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 of lower-skilled and lower-income voters' enfranchisement. Using detailed employee-employer 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 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 people failing to vote (Hoffman et al., 2017). This is particularly concerning because lower-income and less educated citizens are the ones less likely to participate in an election (Hodler et al., 2015), which may translate into fiscal policies that are biased towards wealthier and educated citizens (Lijphart, 1997; Bugarin and Portugal, 2015) and which sustain existing inequalities. Consistent with positive theories of voting, extending the voting franchise to incorporate less educated, lower-income voters increases redistribution (Meltzer and Richard, 1981) and decreases income inequality (Mueller and Stratmann, 2003). This unequal participation in voting among different groups of citizens can be mitigated through policies that reduce voting costs for low-skilled individuals. Nevertheless we have limited empirical evidence on the effect of improved political representation on the labour outcomes of disadvantage groups, with the exception of the effect of the targeted intervention of the 1965 Voting Rights act to improve access to voting for black Americans (Aneja and Avenancio-Leon, 2019).

We investigate the effect of enfranchisement of socioeconomically-disadvantaged voters on their labor outcomes, earnings, as well as entrepreneurial entry. A challenge into answering this question is that often these interventions are not random and they are targeting specific geographic areas or groups. Moreover, it requires to be able to observe the employment and earnings trajectory of individuals. We overcome these challenges using the introduction of electronic voting in Brazil, which created a positive shock of lower-skilled voters' enfranchisement (Hidalgo, 2012; Fujiwara, 2015). Another advantage of our setting is the availability of administrative employer-employee data that provides comprehensive labor contract information and allows us to follow individuals and firms over time.

In the mid-1990s, the Brazilian government developed an EV technology as a substitute for paper ballots. Due to limited supply of devices in the 1998 election, only municipalities with more than 40,500 registered voters used the new technology, while the rest used paper ballots. Using RDD and difference-in-differences methodology around the population cutoff we find that the introduction of electronic voting in Brazil benefits disadvantaged groups by leading to relative increases in earnings. Specifically we find an increase of 7.2 and 4.7 log points for illiterate individuals and individuals with elementary education, respectively. On the other hand, high-skilled individuals experience instead a 2.7-log-point relative decline in earnings. We find that the above effects come both from an increase in wages and labor market participation. Investigating the effects for different demographic groups, we show that female and non-white employees benefit in the post-adoption period. They experience a 2.4-and 2.7-log-point earnings increase, respectively. Lower-income individuals in treated municipalities experience an increase of 10 log points

in earnings.

The effects are not explained by migration. We find no evidence of differential shifts in the composition of the workforce in municipalities that were affected. Looking into the mechanisms, we investigate two potentials mechanisms. Enfranchisement could improve outcomes through government hiring. Moreover, there could also be spillover effects to the private sector. We show evidence consistent with those two mechanisms.

Our evidence suggest that the public sector employment is used as a redistribution mechanism. There is a significant increase of 157% in total employment of temporary municipal employees due to a 173% increase in the number of hirings. We find no effect for permanent municipal employees and federal government employees because for those positions there is limited discretion in employment decisions from municipalities. Related to the spillover effects to private sector, we find increased employment of illiterate in private sector, potentially driven by the expansion of public services (i.e. increase construction of schools or hospitals etc.).

Finally, we examine the role of political empowerment in facilitating entrepreneurial entry by individuals from disadvantaged socioeconomic groups. An increase in political power could benefit 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 a economically and statistically significant increase in the likelihood of becoming entrepreneurs after the increase in voting enfranchisement.

This work is mostly related to two strands of the literature. First, the relationship between enfranchisement of low-skilled voters and public spending. Meltzer and Richard (1981) seminal work uses a model of electoral competition to show that enfranchisement of poorer voters increases public spending because no one is excluded from enjoying a public good or service but low-income voters pay a relatively smaller share of the tax revenue needed to finance their provision. Many authors attempted to show empirical evidence corroborating this theoretical model (Meltzer and Richard 1981; 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 biased toward the poor. Cascio and Washington (2013) used the enfranchisement of black voters in the U.S. and Fujiwara (2015) and Schneider et al. (2019) both used the introduction of electronic voting in Brazil as positive exogenous shocks of low-income voters' enfranchisement. These three papers' empirical findings corroborate Meltzer and

