Internet Access, Social Media, and the Behavior of Politicians: Evidence from Brazil

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Motivation

- Information is key to hold politicians accountable to the electorate
  - Monitoring policymakers' actions is central to the proper functioning of democracies
  - For decades, dissemination of information has operated primarily through traditional media (i.e. newspapers, radio, TV)
- In recent years, the Internet has transformed the way citizens access information
  - More access to information, but information might be less precise
  - **Social media**, in particular, became an important channel for dissemination of news and political communication
  - Politicians might communicate directly with the electorate – and change behavior as a result of the two-way, instantaneous channel

This paper

- **Do social media make politicians more responsive to their constituents?**

- We examine how politicians react to the arrival of Facebook (via expansion of 3G mobile phone networks) across political jurisdictions in Brazil

- More specifically, we ask two questions:

  - Do politicians use social media to communicate with voters when 3G Internet becomes available?

    (interactions through Facebook)

  - Does the availability of 3G Internet affect the behavior of politicians *offline*, in how they target their political constituencies?

    (transfers of discretionary funds and congressional speeches)

This paper (cont)

- We exploit two sources of variation:
  - Staggered entry of 3G antennas across municipalities between 2010 and 2014
  - Variation from same politician elected from multiple municipalities (with and without 3G internet)

Related Literature

- Traditional media tends to hold politicians more accountable to voters

  Stromberg 2004; Ferraz and Finan 2008; Snyder and Stromberg 2010

- Effects of new media technologies on the political behavior of citizens

  Broadband: Falck, Gold and Heblich 2014; Campante, Durante and Sobbrio 2018

  Mobile phones: Manacorda and Tesei 2018

  Social media: Enikolopov, Makarin and Petrova 2018

- Less is known on how *politicians* respond to and react on *social media*

  Broadband Internet: Gavazza, Nardotto and Valletti forth.

  ...

Institutional Background & Data

- Institutional background and data on:
  1. Why Brazil?
  2. Brazilian electoral system
  3. Margins for measuring politicians' behavior
  4. Roll-out of 3G internet
  5. Social media and Facebook

Why Brazil?

- 4th largest democracy in the world (Freedom House)
- Mobile phone penetration tripled from 2006 to 2014 in Brazil

  2006, 43 mobile subscriptions per 100 inhabitants

  2014, 139 mobile subscriptions per 100 inhabitants
- Large take-up of online activity, by politicians and citizens alike

  Top 3 Facebook users: US, India and Brazil
- Politicians elected from many constituencies

  Variation in their electoral bases of support

Institutional Background & Data

- Electoral system
  - Two Federal legislative chambers: House (513 members) and Senate (81 members)
  - Focus on the 513 federal deputies, elected in 2010 for a 4-year term
  - Elected under open-list proportional system with votes from entire states, **not local districts**
    a. Seats in the House are pre-allocated across the 27 states
    b. Seats are divided among parties within the states, proportional to the overall number of votes obtained by each party's candidates
    c. The most-voted candidates within the state and party are elected

Institutional Background & Data

- Electoral system introduces strong heterogeneities in the electoral support base across politicians
- **Data**: we obtain the votes at the candidate-municipality level on the 2006 and 2010 elections (TSE)
- Construct the index of electoral base of support

$$\text{VoteShare}_{im} = \frac{\text{Votes of politician } i \text{ in municipality } m}{\text{Total votes of politician } i}$$

$$\text{VoteShareDemeaned}_{im} = \text{VoteShare}_{im} - \overline{\text{VoteShare}}_i$$

where $\overline{\text{VoteShare}}_i$ is the average vote share of candidate i

Institutional Background & Data

Figure 1: Vote share of the two best-voted politicians from São Paulo state

Tiririca (1.3m votes)

Gabriel Chalita (560k votes)

Descriptive Statistics

Table 1: Elected politicians' descriptive statistics

	2011-2014 Sample	2009-2014 Sample
% Female	.088	.089
% College	.778	.786
% North	.127	.125
% Northeast	.294	.300
% Centerwest	.064	.060
% Southeast	.349	.348
% South	.150	.147
Campaign exp. in 2010	R$ 3.24m (R$ 1.87m)	R$ 2.91m (R$ 1.81m)
Votes in 2010	114.86k (86.89k)	86.21k (85.80k)
N	513	744

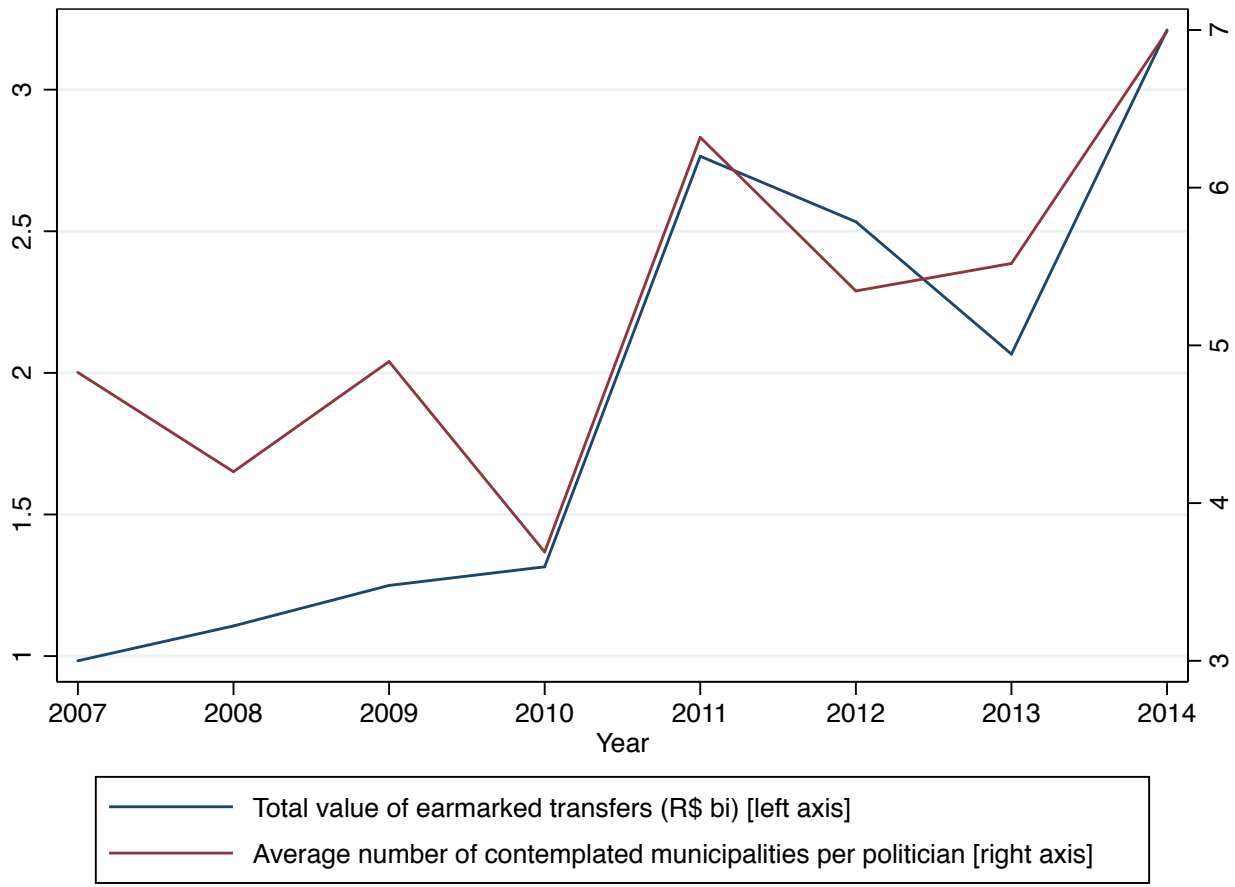
Institutional Background & Data

- Once elected, politicians may propose earmarked transfers to fund various projects of their choice
  - Some projects might be implemented at the federal or state levels, such as national defense or more resources towards security
  - We focus on local projects such as schools, hospitals, and roads
  - Piece of legislation that is elaborated one year prior to use of resources: *Lei Orçamentaria Anual* (LOA)

- **Data**: amendments to the LOA from 2008 to 2015
  - Information about the legislator, description of the project, amount, implementing ministry (116k transfers)
  - Run textual analysis to detect the destination municipalities (19,971 transfers) > algorithm

Institutional Background & Data

Figure 2: Earmarked transfers



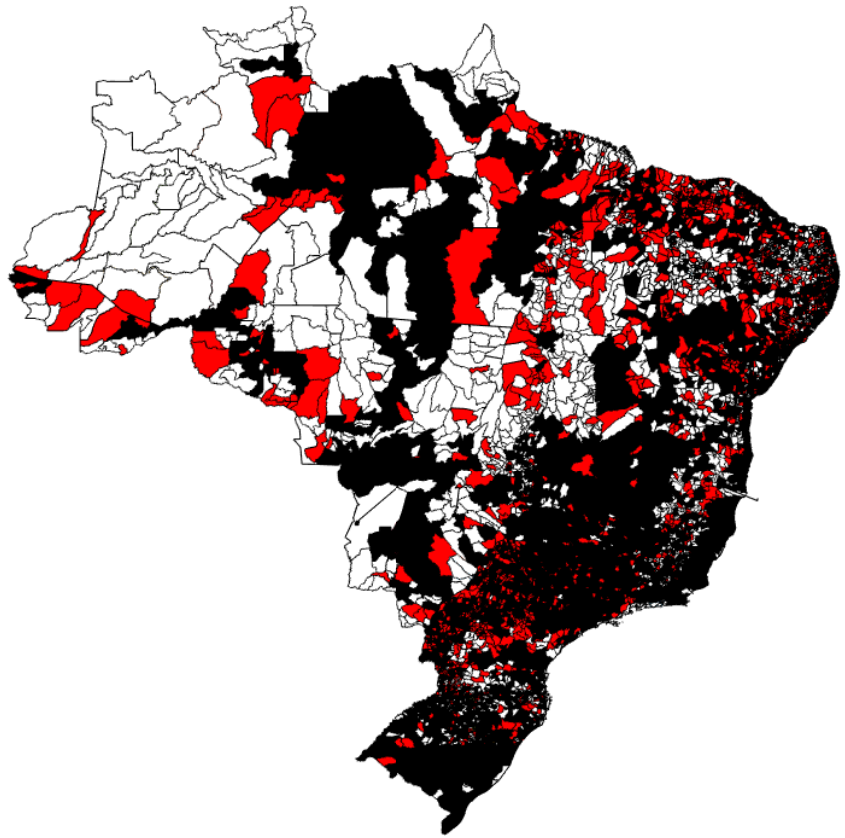
Institutional Background & Data

- We collect data on all **speeches** by legislators (200k speeches)
- Run textual analysis and natural language processing algorithms to detect the municipalities that were cited, and the topic (93,685 speeches)

Institutional Background & Data

- **Data**: 3G access for 5,556 Brazilian municipalities in Brazil, 2007-2014

Figure 3: Rollout of 3G coverage



(Before Jan'12 = black, Jan'12-Dec'14 = red, Never 3G, After Jan'15 = white)

