43]
Public Employment Share	0.22	0.21	0.22	[0.90]
Municipal Employment Share	0.18	0.17	0.19	[0.67]
# of Municipalities	229	78	151	

Notes: The table reports summary statistics for municipalities using electronic voting and paper ballots. We restrict our sample to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500. We also exclude the four states that implemented electronic voting across all its municipalities.

Table 2: The Impact of Electronic Voting on Earnings

	(1)	(2)	(3)	(4)	(5)
Outcomes	**Log Earnings**				
	Years of Education		**Demographic Groups**		
	$\leq$ 5	**$\geq$ 12**	**Female**	**Non-White**	**Low-Income**
$EV \times I_i^C$	0.049***	-0.032***	0.025***	0.029***	0.102***
	(0.007)	(0.006)	(0.008)	(0.007)	(0.009)
Employee Controls	Yes	Yes	Yes	Yes	Yes
Year $\times$ Municipality FE	Yes	Yes	Yes	Yes	Yes
Municipality $\times$ Characteristic FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.27	0.27	0.23	0.22	0.59
Observations	15,808,046	15,808,046	15,808,046	15,808,046	15,808,046

Notes: The table reports the effects of adoption of electronic voting in a municipality on earnings of different groups of employees. The outcome variable is the log of employees' earnings during a year. In Columns (1) and (2), we report estimates for groups of employees based on Years of Education, whereas in Columns (3) to (5) we present estimates for different demographic groups. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table 3: Prices or Quantities? The Impact of Electronic Voting on Wages and Employment

	(1)	(2)	(3)	(4)	(5)
Panel A: Average Wage					
Outcomes	**Log Wage**				
	Years of Education		**Demographic Groups**		
	$\leq$ 5	**$\geq$ 12**	**Female**	**Non-White**	**Low-Income**
$EV \times I_i^C$	0.026***	-0.015***	0.037***	0.017**	0.083***
	(0.006)	(0.006)	(0.008)	(0.007)	(0.008)
Employee Controls	Yes	Yes	Yes	Yes	Yes
Year $\times$ Municipality FE	Yes	Yes	Yes	Yes	Yes
Municipality $\times$ Characteristic FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.32	0.32	0.27	0.26	0.55
Observations	15,808,046	15,808,046	15,808,046	15,808,046	15,808,046
Panel B: Employment Participation					
Outcomes	**Log Months**				
	Years of Education		**Demographic Groups**		
	$\leq$ 5	**$\geq$ 12**	**Female**	**Non-White**	**Low-Income**
$EV \times I_i^C$	0.023***	-0.016***	-0.013***	0.013***	0.019***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.007)
Employee Controls	Yes	Yes	Yes	Yes	Yes
Year $\times$ Municipality FE	Yes	Yes	Yes	Yes	Yes
Municipality $\times$ Characteristic FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.08	0.08	0.07	0.07	0.23
Observations	15,808,046	15,808,046	15,808,046	15,808,046	15,808,046

Notes: The table reports the effects of adoption of electronic voting in a municipality on wages and employment of different groups of employees. The outcome variable in Panel A is the log of employees' average monthly wage during a year, whereas the outcomes variable in Panel B is the log of employees' months of employment during a year. In Columns (1) and (2), we report estimates for groups of employees based on Years of Education, whereas in Columns (3) to (5) we present estimates for different demographic groups. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared in the year prior to the adoption. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table 4: The Impact of Electronic Voting on the Composition of Municipalities' Labor Force

	(1)	(2)	(3)	(4)	(5)	(6)
		Years of Education				
Outcomes	**Total**	**Share with $\leq$ 5**	**Share with $\geq$ 12**	**Female Share**	**Non-White Share**	**Low-Income Share**
EV	-0.027	0.004	0.002	0.001	-0.009	0.005
	(0.035)	(0.003)	(0.004)	(0.004)	(0.006)	(0.006)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.91	0.93	0.92	0.91	0.99	0.96
Observations	1,825	1,825	1,825	1,825	1,825	1,825

Notes: The table reports the effects of adoption of electronic voting on the composition of the municipality's labor force. The outcome variable is the number of the average Years of Education at the municipality in Column (1); the share of employees with at most five Years of Education in Column (2); the share of employees with at least high-school education in Column (3); the share of female employees in Column (4); the share of non-white employees in Column (5); and the share of low-wage employees in Column (6). *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01$,$^{**}p < 0.05$,$^{*}p < 0.1$.