Richard (1981) model. Our paper also uses the introduction of electronic voting in Brazil to identify enfranchisement of low-income voters. However, different from the previous literature, we focus on the impact of low-skilled voters' enfranchisement on employment and earnings at the employee level,

Second, we contribute to the literature investigating whether the choice of public policies when influenced by particular groups (defined by education, income, age, etc.) generate inefficient outcomes. Becker (1983) uses a theoretical model to show that competition among these pressure groups can result in efficient outcomes. However, as argued in Matsusaka (2009), the more usual view is that particular groups compromise democracy when their interest prevails at the expense of the majority. The author shows 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) shows a more 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 advance their economic status and reduce the black-white wage gap. Our study findings are less optimistic. Although we find an increase in hiring in the public education sector, which is disproportionately used by the poor, there was no improvement in educational outcomes. Moreover, we find that enfranchisement of low-skilled voters increases temporary public employment of unqualified workers as well as their wage levels, suggesting an increase in patronage politics. Thus, our work indicate that there are also disadvantages from enfranchising low income voters, especially because they are relatively cheaper to buy with public employment (Robinson and Verdier, 2013) and less likely to prioritize or evaluate educational services (Akhtari et al., 2017).

Besides this introduction, our paper has five additional sections. In section 2, we discuss Brazilian elections and the introduction of electronic voting in Brazil. In section 3 we describe our data and empirical strategy. In section 4, we analyze our results and in section 5 we conduct an analysis exploring heterogeneous effects of the policy we study. Finally, in section 6 we conclude the paper.

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 provide 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 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 tech-

[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.

nology 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).

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

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 employees' 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 unobservable 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 years of experience 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.

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 or 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 confirm 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 elementary to 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. Column (3) reports that female employees experience

[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.

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:

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

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 employees prior to the adoption of electronic voting, implying our identification strategy is potentially effective in mitigating concerns related to selection bias. However, relative

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

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 decline in earnings is likely to reflect numerous (non-mutually exclusive) labor market adjustments across the different groups 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 from migration, 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 Tables6 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. 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

This paper aimed to contribute to the literature investigating the distributional effects of voting enfranchisement. From a theoretical perspective, the seminal study of Meltzer and Richard (1981) predicts that enfranchising lower-income voters should increase taxation and the provision of public goods. This prediction relies on the underlying assumption that citizens cannot be excluded from using public goods, however, higher-income voters pay a larger share of the tax revenue used to finance the provision of public goods.

Nonetheless, Hodler et al. (2015) provides empirical evidence documenting that enfranchisement of lower-skilled voters actually *decreased* government spending and business taxation in Switzerland. The authors explain this result by claiming that the newly enfranchised voters are less informed and more likely to be impressed by political campaigns that are disproportionately financed by groups demanding lower taxation. Hoffman et al. (2017) show that, in Austria, enfranchisement of the lower-skilled voters did not change government spending because this group had lower interest in politics. Finally, Cascio and Washington (2013), Fujiwara (2015) and Schneider et al. (2019) analyze shocks of less skilled voters' enfranchisement and show that this caused an increase in government spending corroborating the aforementioned theoretical model.

Therefore, although intuitive, Meltzer and Richard (1981) theoretical model is not trivially corroborated by empirical evidence and the political landscape and context appears to be important in the the way politicians respond to the of enfranchisement lower-skilled voters. More important to budgetary analysis and fiscal efficiency, though, is to examine whether a potential response to enfranchisement actually improve the efficiency of public expenditure or if it is used by politicians to extract rents. In our paper, we go beyond the previous literature investigating the impact of enfranchisement of low skilled voters in Brazil, which have so far established that politicians responded to this enfranchisement by increasing public expenditure (Fujiwara, 2015, Schneider et al., 2019, Schneider et al., 2020) and use granular data from the public sector job market to test whether this larger public expenditure also improved public services. Our results indicate that the increase in public spending was done through the new hire of temporary public employees, especially unqualified ones and in the public education sector. At the same time, we find no improvements in school outcomes. As temporary public employment is commonly used as a way to engage in patronage politics in Brazil (Brollo and Troiano, 2016) and the hiring of unqualified workers, according to our results, seems to reflect not only inefficiency but also favoring of less skilled workers which were disproportionately enfranchised, our research suggests that there is also a downside to enfranchisement of low skilled voters. Namely, increase in patronage politics and inefficient public expenditure.