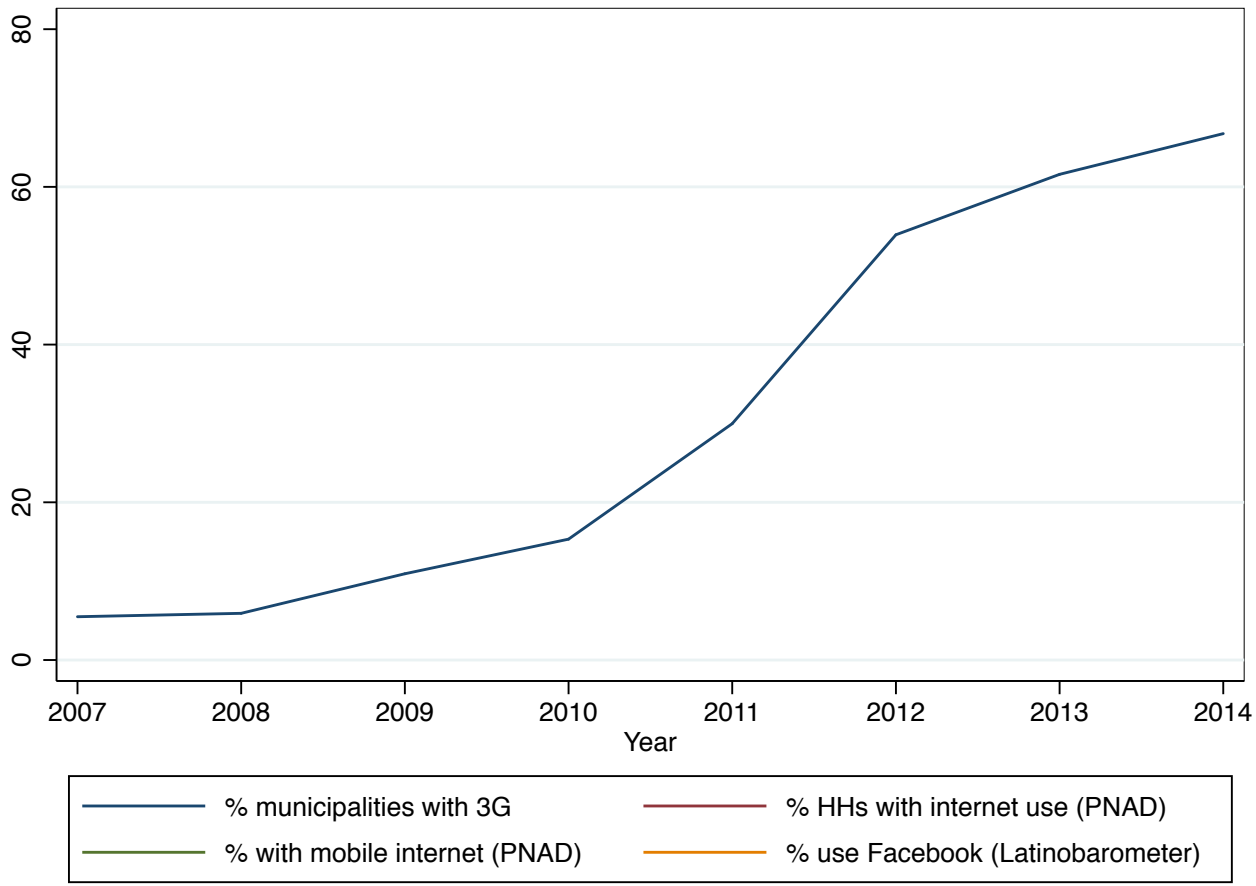
Descriptive Statistics

Table 2: Municipalities' descriptive statistics, 2011-2014

	Full Sample	Always 3G 3G before Jan'12	Switchers Jan'12 to Dec'14	Never 3G After Jan'15
Income per capita	R$ 493.80 (243.34)	R$ 621.42 (272.41)	R$ 491.32 (218.10)	R$ 389.67 (189.65)
Schooling (years)	9.46 (1.09)	9.56 (.866)	9.56 (1.11)	9.27 (1.22)
Gini Index	.494 (.066)	.498 (.058)	.484 (.068)	.504 (.068)
Population	34,316 (203,274)	93,617 (379,155)	13,929 (12,911)	8,696 (7,663)
% Urban Population	.638 (.220)	.779 (.197)	.624 (.207)	.537 (.191)
% poor	.232 (.179)	.162 (.151)	.219 (.178)	.306 (.175)
% electricity	.972 (.060)	.988 (.033)	.976 (.052)	.954 (.079)
N	5,556	1,542	2,178	1,836