Table 5: The Impact of Electronic Voting on Public Sector Employment Outcomes By Years of Education

	(1)	(2)	(3)	(4)	(5)	(6)
Outcomes	**1(Temporary Public Sector)**		**Log Wage**		**Log Months**	
	$\leq$ 5	**$\geq$ 12**	**$\leq$ 5**	**$\geq$ 12**	**$\leq$ 5**	**$\geq$ 12**
$EV \times I_i^C$	-0.003	0.004	0.092***	-0.066**	0.019***	-0.020***
	(0.003)	(0.004)	(0.022)	(0.027)	(0.006)	(0.004)
Employee Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year $\times$ Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality $\times$ Characteristic FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.13	0.13	0.44	0.44	0.08	0.08
Observations	15,808,046	15,808,046	2,833,489	2,833,489	2,833,489	2,833,489

Notes: The table reports the effects of adoption of electronic voting in a municipality on the probability of being employed in the private sector for different groups of employees. The outcome variable is an indicator variable equal to one for individuals employed in the private sector in a given year, and zero otherwise. In Columns (1) to (4), we report estimates for different educational groups, whereas in Columns (1) to (4) we present estimates for different demographic groups. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared in the year prior to the adoption. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01,^{**}p < 0.05,^{*}p < 0.1$.

Table 6: The Impact of Electronic Voting on Public Sector Employment Outcomes By Demographic Group

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcomes	**1(Temporary Public Sector)**			**Log Wage**			**Log Months**		
	Female	**Non-White**	**Low-Income**	**Female**	**Non-White**	**Low-Income**	**Female**	**Non-White**	**Low-Income**
$EV \times I_i^C$	0.013***	-0.000	0.001	0.081***	0.038	0.116***	-0.007**	0.008**	0.018*
	(0.003)	(0.003)	(0.003)	(0.013)	(0.023)	(0.032)	(0.003)	(0.004)	(0.010)
Employee Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year × Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality × Characteristic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.13	0.12	0.12	0.34	0.34	0.60	0.08	0.08	0.20
Observations	15,808,046	15,808,046	15,808,046	2,833,489	2,833,489	2,833,489	2,833,489	2,833,489	2,833,489

Notes: The table reports the effects of adoption of electronic voting in a municipality on the probability of being employed in the private sector for different groups of employees. The outcome variable is an indicator variable equal to one for individuals employed in the private sector in a given year, and zero otherwise. In Columns (1) to (4), we report estimates for different educational groups, whereas in Columns (1) to (4) we present estimates for different demographic groups. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared in the year prior to the adoption. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table 7: The Impact of Electronic Voting on Private Sector Employment Outcomes By Years of Education

	(1)	(2)	(3)	(4)	(5)	(6)
Outcomes	**1(Private Sector)**		**Log Wage**		**Log Months**	
	$\leq$ 5	**$\geq$ 12**	**$\leq$ 5**	**$\geq$ 12**	**$\leq$ 5**	**$\geq$ 12**
$EV \times I_i^C$	-0.002	-0.000	0.021***	-0.011**	0.023***	-0.014***
	(0.005)	(0.003)	(0.005)	(0.005)	(0.004)	(0.002)
Employee Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year $\times$ Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality $\times$ Characteristic FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.22	0.22	0.32	0.32	0.06	0.08
Observations	15,808,046	15,808,046	12,974,556	12,974,556	12,974,556	12,974,556

Notes: The table reports the effects of adoption of electronic voting in a municipality on the probability of being employed in the private sector for different groups of employees. The outcome variable is an indicator variable equal to one for individuals employed in the private sector in a given year, and zero otherwise. In Columns (1) to (4), we report estimates for different educational groups, whereas in Columns (1) to (4) we present estimates for different demographic groups. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared in the year prior to the adoption. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01$,** $p < 0.05$,* $p < 0.1$.

Table 8: The Impact of Electronic Voting on Private Sector Employment Outcomes By Demographic Group

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcomes	**1(Private Sector)**			**Log Wage**			**Log Months**		
	Female	**Non-White**	**Low-Income**	**Female**	**Non-White**	**Low-Income**	**Female**	**Non-White**	**Low-Income**
$EV \times I_i^C$	-0.002	-0.004	0.003	0.017**	0.008*	0.079***	-0.012***	0.014**	0.018**
	(0.005)	(0.006)	(0.006)	(0.007)	(0.004)	(0.006)	(0.004)	(0.003)	(0.008)
Employee Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year × Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality × Characteristic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.23	0.21	0.20	0.29	0.26	0.55	0.06	0.06	0.23
Observations	15,808,046	15,808,046	15,808,046	12,974,556	12,974,556	12,974,556	12,974,556	12,974,556	12,974,556

Notes: The table reports the effects of adoption of electronic voting in a municipality on the probability of being employed in the private sector for different groups of employees. The outcome variable is an indicator variable equal to one for individuals employed in the private sector in a given year, and zero otherwise. In Columns (1) to (4), we report estimates for different educational groups, whereas in Columns (1) to (4) we present estimates for different demographic groups. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared in the year prior to the adoption. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table 9: The Impact of Electronic Voting on Entrepreneurial Entry By Group