The results presented in this work may indicate usage of patronage politics. However, if this is the case, one question that may still arise is: why are the results reported in this work not driven by the hiring of the newly enfranchised (i.e., illiterates)? This would be expected because the newly enfranchised can now reward politicians as they are capable of casting a ballot using the new technology and they are also relatively cheaper to be bought via public employment (Robinson and Verdier, 2013). Targeting newly enfranchised voters to provide them with job opportunities in the public sector was verified, for instance, in the United States after the 1965 Voting Rights Act (Aneja and Avenancio-Leon, 2019) and, therefore, the same would be expected to happen in Brazil. The main reason for the unexpected result in the Brazilian context, however, is that

expansion of public spending at the local level was only possible because of earmarked intergovernmental transfers (Schneider et al., 2020). Thus, local politicians had their hands tied, in the sense that the money had to be spent in education. The hiring of temporary and unqualified workers to work in education, an area that is less valued by the newly enfranchised (Bursztyn, 2016), corroborates the findings of Akhtari et al. (2017) showing that politicians use hiring public employees in the area of education in exchange for political gains. That way, politicians are able to extract rents from loyal but less productive bureaucrats without being severely punished as less skilled voters do not value or do not know how to evaluate public education and, as we reported in Table 15, they also benefit from spill over effects in the private sector.