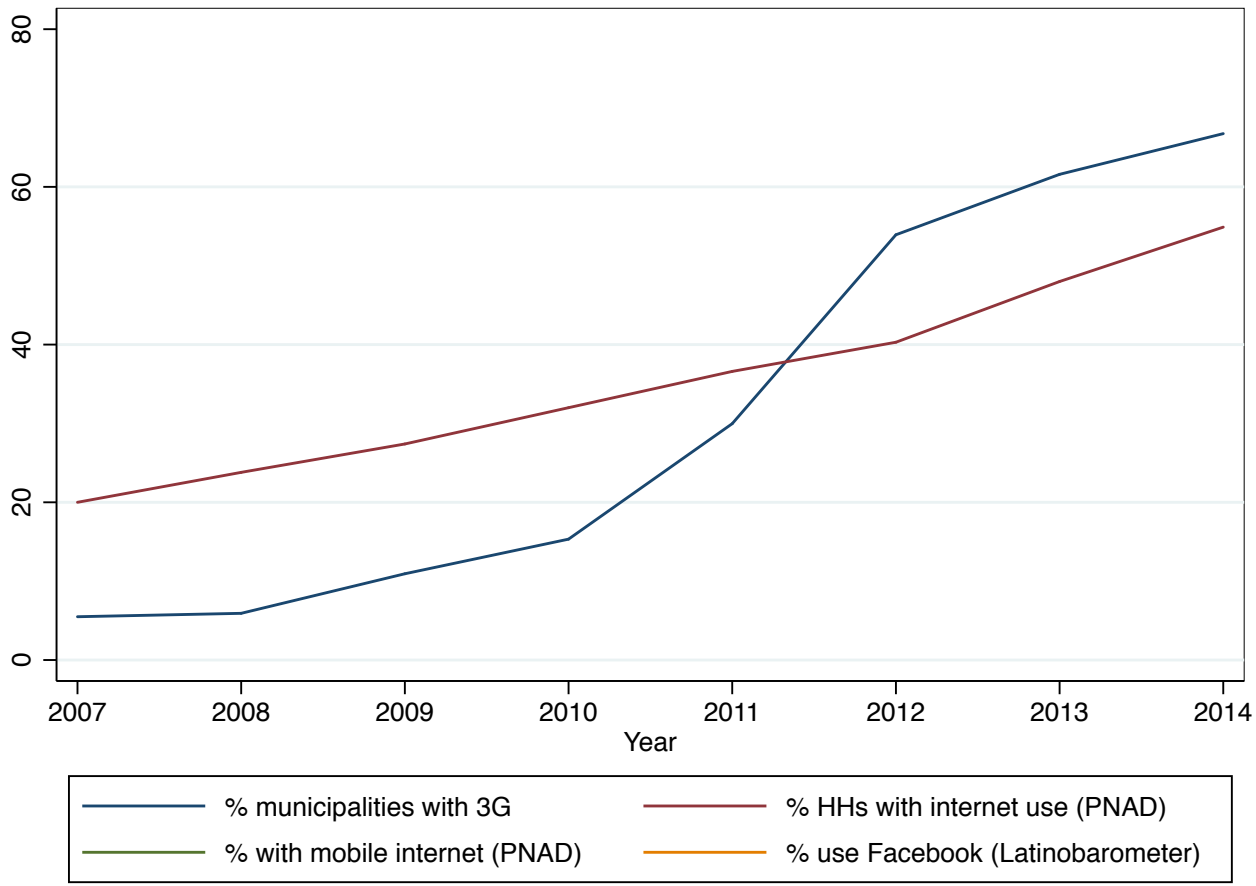
Institutional Background & Data

Figure 4: Internet and Facebook adoption



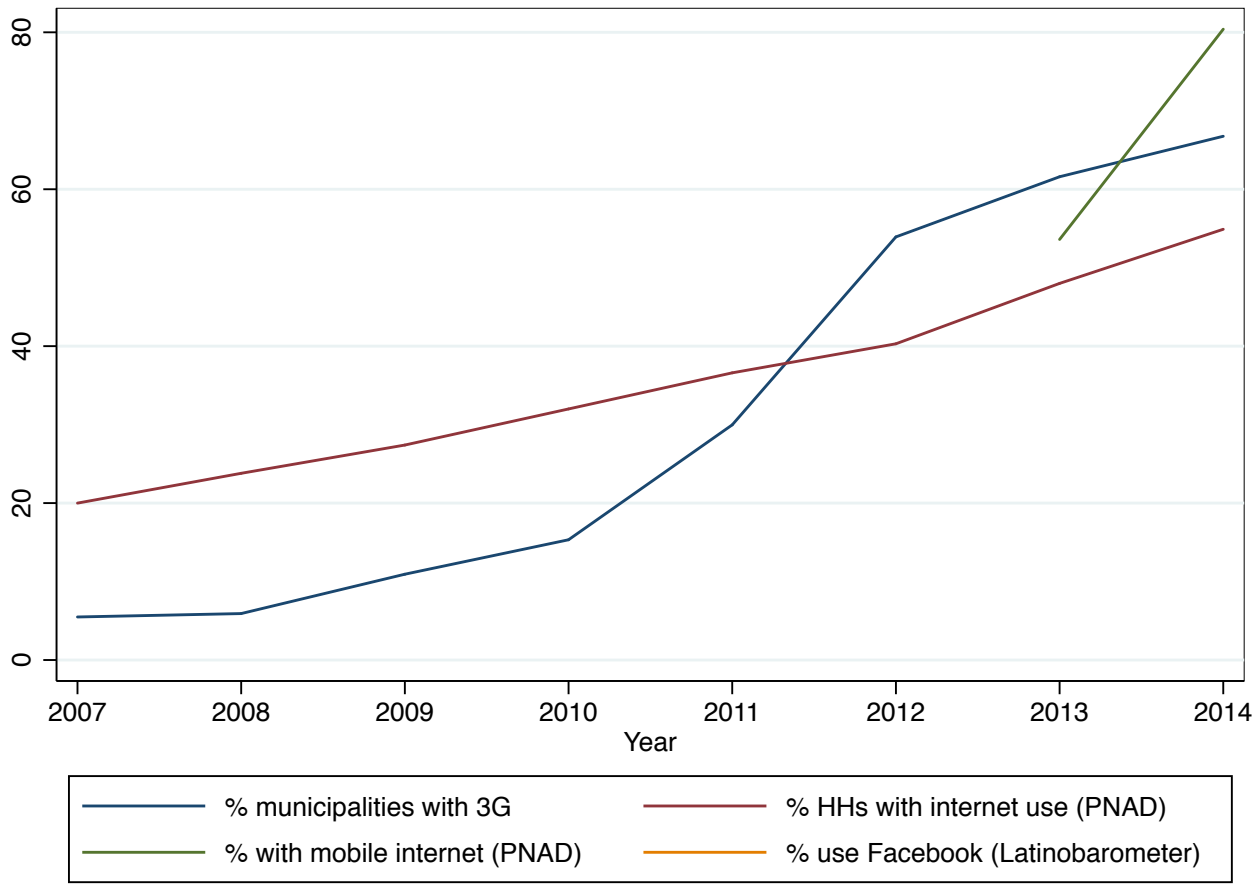
Institutional Background & Data

Figure 4: Internet and Facebook adoption



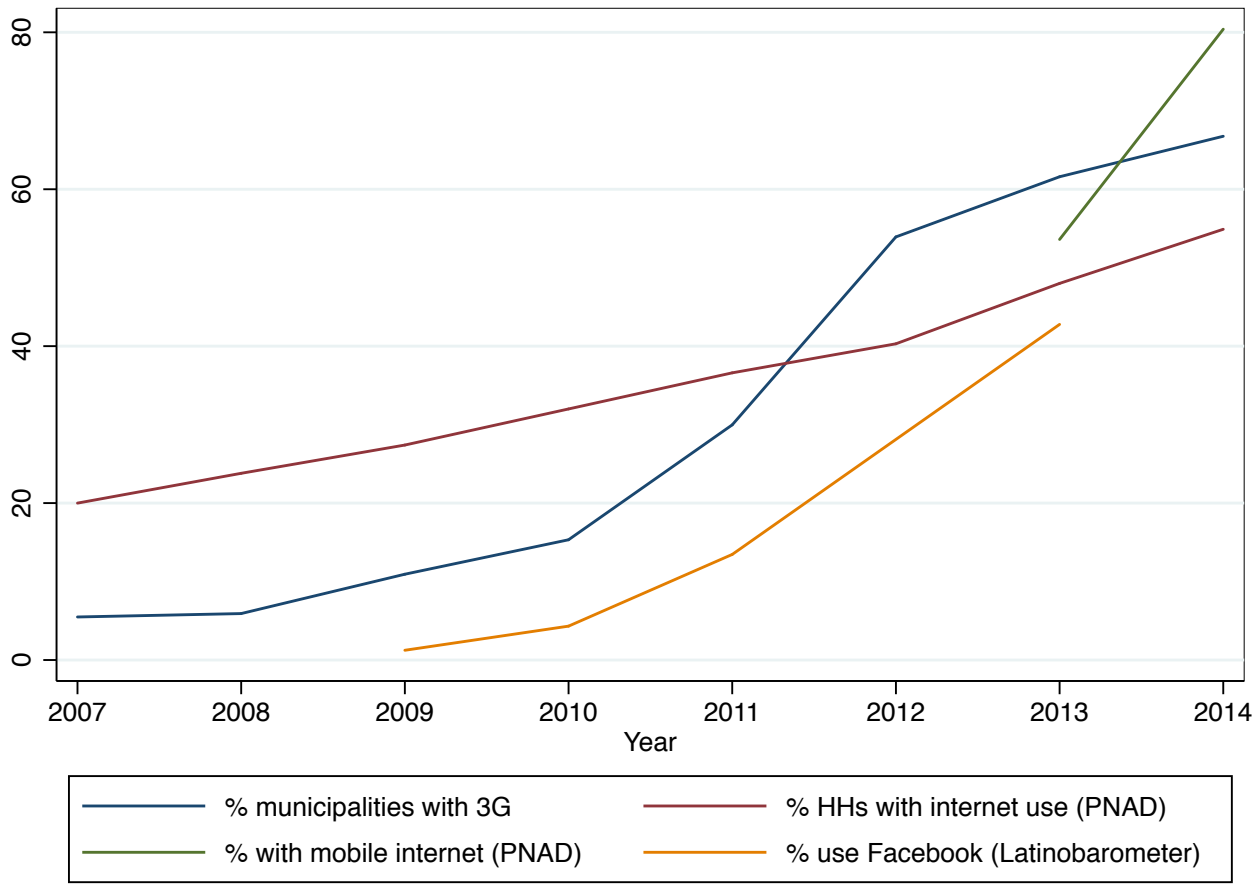
Institutional Background & Data

Figure 4: Internet and Facebook adoption



Institutional Background & Data

Figure 4: Internet and Facebook adoption



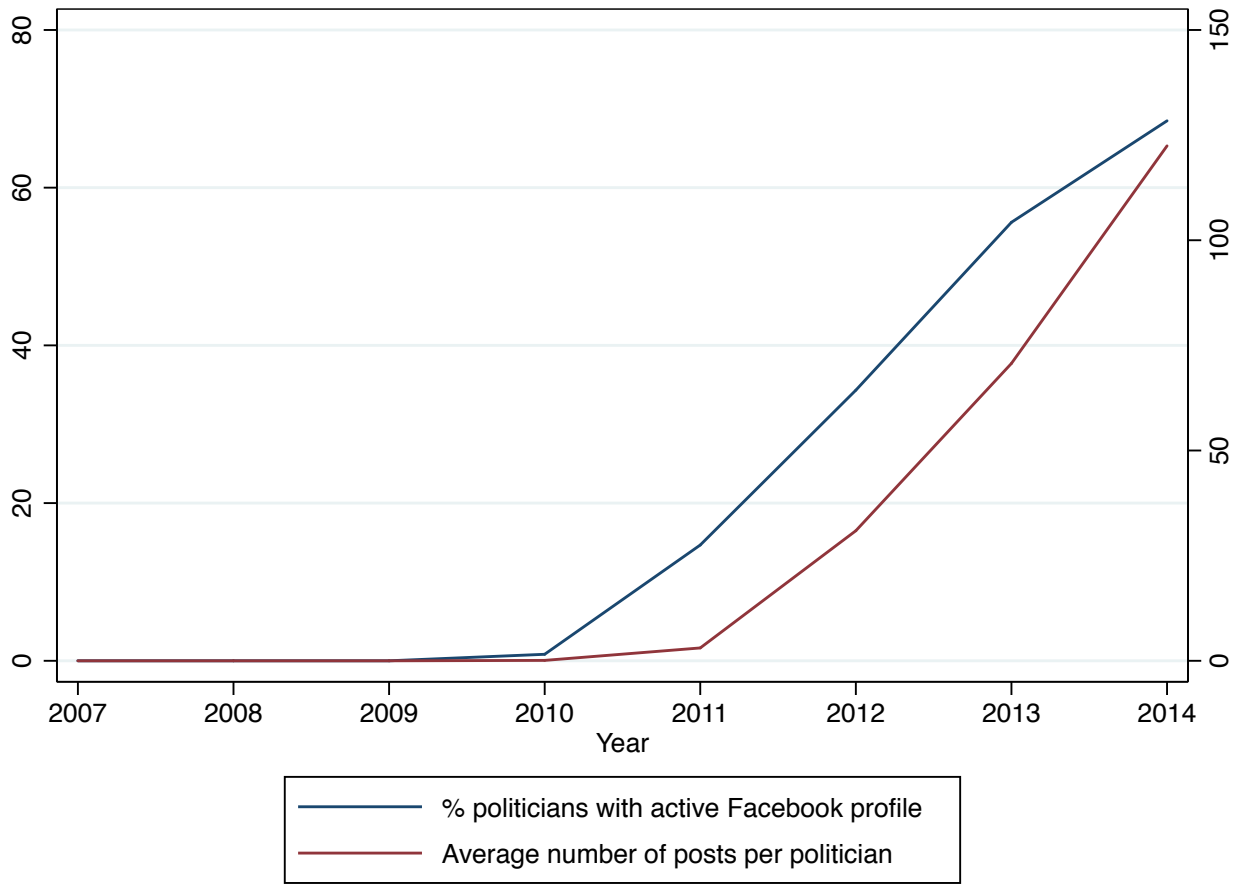
Institutional Background & Data

- Facebook is an important source of political information in Brazil, and widely used to communicate with voters
  - Scant coverage by traditional media
  - Twitter has low penetration
  - Widespread adoption of Facebook by Federal Deputies

- **Facebook data**
  - Scraped the universe of posts on each Facebook page for all politicians of the 2011-14 legislature
  - Data includes posts contents, likes, shares and comments
  - Textual analysis and natural language processing to identify the topic and municipalities that were made reference to > algorithm

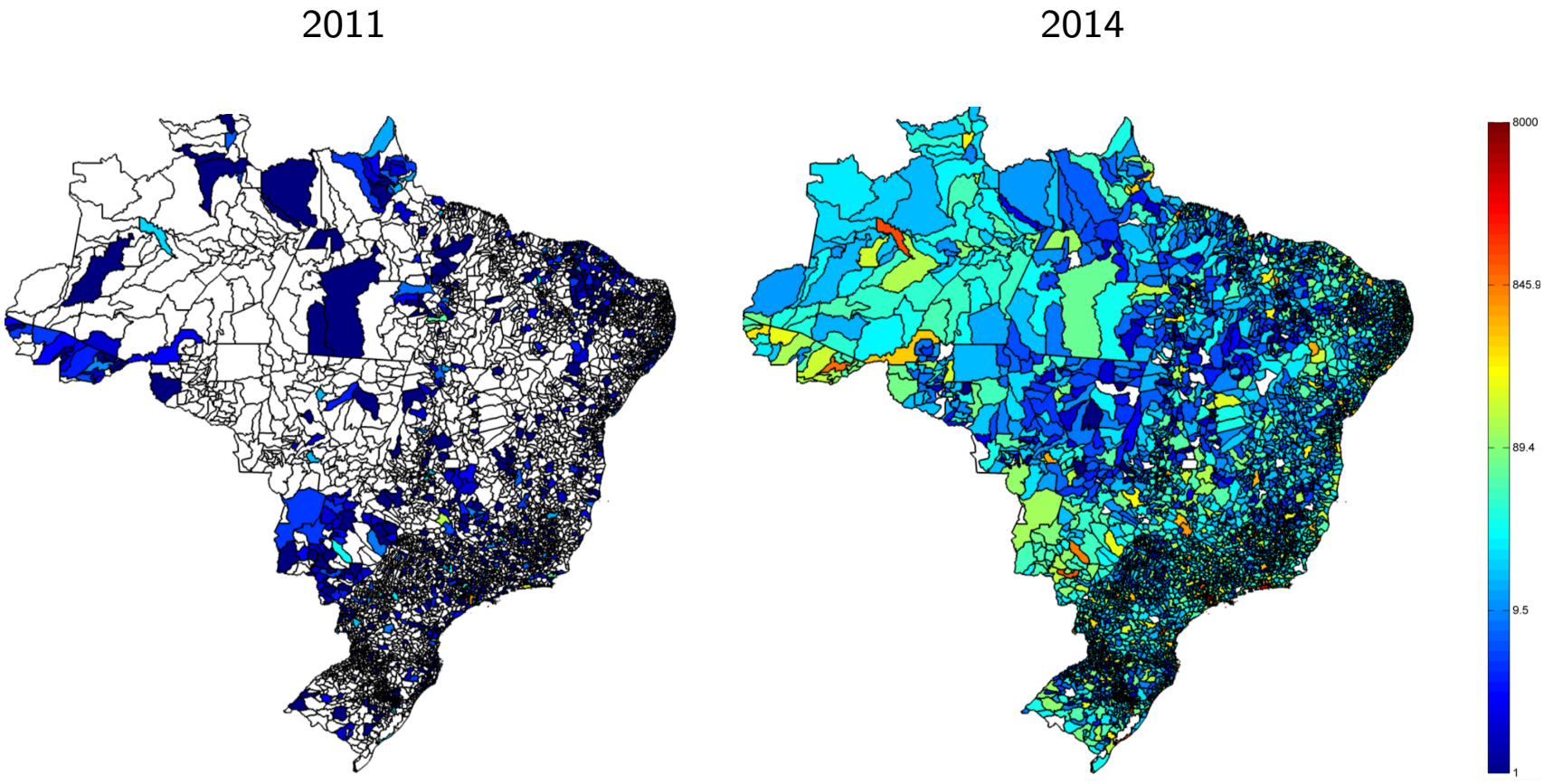
Institutional Background & Data

Figure 5: Use of Facebook by politicians



Institutional Background & Data

Figure 6: Number of mentions to municipalities on Facebook



Descriptive Statistics

Table 3: Descriptive statistics of 3G, transfers and Facebook, 2011-2014

	2011	2012	2013	2014	2011-2014 total, per pol.	2011-2014 total, all pol.
% Municipalities with 3G	.300	.539	.616	.668	-	-
Transfers	5.68 (7.76)	4.95 (7.33)	4.81 (8.08)	6.56 (7.85)	21.81 (24.23)	11.28k (7.78)
Value of Transfers	R$ 5.54m (R$ 5.74m)	R$ 5.35m (R$ 6.04m)	R$ 4.12m (R$ 5.52m)	R$ 6.73m (R$ 6.49m)	R$ 21.74m (R$ 20.42m)	R$ 11.21b (R$ 6.03m)
Speeches	24.06 (42.69)	20.38 (44.22)	26.09 (60.24)	17.74 (45.16)	87.91 (179.26)	45.28k (48.67)
% Open FB Profiles	.173	.406	.657	.809	-	-
Posts	4.44 (17.74)	44.85 (117.67)	102.55 (212.67)	177.56 (266.71)	329.1 (523.85)	168.98k (191.85)
Likes	26.57 (98.21)	819.37 (3,022.8)	3,307.7 (9,159.6)	29,398.7 (146.31k)	33,465.4 (151.98k)	17.21m (74,265.7)
Shares	4.15 (16.94)	296.57 (1,010.2)	1,107.5 (2,971.3)	11,617.2 (143.52k)	12,937.7 (144.47k)	6.64m (71,887.7)
Comments	7.52 (30.42)	146.60 (530.63)	367.40 (1,083.2)	2,513.1 (20,906.2)	3,034.6 (21,284.8)	1.56m (10,512.6)

Empirical Strategy

- We construct a municipality panel and estimate the following model

$$y_{mst} = \beta \cdot 3G_{mst} + \mu_m + \lambda_{st} + \epsilon_{mst}$$

where y_{mst} is the outcome of interest in municipality m, state s and year t

$3G_{mst}$ is an indicator that is equal to 1 if municipality m in state s had $3G$ internet access, and β is the coefficient of interest

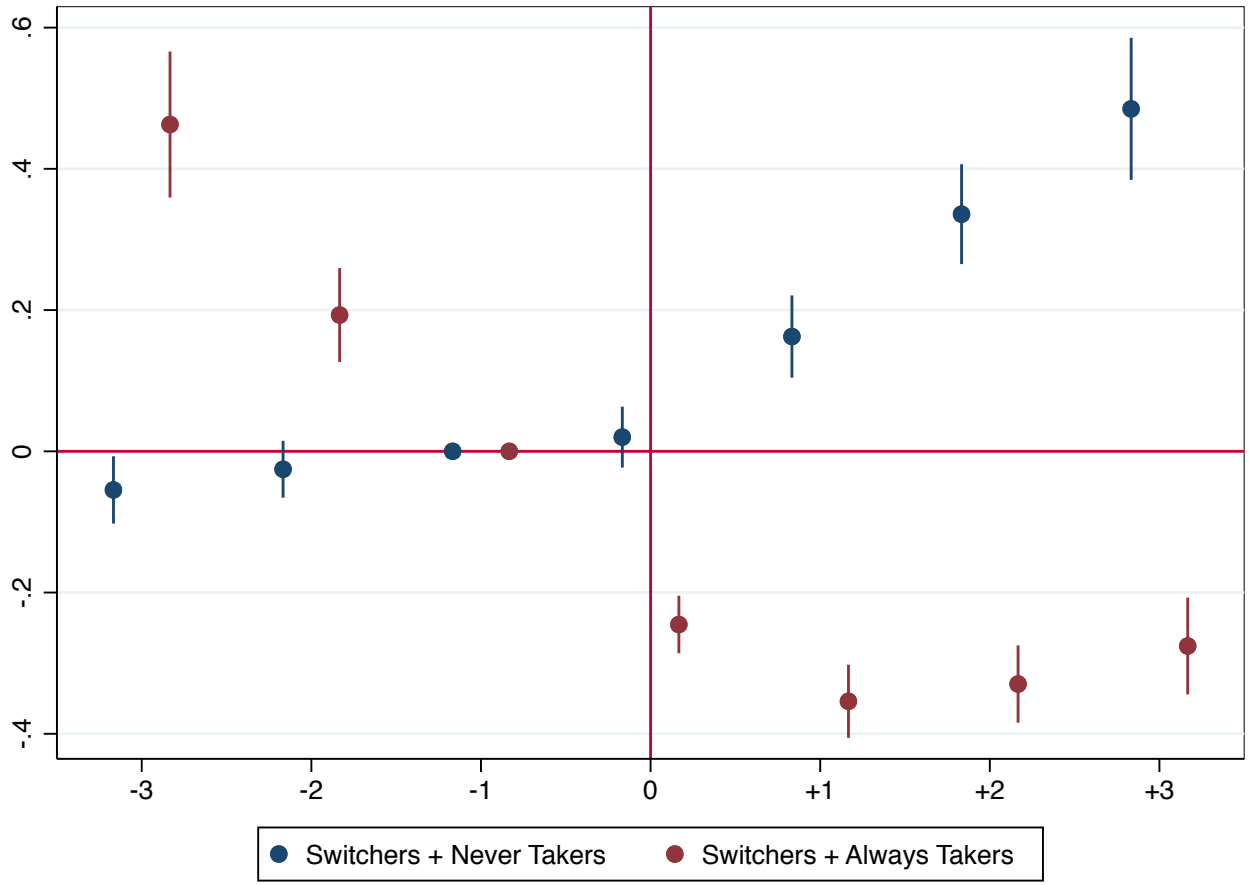
- Specification controls for unobserved confounders at the municipality level or state-year levels