	(1)	(2)	(3)	(4)	(5)
Outcomes	**1(Founder)**				
	Years of Education		**Demographic Groups**		
	$\leq$ 5	**$\geq$ 12**	**Female**	**Non-White**	**Low-Income**
$EV \times I_i^C$	0.0023***	-0.0012***	-0.0008***	0.0009***	-0.0001
	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0006)
Employee Controls	Yes	Yes	Yes	Yes	Yes
Year $\times$ Municipality FE	Yes	Yes	Yes	Yes	Yes
Municipality $\times$ Characteristic FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.01	0.01	0.01	0.01	0.01
Observations	15,808,046	15,808,046	15,808,046	15,808,046	15,808,046

Notes: The table reports the effects of adoption of electronic voting in a municipality on the probability of being employed in the private sector for different groups of employees. The outcome variable is an indicator variable equal to one for individuals employed in the private sector in a given year, and zero otherwise. In Columns (1) and (2), we report estimates for different educational groups, whereas in Columns (3) to (5) we present estimates for different demographic groups. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared in the year prior to the adoption. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01,^{**}p < 0.05,^{*}p < 0.1$.

Table 10: The Impact of Electronic Voting on Firm Performance By Group

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Outcomes	**Low-Skilled Founders**				**Non-White Founders**			
	Survival		**Employment $\geq$ 5**		**Survival**		**Employment $\geq$ 5**	
	t = 1	**t = 3**	**t = 1**	**t = 3**	**t = 1**	**t = 3**	**t = 1**	**t = 3**
$EV \times I_i^C$	-0.015**	-0.010	-0.024***	-0.024***	-0.009**	-0.009*	-0.007	-0.004
	(0.007)	(0.009)	(0.006)	(0.006)	(0.004)	(0.005)	(0.005)	(0.004)
Employee Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Founding Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.07	0.06	0.07	0.06	0.07	0.06	0.07	0.06
Observations	184,753	184,753	184,753	184,753	184,753	184,753	184,753	184,753

Notes: The table reports the effects of adoption of electronic voting in a municipality on performance of newly created firms. In Columns (1), (2), (5) and (6) the outcome variable is an indicator variable equal to one for firms that survive in a given year, and zero otherwise. In Columns (3), (4)), (7) and (8) the outcome variable is an indicator variable equal to one for firms that employ at least five employees in a given year, and zero otherwise. In Columns (1) to (4), we report estimates for employees with at most five years of education, whereas in Columns (5) to (8) we present estimates for non-white individuals. EV is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to newly created firms in municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared in the year prior to the adoption. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01,^{**}p < 0.05,^{*}p < 0.1$.

Appendix

Table A1: The Impact of Electronic Voting on Earnings by Educational Attainment

	(1)	(2)	(3)	(4)
Outcomes	**Log Earnings**			
	Illiterate	**Elementary**	**High School (Incomplete)**	**High School (Completed)**
$EV \times I_i^C$	0.075***	0.045***	0.005	-0.032***
	(0.021)	(0.006)	(0.005)	(0.006)
Employee Controls	Yes	Yes	Yes	Yes
Year × Municipality FE	Yes	Yes	Yes	Yes
Municipality × Characteristic FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.27	0.32	0.32	0.32
Observations	15,808,046	15,808,046	15,808,046	15,808,046

Notes: The table reports the effects of adoption of electronic voting in a municipality on earnings of different educational groups of employees. The outcome variable is the log of employees' earnings during a year. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared in the year prior to the adoption. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table A2: Prices or Quantities? The Impact of Electronic Voting on Wages and Employment by Educational Attainment

	(1)	**(2)**	**(3)**	**(4)**
Panel A: Average Wage				
Outcomes	**Log Wage**			
	Illiterate	**Elementary**	**High School (Incomplete)**	**High School (Completed)**
$EV \times I_i^C$	0.037**	0.024***	0.001	-0.015***
	(0.016)	(0.005)	(0.004)	(0.006)
Adjusted R^2	0.32	0.32	0.32	0.32
Panel B: Employment Participation				
Outcomes	**Log Employment Months**			
	Illiterate	**Elementary**	**High School (Incomplete)**	**High School (Completed)**
$EV \times I_i^C$	0.038**	0.021***	0.004**	-0.016***
	(0.015)	(0.003)	(0.002)	(0.003)
Adjusted R^2	0.08	0.08	0.08	0.08
Employee Controls	Yes	Yes	Yes	Yes
Year × Municipality FE	Yes	Yes	Yes	Yes
Municipality × Characteristic FE	Yes	Yes	Yes	Yes
Observations	15,808,046	15,808,046	15,808,046	15,808,046

Notes: The table reports the effects of adoption of electronic voting in a municipality on wages and employment for different educational groups of employees. The outcome variable in Panel A is the log of employees' average monthly wage during a year, whereas the outcomes variable in Panel B is the log of employees' months of employment during a year. *EV* is an indicator variable equal to one if a municipality adopted electronic voting in a given year, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Employee controls include age, and age squared. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01$,$^{**}p < 0.05$,$^{*}p < 0.1$.