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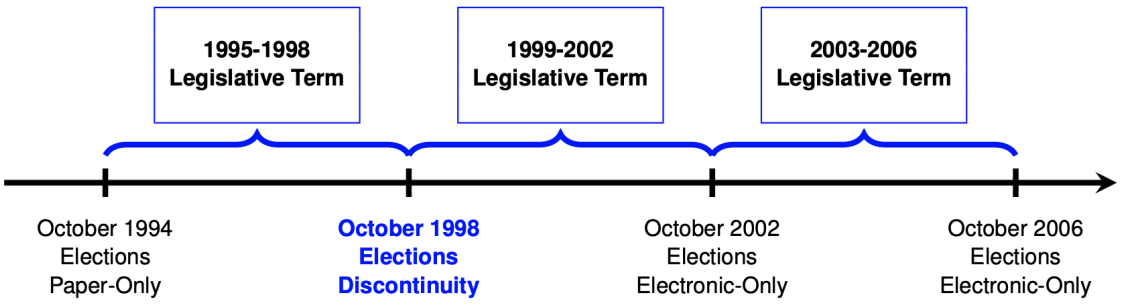
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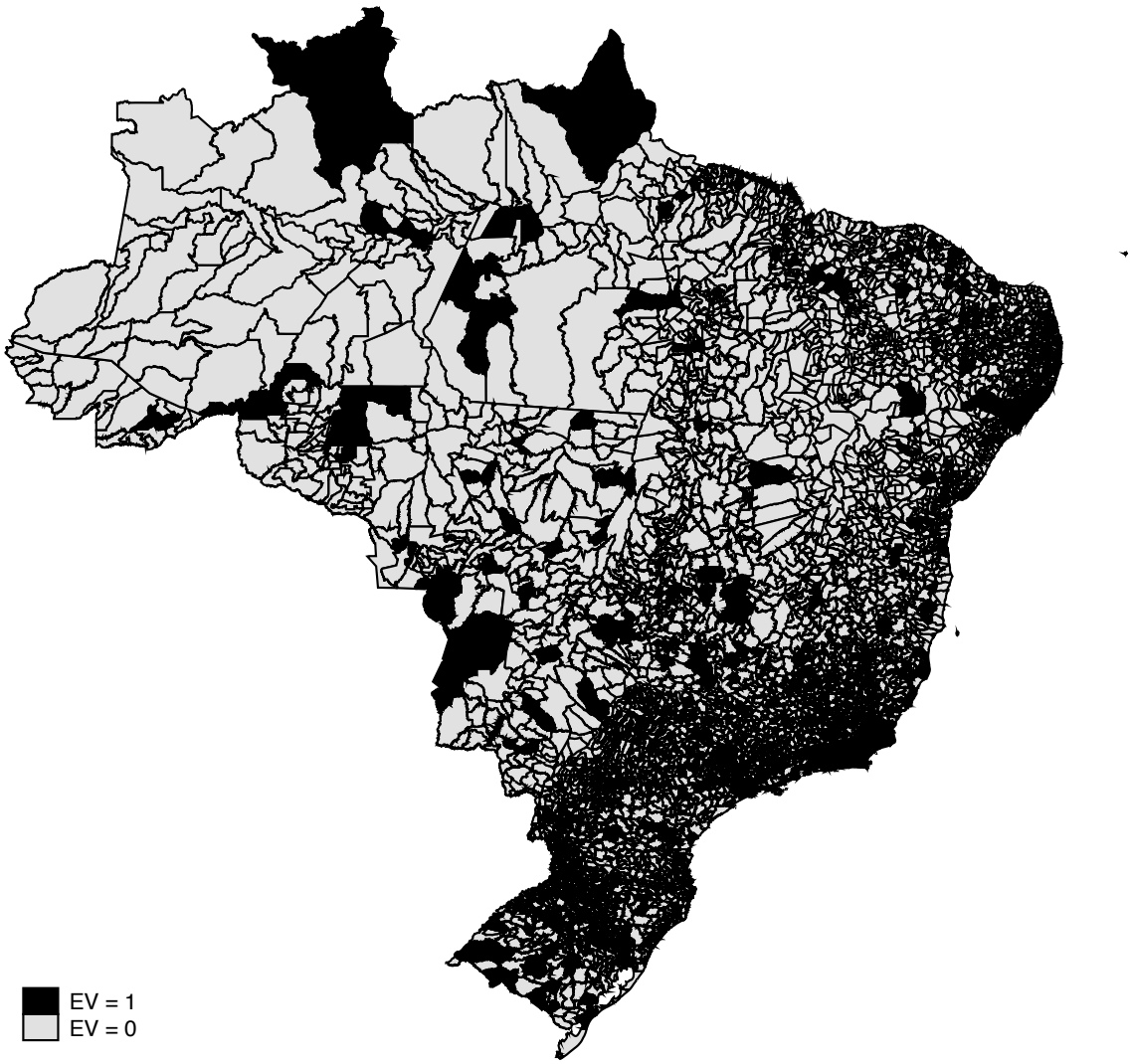
Figures

Figure 1: The Timeline of Elections in Brazil



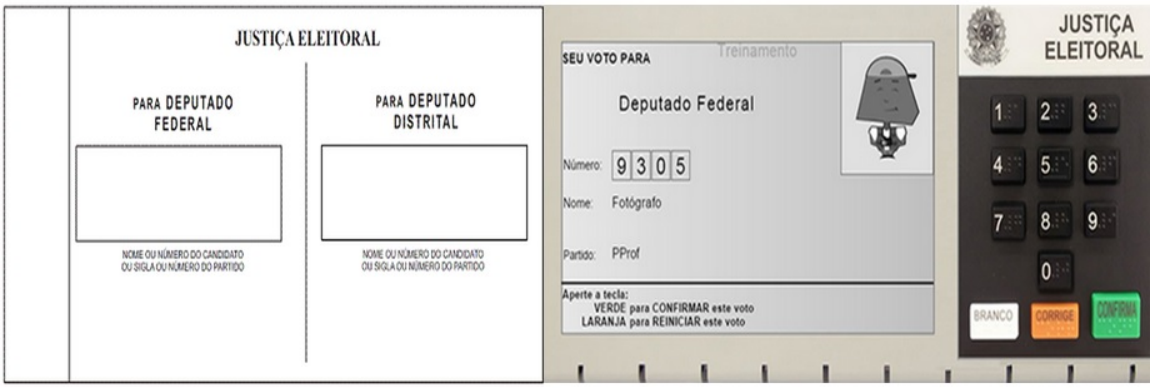
Notes: The figure reports the timeline of elections in Brazil.