  μ_m are municipality fixed effects

  λ_{st} are state-year fixed effects

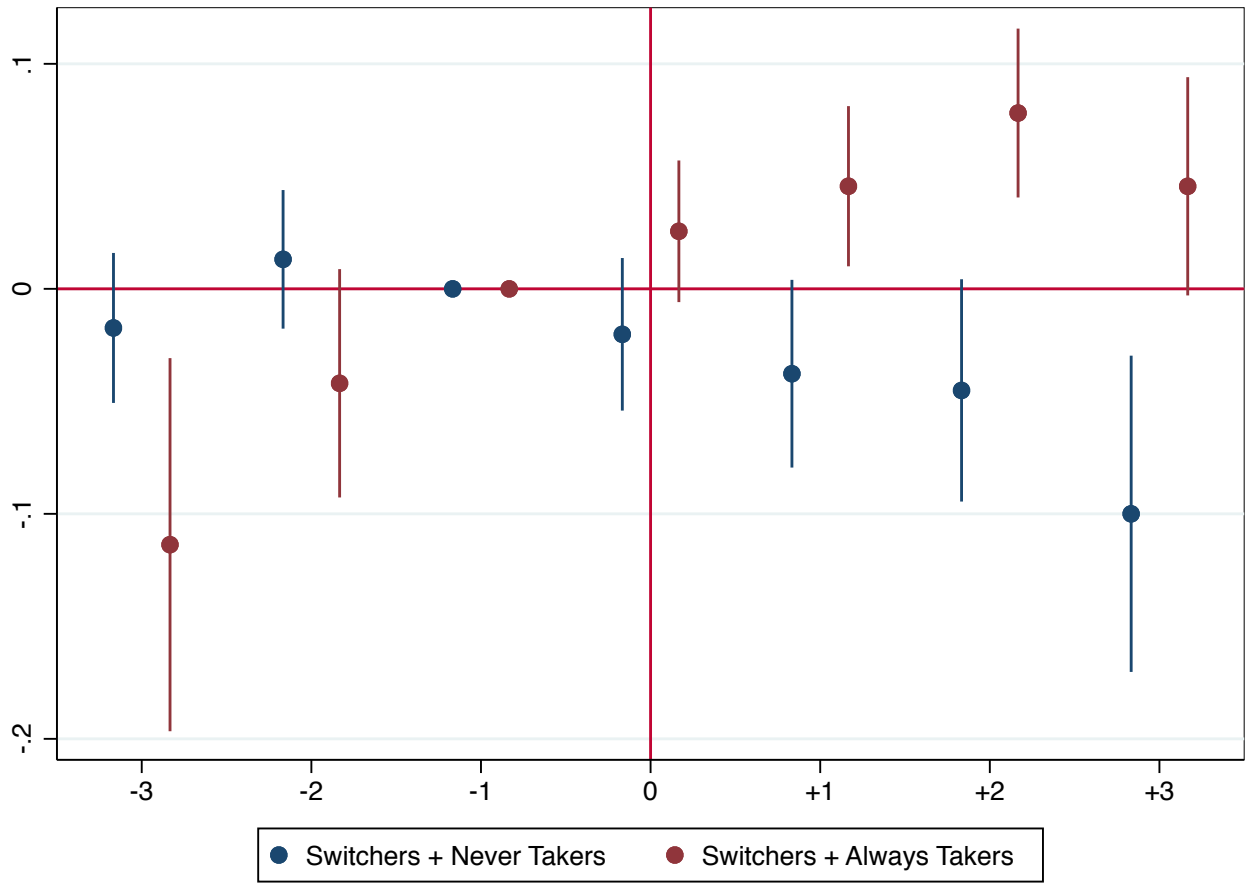
Pre-trends

Figure 3a: Pre-intervention trends on online behaviour (Facebook posts)



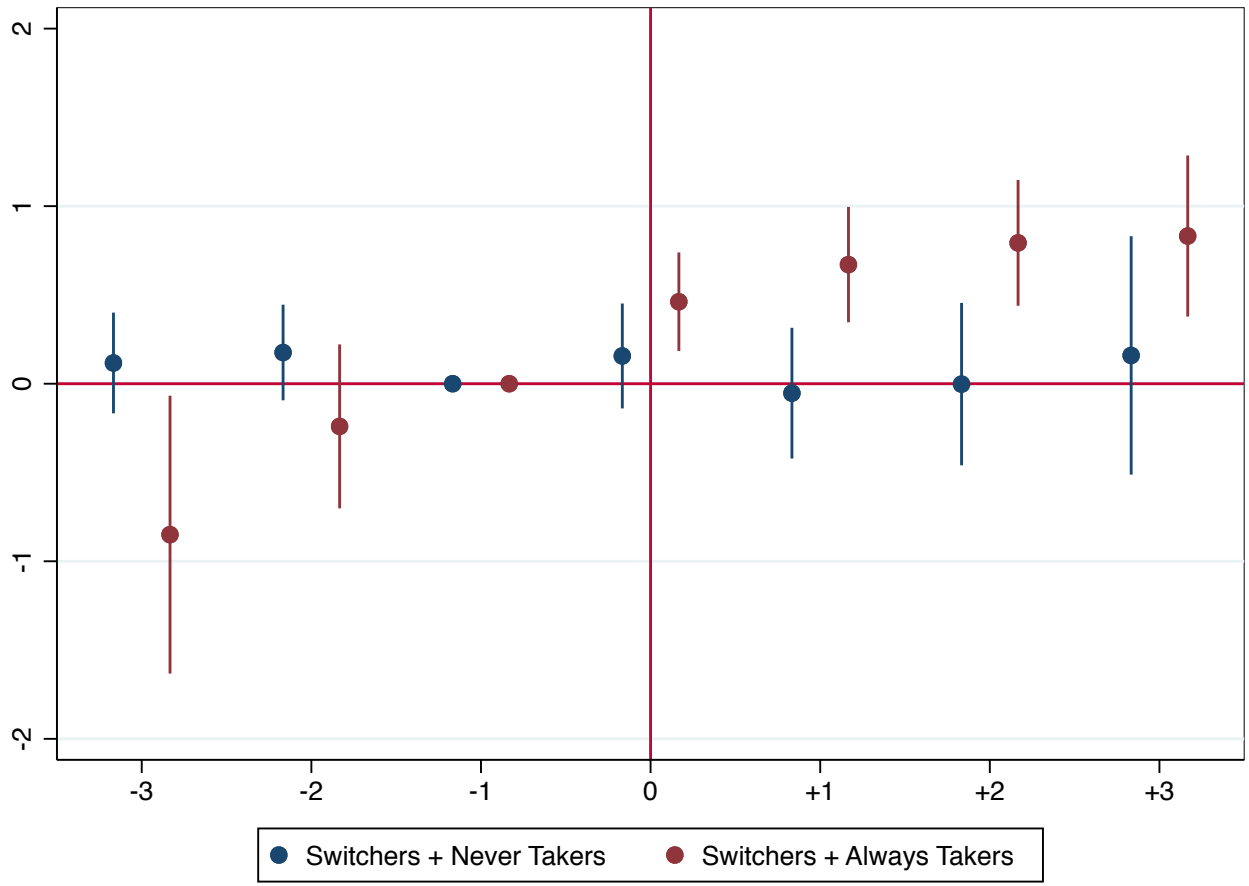
Pre-trends

Figure 3b: Pre-intervention trends on offline behaviour (speeches)



Pre-trends

Figure 3c: Pre-intervention trends on offline behaviour (transfers)



Empirical Strategy

- Interested in the behavior of the politicians: politician-municipality level
- In a context such as the US, politicians represent a single congressional district, so we could estimate the DiD specification

$$y_{imst} = \beta \cdot 3G_{mt} + \mu_m + \lambda_t + \epsilon_{imst}$$

for politicians i relative to municipality m in state s at time t

- Fixed effects

  μ_m cannot separate between politician and municipality unoberved component

Empirical Strategy

- The Brazilian context allows us to go one step further: separately control for legislator and municipality fixed effects because legislators are elected with votes across the state

$$y_{imst} = \beta \cdot 3G_{mst} + \mu_{im} + \lambda_t + \epsilon_{imst}$$

where y_{imst} are the outcomes of interest of politician i relative to municipality m in state s and at year t

- This specification controls for unobserved confounders at the politician-municipality level

  μ_{im} are politician interacted with municipality fixed effects

  λ_t are year effects

Empirical Strategy

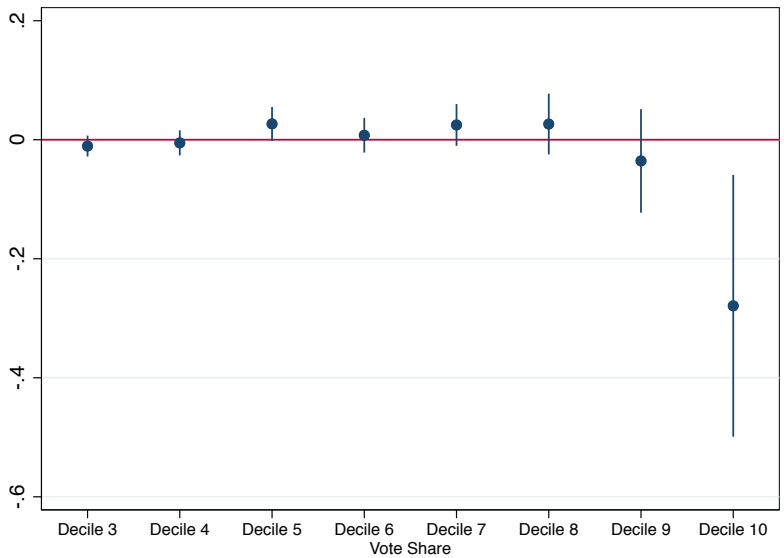
- Our final model controls for municipality-year shocks λ_{mt}
- Allow the effect to vary according to the importance of municipality m to politician i
- Our final triple-difference model is

$$y_{imst} = \gamma \cdot 3G_{mt} \cdot \text{VoteShare}_{im} + \mu_{im} + \lambda_{mt} + \epsilon_{imst}$$