Table A3: List of Municipal Temporary Jobs with Largest Entry

	(1)	(2)
Occupational Description	**Entry**	**% of Entry**
Administrative Personnel	16,546	25.13
Teachers	11,102	15.82
Maintenance and Cleaning Services Personnel	9,154	13.05
Public Health Personnel	4,084	5.82
Nursing Personnel	2,959	4.22
Security Personnel	1,711	2.44

Notes: The table reports description of occupations where the entry of temporary municipal employment occured in municipalities that adopted electronic voting. The estimates are based on the period from 1998 to 2002. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide.

Table A4: The Impact of Electronic Voting on Employment at the Municipal Public Sector

	(1)	(2)	(3)	(4)	(5)	(6)
Outcomes	**Log Employment**			**Log Entry**		
	Total	**Permanent**	**Temporary**	**Total**	**Permanent**	**Temporary**
EV	0.286**	0.388	1.569***	0.776**	0.042	1.727***
	(0.126)	(0.428)	(0.564)	(0.355)	(0.542)	(0.614)
Adjusted R^2	0.09	0.01	0.05	0.04	0.01	0.04
Observations	229	229	229	229	229	229

Notes: The table reports the effects of adoption of electronic voting on employment at the municipal public sector. In Columns (1) to (3), the outcome variable is the log number of individuals employed in the municipal public sector, whereas in Columns (4) to (6), the outcome variable is the log number of individuals entering the municipal public sector as employees. Estimates in Columns (1) and (4) rely on total employment levels, estimates in Columns (2) and (5) rely on employment levels for employees with permanent contracts, and estimates in Columns (3) and (6) rely on employment levels for employees with temporary contracts. *EV* is an indicator variable equal to one for municipalities that adopted electronic voting, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01$,$^{**}p < 0.05$,$^{*}p < 0.1$.

Table A5: The Impact of Electronic Voting on Employment at the Federal Public Sector

	(1)	(2)	(3)	(4)	(5)	(6)
Outcomes	**Log Employment**			**Log Entry**		
	Total	**Permanent**	**Temporary**	**Total**	**Permanent**	**Temporary**
EV	-0.203	-0.022	-0.120	0.166	0.225	0.042
	(0.334)	(0.323)	(0.193)	(0.350)	(0.200)	(0.332)
Adjusted R^2	0.03	0.03	0.03	0.04	0.02	0.03
Observations	229	229	229	229	229	229

Notes: The table reports the effects of adoption of electronic voting on employment at the federal public sector. In Columns (1) to (3), the outcome variable is the log number of individuals employed in the federal public sector, whereas in Columns (4) to (6), the outcome variable is the log number of individuals entering the federal public sector as employees. Estimates in Columns (1) and (4) rely on total employment levels, estimates in Columns (2) and (5) rely on employment levels for employees with permanent contracts, and estimates in Columns (3) and (6) rely on employment levels for employees with temporary contracts. *EV* is an indicator variable equal to one for municipalities that adopted electronic voting, and zero otherwise. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table A6: The Impact of Electronic Voting on Intergovernmental Transfers

	(1)	(2)	(3)	(4)	(5)
Outcomes	**Log Value of Transfers**				
	Education	**Health**	**Cities**	**Sports**	**Defense**
EV	0.833*	0.261	-0.044	0.300	0.166
	(0.430)	(0.307)	(0.396)	(0.313)	(0.349)
Adjusted R^2	0.02	0.01	0.05	0.02	0.02
Observations	218	226	162	131	152

Notes: The table reports thee effects of adoption of electronic voting on intergovernmental transfers. The dependent variable is the log of discretionary transfers by ministry. Column (1) presents estimates for transfers from the Ministry of Education. Column (2) presents estimates for transfers from Ministry of Health. Column (3) presents estimates for transfers from the Ministry of Cities. Column (4) presents estimates for transfers from the Ministry of Sports, whereas Column (5) presents estimates for transfers from the Ministry of Defense. The sample is restricted to municipalities with a number of electorates that is 10,000 around the population threshold for the adoption of electronic voting, i.e. population between 30,500 and 50,500, and excludes municipalities in states that implemented electronic voting statewide. Standard errors are in parentheses and clustered at the municipality level.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.