Figure 2: Geographical Distribution of Electronic Voting Adoption



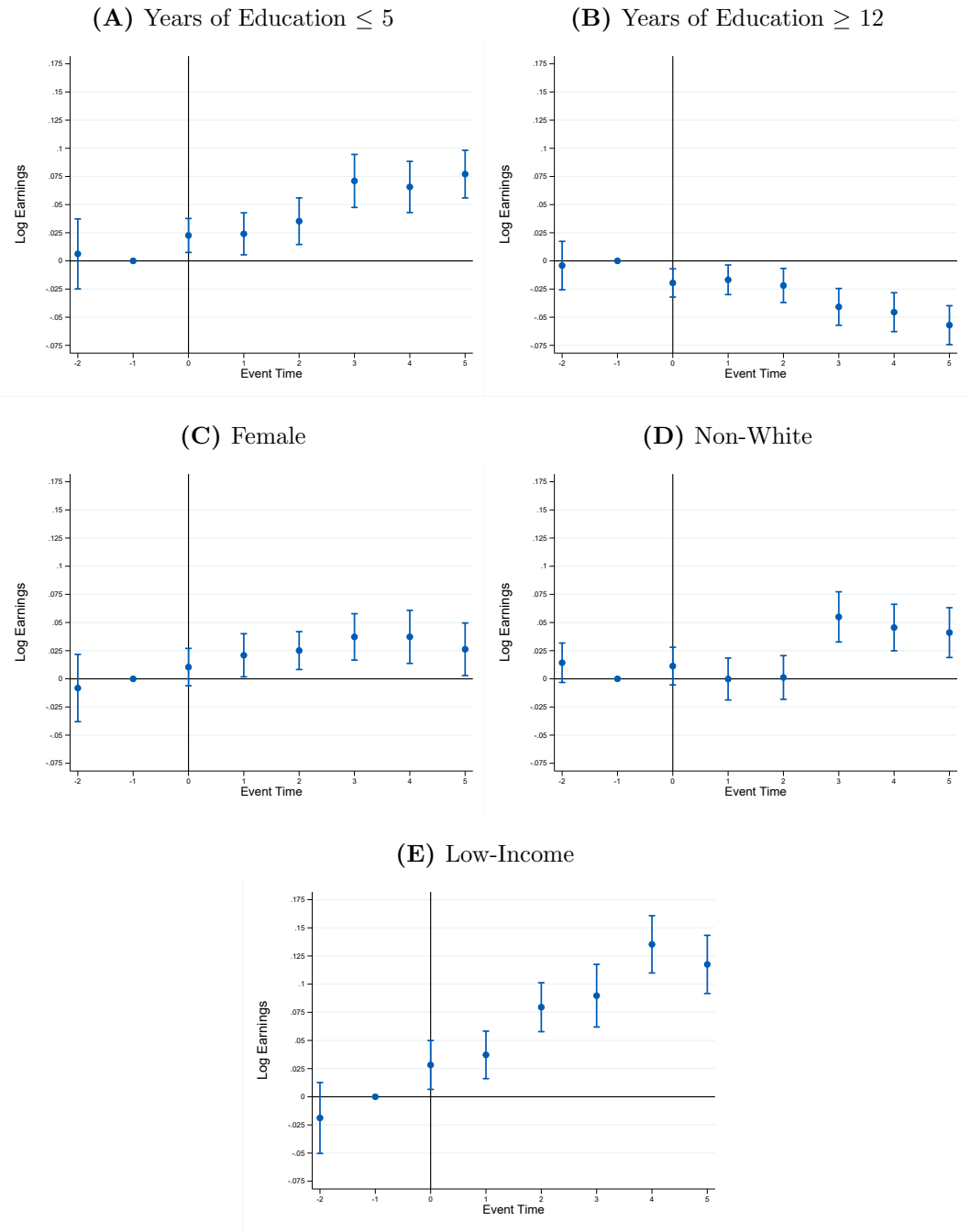
Notes: The figure reports a map with the adoption of electronic voting across municipalities in Brazil.

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) 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: $^{***}p < 0.01,^{**}p < 0.05,^{*}p < 0.1$.

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: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.