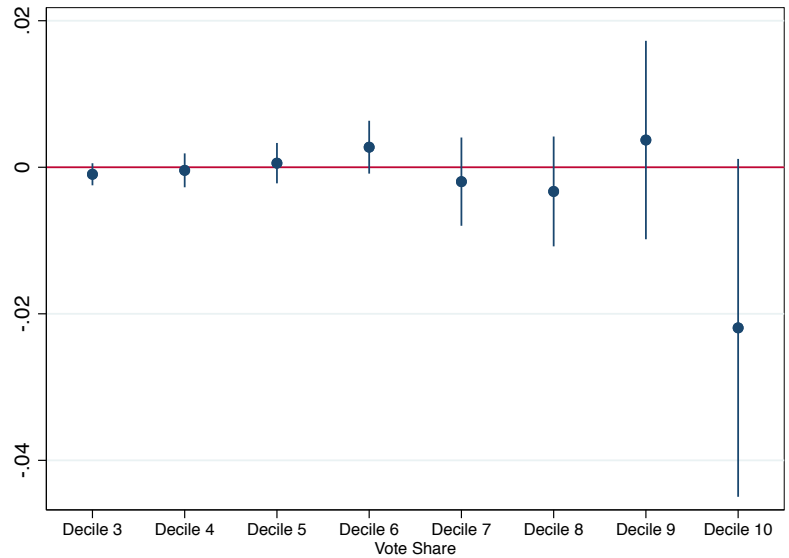
where γ is the coefficient of interest

Fitted values & implications

Transfers

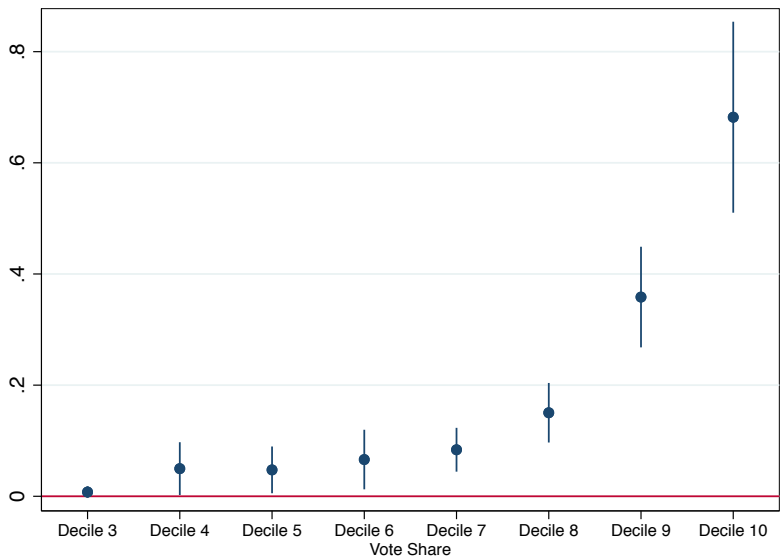


Speeches

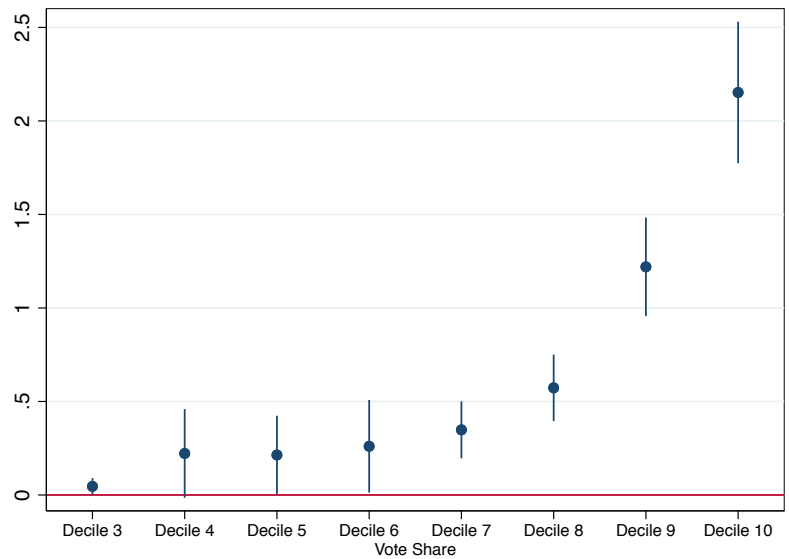


Fitted values & implications

Posts

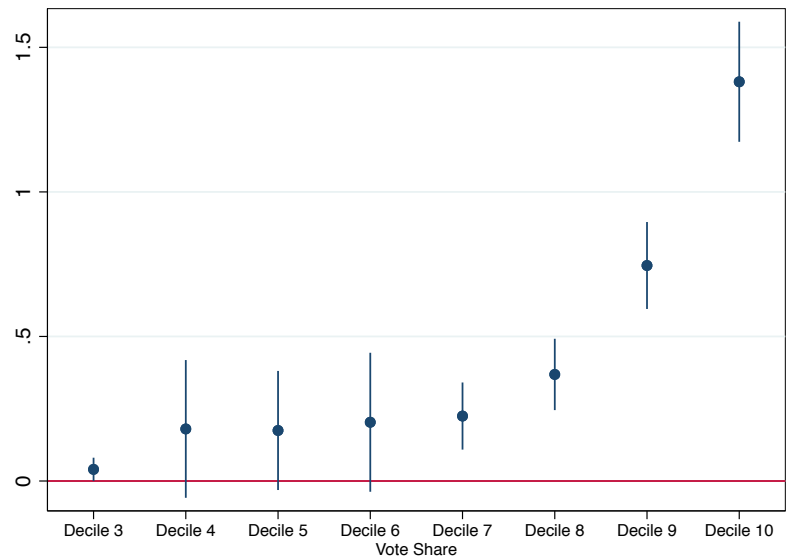


Likes



Fitted values & implications

Shares



Comments

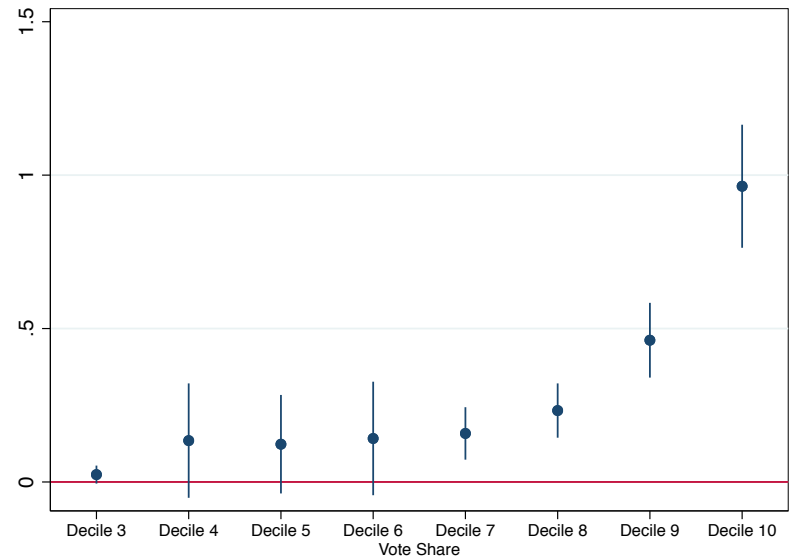
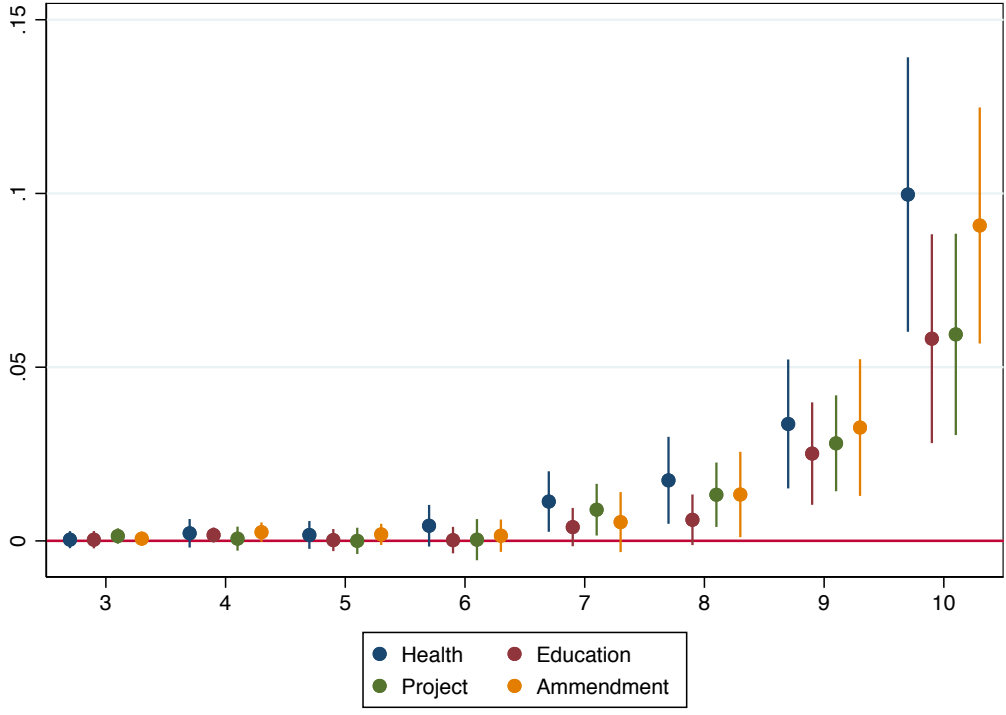


Figure 19: Keywords mentioned on Facebook

Municipality-politician level regressions



In Sum

- The entry of 3G/Facebook in a municipality leads to more communication about the municipality (and these posts become more popular)
- A politician posts more about a given municipality when 3G/Facebook enter and that municipality is important to him/her (in terms of vote share)
- **Substitution**: the politician devotes less effort (speeches) and obtain fewer resources (earmarks) to municipalities that they have a higher online engagement
    - The effects are driven by places with high vote shares

Takeaway

- The expansion of social media make politicians more responsive **online** to their key constituencies, but...
- ... that comes at the expense of their responsiveness **offline**.
- **Next steps**:
  - From responsiveness to accountability: vote shares in subsequent election?
  - What do politicians talk about when they talk about a municipality? Education, health, etc.
  - What are they spending less on?

Thank You!

Supplementary slides

Detecting Municipalities in Facebook posts

"Congresswoman Iara Bernardi (PT) meets the mayors of Capela do Alto, Iperó, Cedral, Cunha and Arocoaiba da Serra to assess the impact of the mining industry in Ipanema National Forest."

- Find municipalities contained in post string

Matched: Capela (SE), Capela (AL), Capela do Alto (SP), Iperó (SP), Cedral (MA), Cedral (SP), Cunha (SP), Arocoiaba da Serra (SP), Ipanema (MG).

- Drop names contained in longer strings also matched and duplicate names not in Congressman' state of origin

Matched: Capela (SE), Capela (AL), Capela do Alto (SP), Iperó (SP), Cedral (MA), Cedral (SP), Cunha (SP), Arocoiaba da Serra (SP), Ipanema (MG).

Detecting Municipalities in Facebook posts

- Dubious names are kept if immediately preceded by term that indicates a location

> "Congresswoman Iara Bernardi (PT) meets the mayors of Capela do Alto, Iperó, Cedral, Cunha and Arocoaiba da Serra to assess the impact of the mining industry in Ipanema National Forest."

- Final matches:

> Matched: Capela (SE), Capela (AL), Capela do Alto (SP), Iperó (SP), Cedral (MA), Cedral (SP), Cunha (SP), Arocoiaba da Serra (SP), Ipanema (MG).

- Sampled evaluation performance: matched 92% of true citations, $< 3\%$ of false matches

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Municipality-level regressions

Dependent variable: IHS

	(i) Posts	(ii) Likes	(iii) Shares	(iv) Comments	(v) Speeches	(vi) Transfers
Panel A. Extensive margin, binary dependent variable						
3G	.005	.013	.028***	.040***	-.024*	-.007
	(.013)	(.012)	(.012)	(.012)	(.015)	(.014)
Mean of dep. var.	.535	.521	.467	.433	.348	.189
Panel B. Intensive and extensive margins, IHS of dependent variable						
3G	.157***	.263***	.210***	.255***	-.040**	-.151
	(.027)	(.060)	(.041)	(.049)	(.020)	(.176)
Mean of dep. var.	3.19	294.9	161.7	30.34	.846	R$ 99,756
Observations	16,056	16,056	16,056	16,056	16,056	16,056
Treated	2,178	2,178	2,178	2,178	2,178	2,178
Control	1,836	1,836	1,836	1,836	1,836	1,836

Table A1: Municipality-level regressions

Dependent variable: binary

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G	-.007	-.024*	.005	.013	.028***	.040***
	(.014)	(.015)	(.013)	(.012)	(.012)	(.012)
Observations	16,056	16,056	16,056	16,056	16,056	16,056
Treated	2,178	2,178	2,178	2,178	2,178	2,178
Control	1,836	1,836	1,836	1,836	1,836	1,836

> back

Table A2: Municipality-level regressions, sample 2009-2014

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G	.073	-.006	.188***	.312***	.201***	.234***
	(.118)	(.014)	(.020)	(.041)	(.028)	(.033)
Observations	29,574	29,574	29,574	29,574	29,574	29,574
Treated	2,178	2,178	2,178	2,178	2,178	2,178
Control	1,836	1,836	1,836	1,836	1,836	1,836

> back

Table A3: Municipality-level regressions, heterogeneity by region

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G × North	-2.030**	.050	.195**	.456***	.213*	.434***
	(.879)	(.099)	(.088)	(.166)	(.122)	(.139)
3G × Northeast	.208	-.058	.114**	.167	.126*	.229***
	(.281)	(.037)	(.047)	(.106)	(.069)	(.082)
3G × Centerwest	-.111	-.064	.210*	.262	.335*	.281
	(.683)	(.073)	(.114)	(.249)	(.182)	(.198)
3G × Southeast	-.208	-.029	.144***	.275**	.194**	.210**
	(.305)	(.029)	(.049)	(.113)	(.084)	(.101)
3G × South	-.150	-.041	.216***	.356***	.330***	.284***
	(.376)	(.039)	(.055)	(.114)	(.080)	(.092)
Observations	16,056	16,056	16,056	16,056	16,056	16,056
Treated	2,178	2,178	2,178	2,178	2,178	2,178
Control	1,836	1,836	1,836	1,836	1,836	1,836

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Table A4: Municipality-level regressions, heterogeneity by population

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G × Above Median Pop	-.502*	-.056**	.388***	.669***	.516***	.598***
	(.256)	(.026)	(.035)	(.074)	(.054)	(.062)
3G × Below Median Pop	.188	-.026	-.066**	-.129*	-.086*	-.077
	(.192)	(.024)	(.032)	(.072)	(.049)	(.058)
Observations	16,056	16,056	16,056	16,056	16,056	16,056
Treated	2,178	2,178	2,178	2,178	2,178	2,178
Control	1,836	1,836	1,836	1,836	1,836	1,836

> back

Table A5: Municipality-level regressions, heterogeneity by share of urban population

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G × Above Median Urban	-.123	-.029	.262***	.449***	.326***	.360***
	(.251)	(.026)	(.037)	(.079)	(.057)	(.066)
3G × Below Median Urban	-0.173	-.049**	.077**	.121*	.121**	.174***
	(.201)	(.025)	(.032)	(.072)	(.049)	(.057)
Observations	16,056	16,056	16,056	16,056	16,056	16,056
Treated	2,178	2,178	2,178	2,178	2,178	2,178
Control	1,836	1,836	1,836	1,836	1,836	1,836

> back

Municipality-politician level regressions

Dependent variable: IHS

	(i) Posts	(ii) Likes	(iii) Shares	(iv) Comments	(v) Speeches	(vi) Transfers
Panel A. Extensive margin, binary dependent variable						
3G×Vote Share	.130***	.149***	.147***	.159***	-.0061*	-.0056*
	(.024)	(.024)	(.022)	(.023)	(.003)	(.0038)
Mean of dep. var.	.094	.091	.080	.067	.020	.010
Panel B. Intensive and extensive margins, IHS of dependent variable						
3G×Vote Share	.318***	1.063***	.471***	.698***	-.013**	-.069
	(.057)	(.127)	(.070)	(.079)	(.005)	(.053)
Mean of dep. var.	.229	21.19	2.18	11.62	.033	3,844.2
Observations	203,107	203,107	203,107	203,107	412,254	412,254

Table 6: Municipality-politician level regressions

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Vote Share, decile 3	-.011	-.001	.008	.046**	.024	.042*
	(.009)	(.001)	(.005)	(.023)	(.015)	(.021)
3G×Vote Share, decile 4	-.005	-.001	.050**	.222*	.135	.180
	(.011)	(.001)	(.024)	(.120)	(.095)	(.121)
3G×Vote Share, decile 5	.027*	.001	.047**	.214**	.123	.175*
	(.014)	(.001)	(.021)	(.106)	(.082)	(.105)
3G×Vote Share, decile 6	.008	.003	.066**	.260***	.142	.203*
	(.015)	(.002)	(.027)	(.126)	(.094)	(.122)
3G×Vote Share, decile 7	.025	-.002	.084***	.348***	.158***	.225***
	(.018)	(.003)	(.020)	(.077)	(.043)	(.059)
3G×Vote Share, decile 8	.026	-.003	.150***	.573***	.233***	.369***
	(.026)	(.004)	(.027)	(.090)	(.045)	(.063)
3G×Vote Share, decile 9	-.036	.004	.358***	1.220***	.462***	.745***
	(.044)	(.007)	(.046)	(.134)	(.062)	(.076)
3G×Vote Share, decile 10	-.279**	-.022*	.682***	2.152***	.964***	1.381***
	(.112)	(.012)	(.087)	(.192)	(.102)	(.106)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

Figure A1: Pre-trends

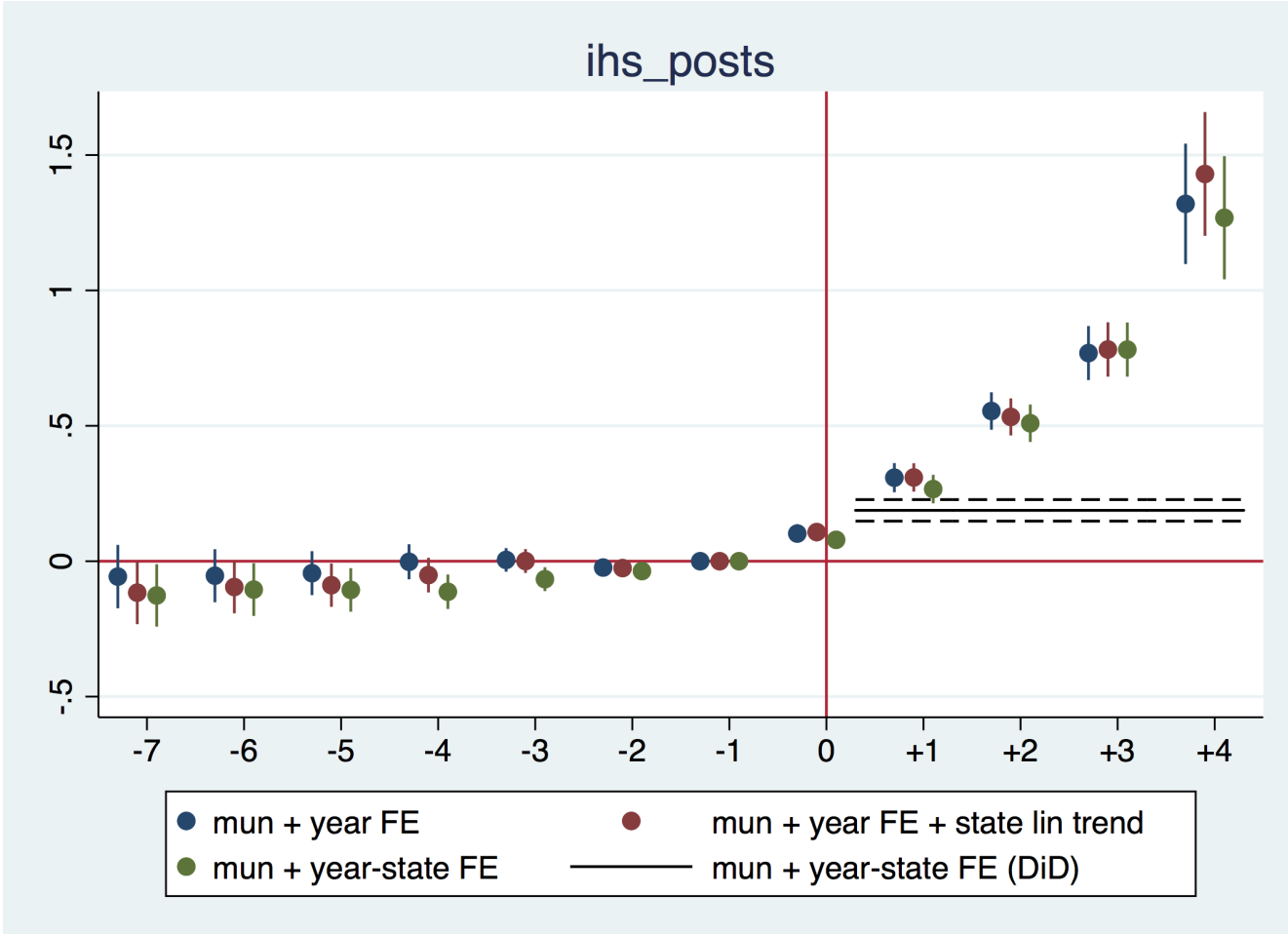

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Table A6: Municipality-politician level regressions, linear probability model

Dependent variable: binary

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Vote Share	-.0056*	-.0061*	.130***	.149***	.147***	.159***
	(.0038)	(.003)	(.024)	(.024)	(.022)	(.023)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

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Table A7: Municipality-politician level regressions, sample 2009-2014

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Vote Share	-.172***	-.009***	.325***	1.079***	.481***	.714***
	(.041)	(.003)	(.058)	(.130)	(.071)	(.082)
Observations	737,047	737,047	256,098	256,098	256,098	256,098

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Table A8: Municipality-politician level regressions, heterogeneity by region

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Vote Share×North	-.065	-.012	-.031	.213	.131	.239
	(.120)	(.006)	(.148)	(.273)	(.217)	(.148)
3G×Vote Share×Northeast	.030	-.014*	.167***	.686***	.291***	.508***
	(.067)	(.008)	(.059)	(.139)	(.075)	(.112)
3G×Vote Share×Centerwest	-.228	.033	.075	.266	.225	.035
	(.388)	(.022)	(.169)	(.431)	(.370)	(.365)
3G×Vote Share×Southeast	-.441***	-.017	.614***	1.899***	.795***	1.169***
	(.137)	(.011)	(.140)	(.302)	(.162)	(.158)
3G×Vote Share×South	-.165	-.017	.464***	1.350***	.640***	.829***
	(.135)	(.020)	(.092)	(.256)	(.133)	(.161)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

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Table A9: Municipality-politician level regressions, heterogeneity by population

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Vote Share×Above Median Pop.	-.058	-.014***	.249***	.856***	.391***	.577***
	(.054)	(.005)	(.053)	(.115)	(.066)	(.073)
3G×Vote Share×Below Median Pop.	-.198**	-.007	.674***	2.142***	.890***	1.331***
	(.094)	(.016)	(.111)	(.291)	(.143)	(.185)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

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Table A10: Municipality-politician level regressions, heterogeneity by share of urban population

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Vote Share×Above Median Urban Pop.	-.059	-.010*	.379***	1.161***	.526***	.715***
	(.070)	(.006)	(.094)	(.192)	(.111)	(.107)
3G×Vote Share×Below Median Urban Pop.	-.079	-.016**	.273***	.992***	.431***	.686***
	(.075)	(.007)	(.052)	(.139)	(.068)	(.097)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

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Table A11: Municipality-politician level regressions, heterogeneity by politician's age

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Above Median Age	.003	.005**	-.004	-.057	.022	.006
	(.017)	(.002)	(.028)	(.128)	(.092)	(.120)
3G×Vote Share×Above Median Age	-.049	-.007	.237***	.821***	.278***	.505***
	(.074)	(.007)	(.084)	(.193)	(.100)	(.116)
3G×Vote Share×Below Median Age	-.108	-.025***	.404***	1.316***	.680***	.906***
	(.075)	(.011)	(.057)	(.159)	(.093)	(.122)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

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Table A12: Municipality-politician level regressions, heterogeneity by politician's education

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×College	.018	.005*	.023	.139	.107	.118
	(.021)	(.003)	(.031)	(.135)	(.096)	(.126)
3G×Vote Share×College	-.068	-.010	.326***	1.086***	.489***	.690***
	(.065)	(.006)	(.061)	(.137)	(.077)	(0.086)
3G×Vote Share×No college	-.072	-.020*	.258*	.893***	.335***	.751***
	(.072)	(.011)	(.131)	(.294)	(.151)	(.207)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

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Table A13: Municipality-politician level regressions, heterogeneity by campaign cost

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Above Median Campaign Cost	.017	-.003	-.015	-.063	-.004	-.032
	(.021)	(.004)	(.026)	(.113)	(.063)	(.090)
3G×Vote Share×Above Median Campaign Cost	-.093	-.013	.383***	1.143***	.503***	.684***
	(.071)	(.008)	(.079)	(.192)	(.107)	(.120)
3G×Vote Share×Below Median Campaign Cost	-.056	-.013*	.243***	.976***	.434***	.717***
	(.071)	(.007)	(.070)	(.172)	(.099)	(.115)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

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Table A14: Municipality-politician level regressions, heterogeneity by same party as the mayor

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Same party	.026	.002	.038***	.101***	.024	.047
	(.018)	(.002)	(.012)	(.045)	(.031)	(.042)
3G×Vote Share×Same party	-.090	-.021***	.325***	1.094***	.497***	.721***
	(.087)	(.006)	(.065)	(.139)	(.079)	(.089)
3G×Vote Share×Different party	-.066	-.012**	.313***	1.049***	.463***	.689***
	(.056)	(.005)	(.057)	(.129)	(.071)	(.081)
Observations	412,254	412,254	203,107	203,107	203,107	203,107

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Table A15: Municipality-politician level regressions, heterogeneity by same coallition as the mayor

Dependent variable: IHS

	(i) Transfers	(ii) Speeches	(iii) Posts	(iv) Likes	(v) Shares	(vi) Comments
3G×Same coallition	.009	.001	.013***	.006	-.032***	-.030***
	(.010)	(.001)	(.016)	(.076)	(.059)	(.076)
3G×Vote Share×Same coallition	-.095	-.014***	.352***	1.174***	.545***	.782***
	(.072)	(.006)	(.060)	(.137)	(.075)	(.087)
3G×Vote Share×Different coallition	-.058	-.013**	.287***	.965***	.409***	.627***
	(.055)	(.005)	(.057)	(.130)	(.072)	(.084)
Observations	412,131	412,131	203,069	203,069	203,069	203,069

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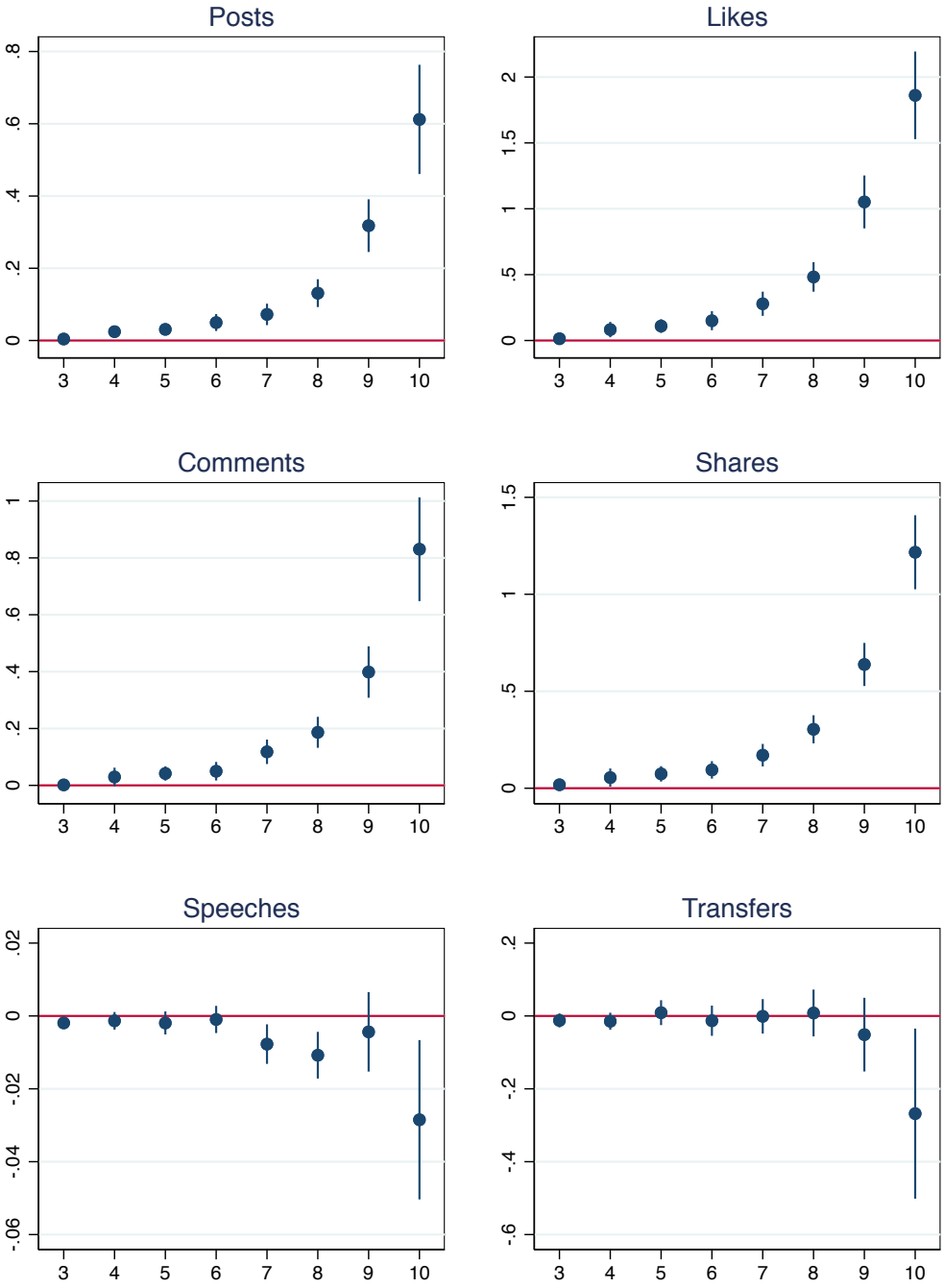
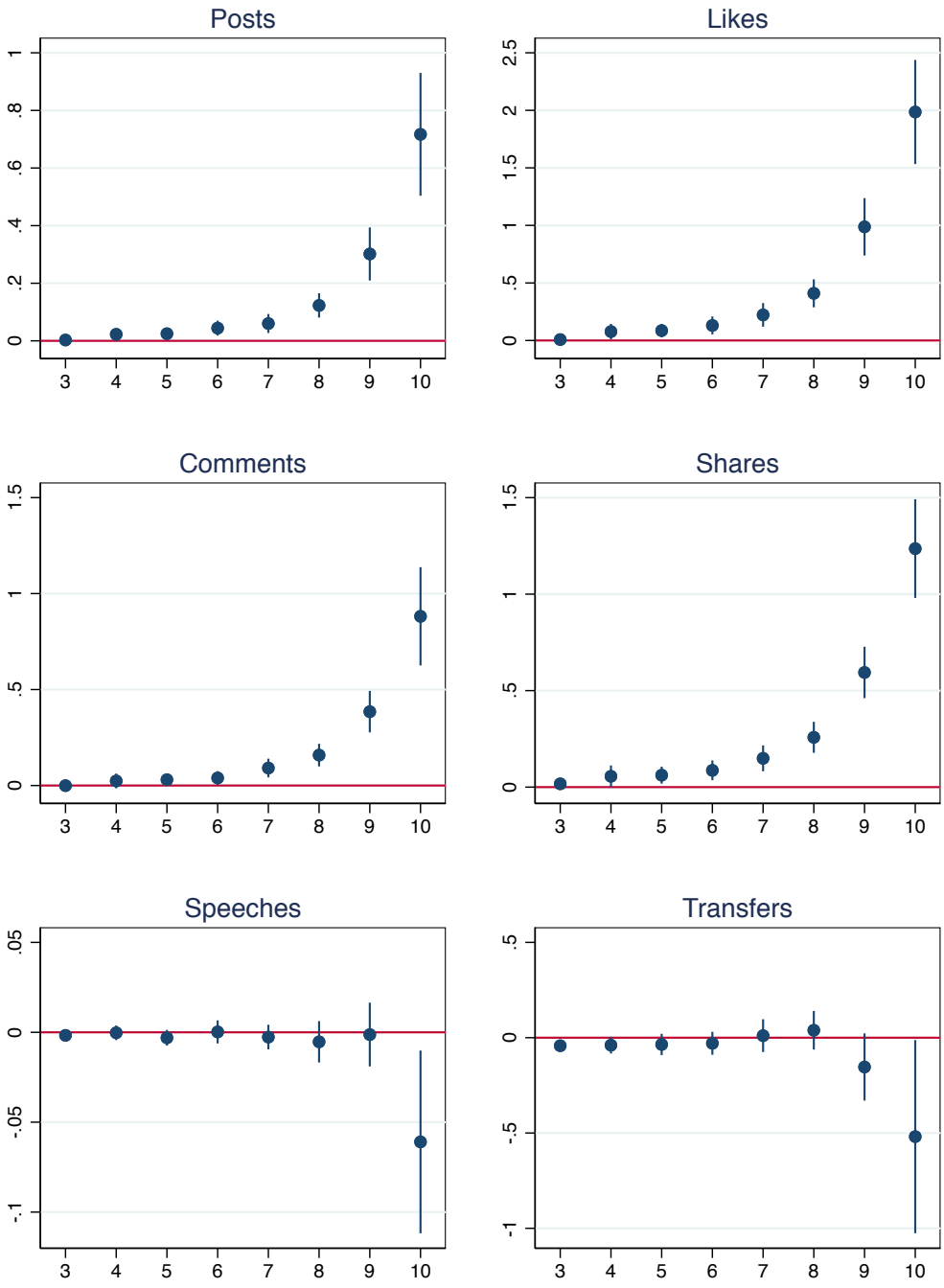
Figure 4: Effect of 3g entry on online and offline behaviour



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction below (blue) and above median population (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects, and observations are weighted by the population of the municipality. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 5: Effect of 3g entry on online and offline behaviour

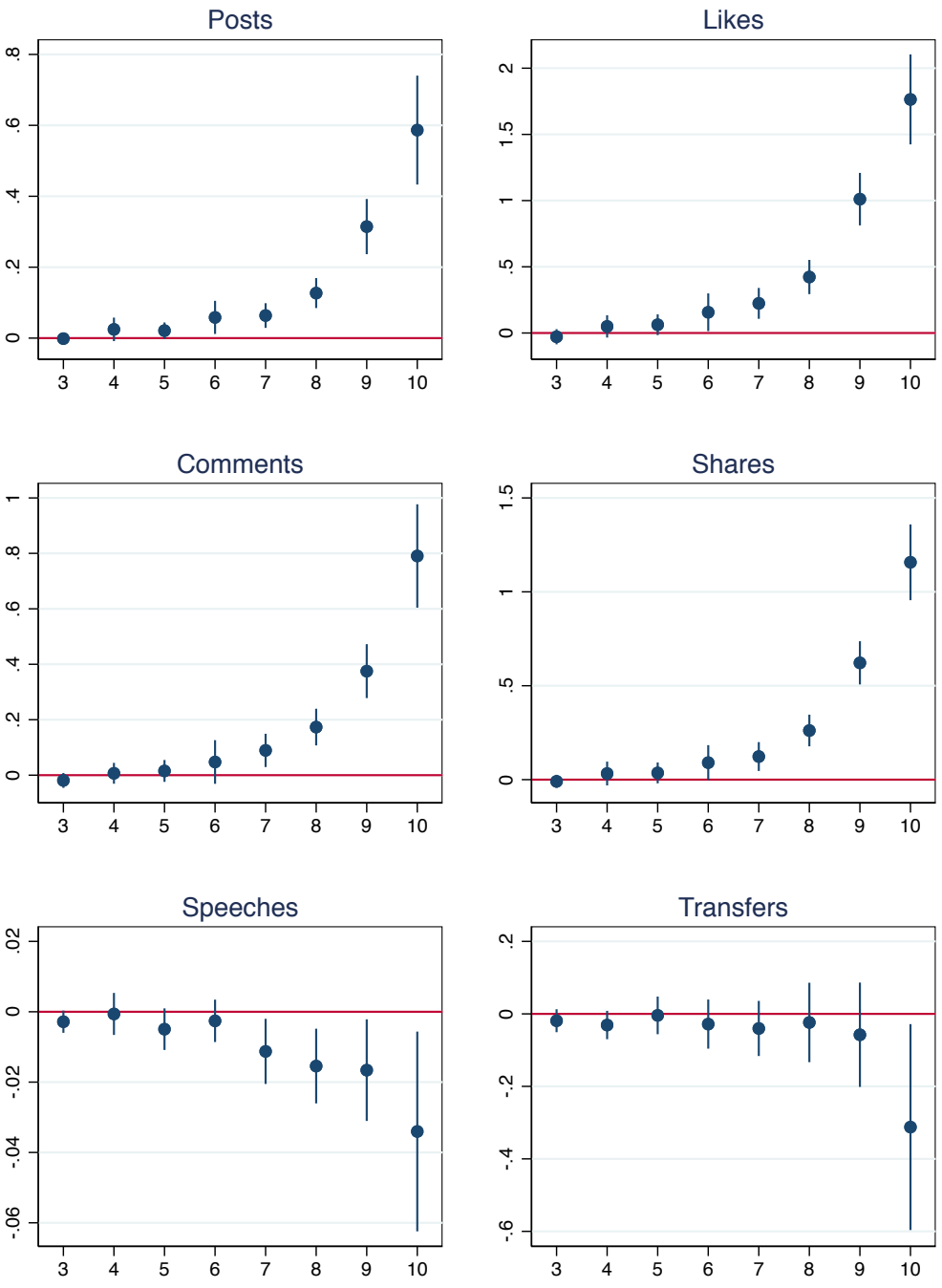
Municipality-politician level regressions, panel only with politicians who opened their Facebook profile during or prior to 2011



Notes: Panel regressions at the municipality-politician by year levels, only with politicians who opened their Facebook profiles during or prior to 2011. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction below (blue) and above median population (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects, and observations are weighted by the population of the municipality. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 6: Effect of 3g entry on online and offline behaviour

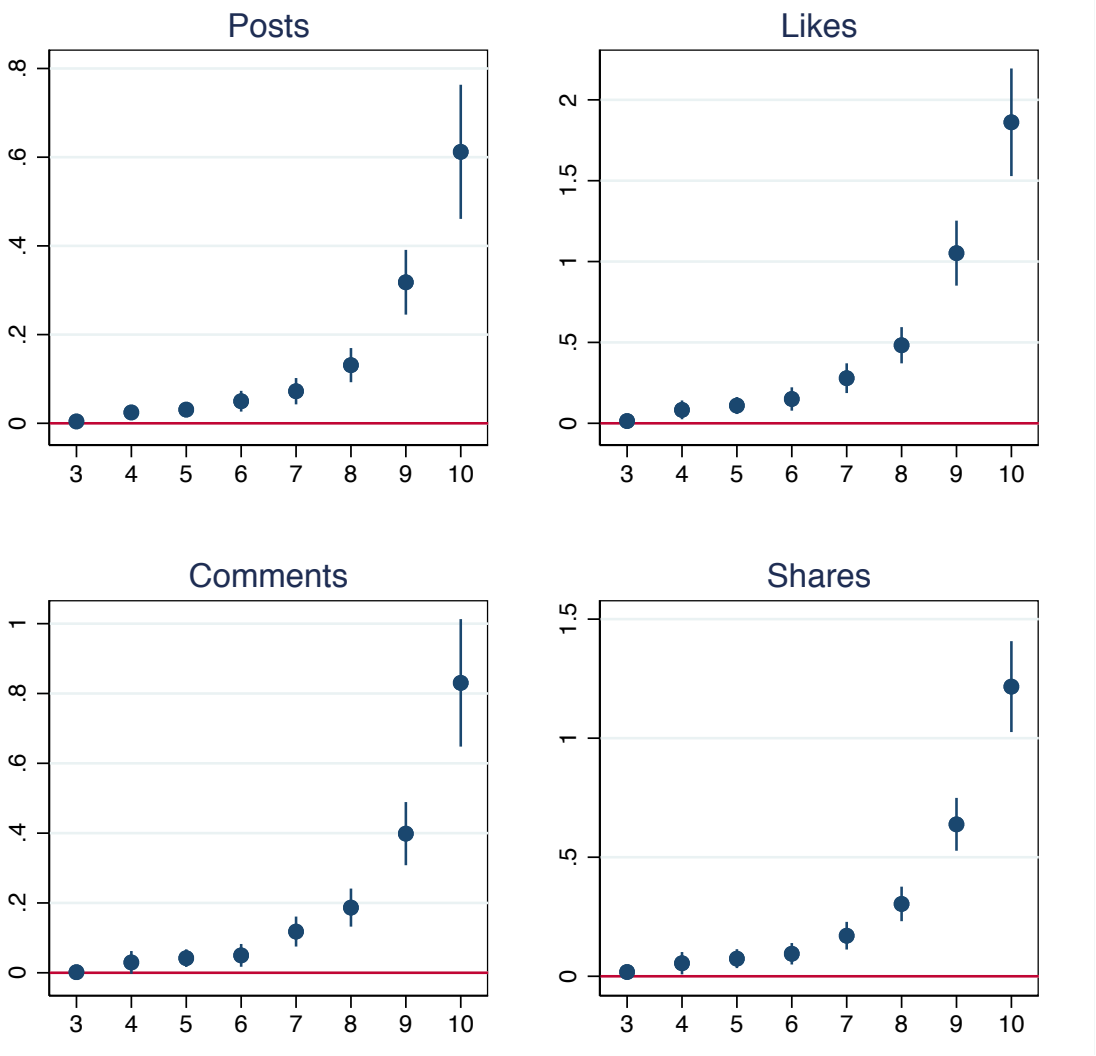
Municipality-politician level regressions, weighted by population



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction below (blue) and above median population (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects, and observations are weighted by the population of the municipality. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 7: Effect of 3g entry on online behaviour

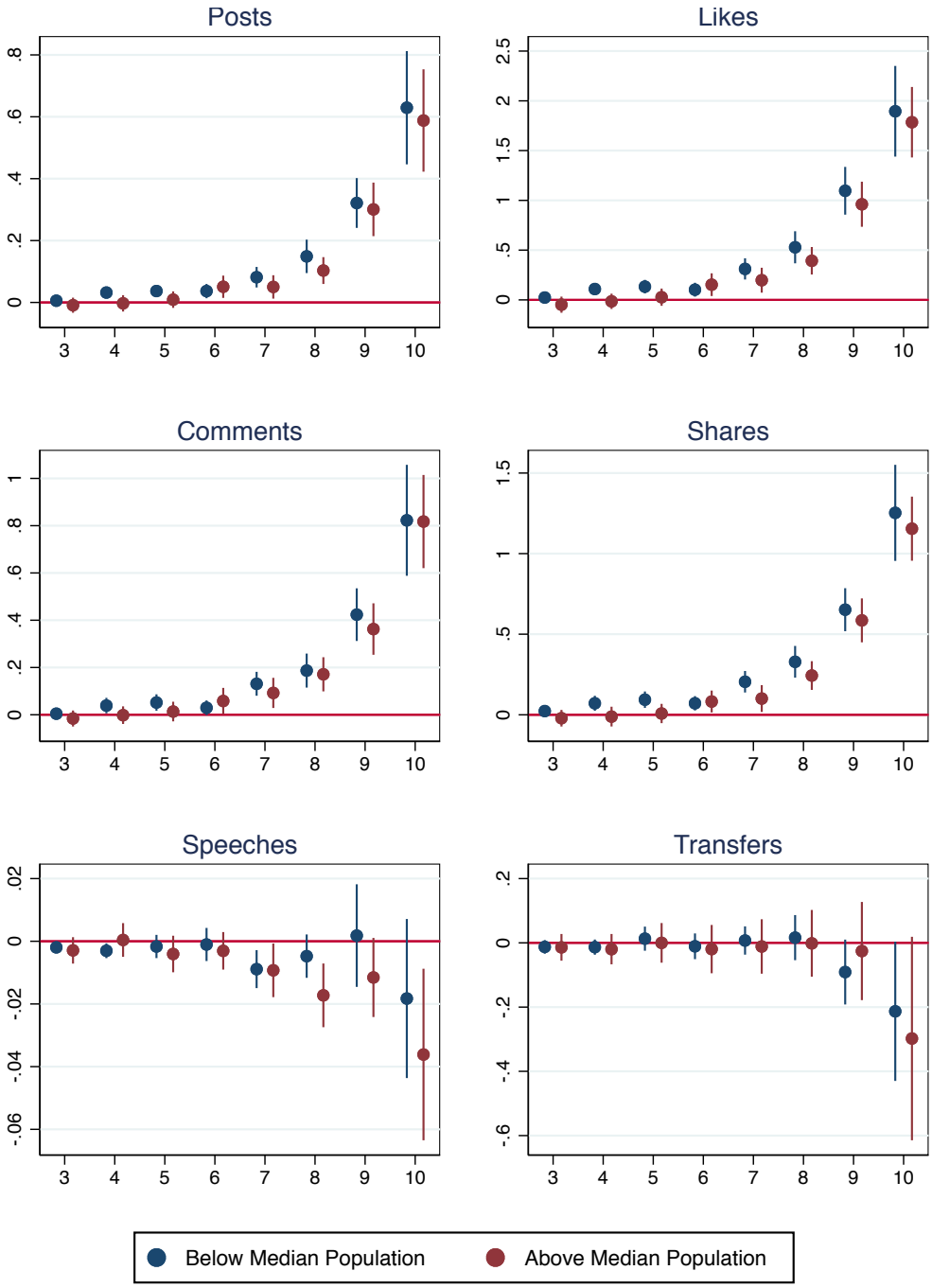
Municipality-politician level regressions, setting Facebook activity to zero if profile was not open



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. Two-way clustered standard errors at the municipality and politician levels.

Figure 8: Effect of 3g entry on online and offline behaviour

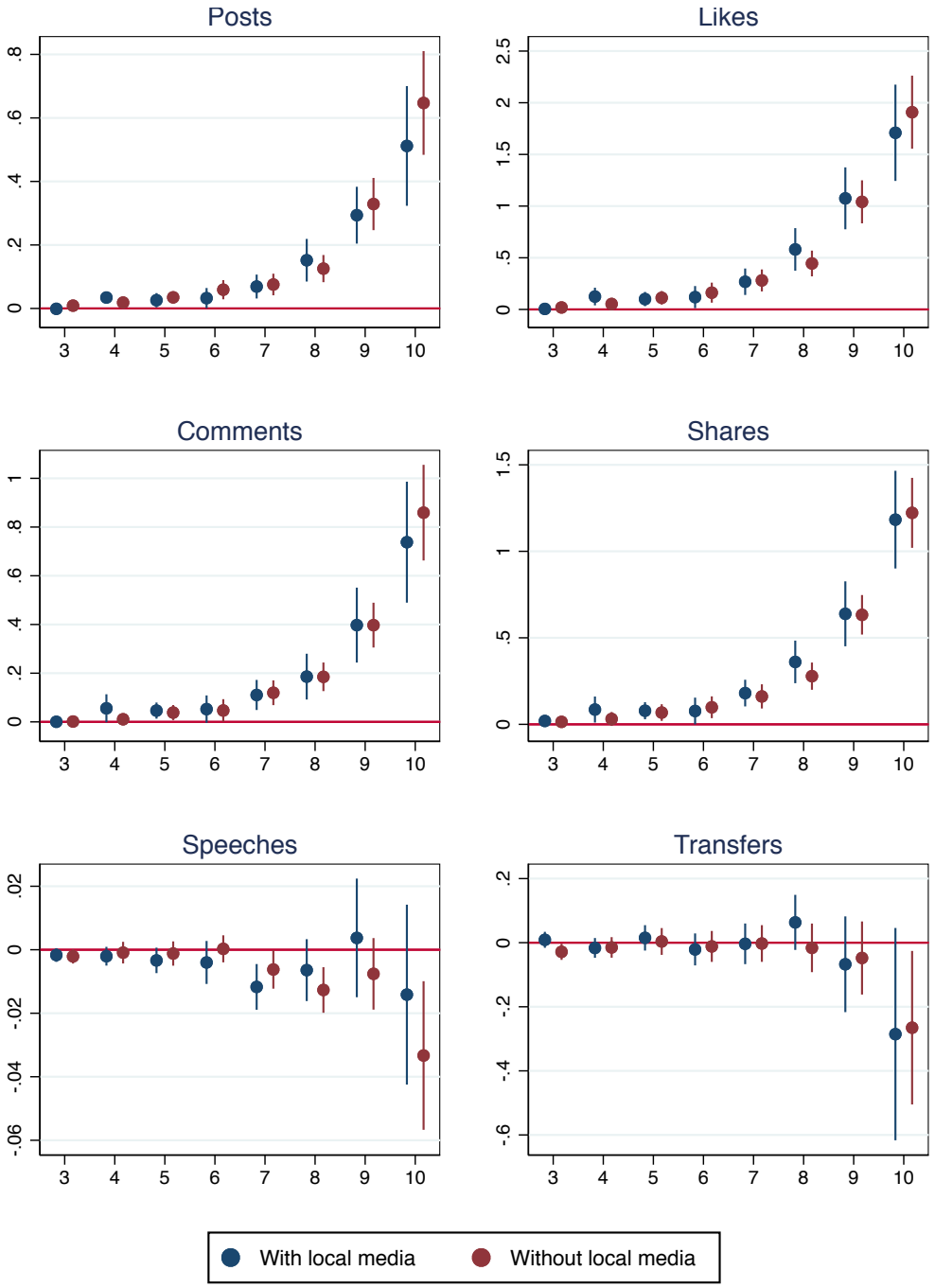
Municipality-politician level regressions, heterogeneous effects by population



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction below (blue) and above median population (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 9: Effect of 3g entry on online and offline behaviour

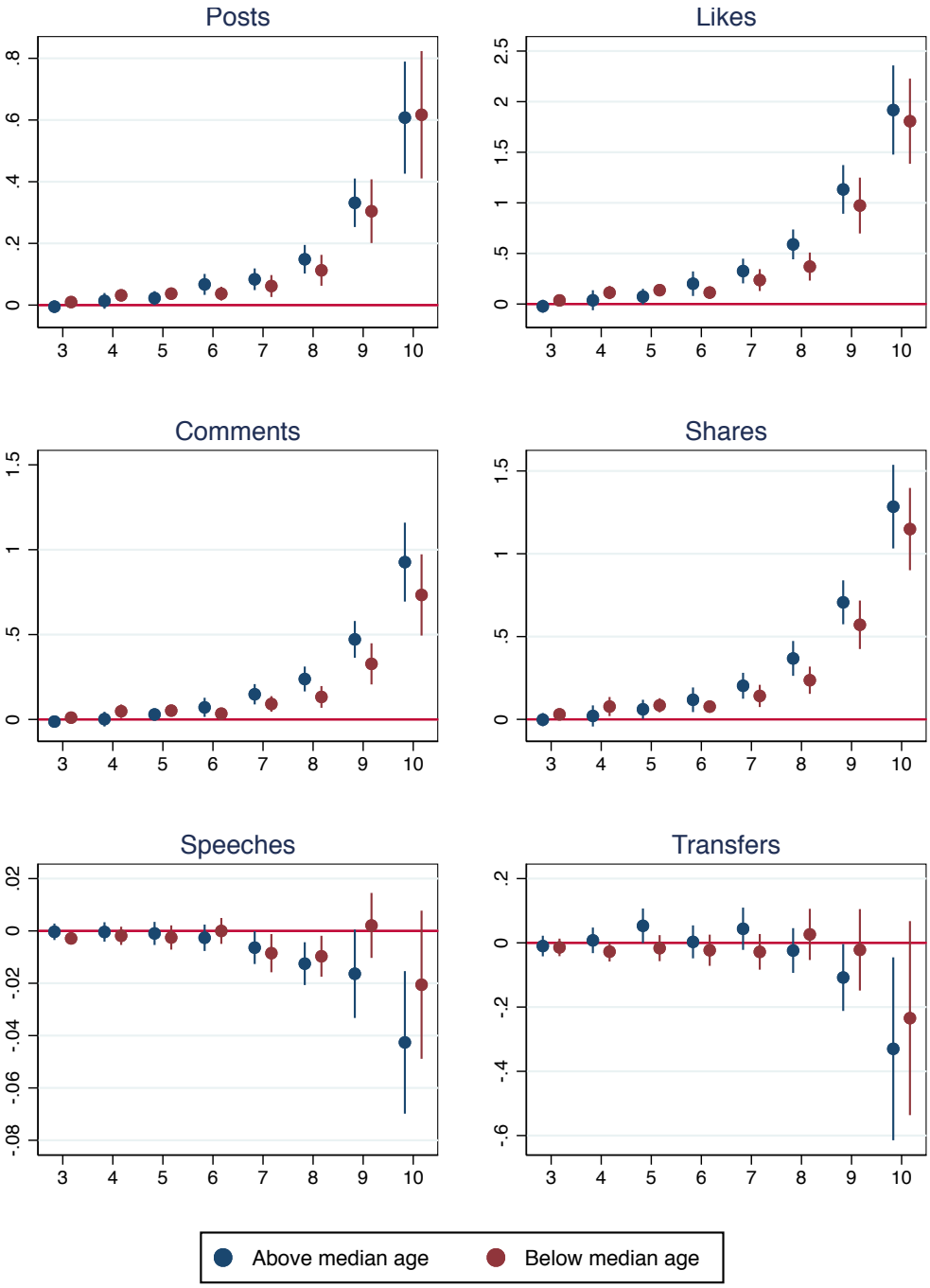
Municipality-politician level regressions, heterogeneous effects by presence of local media



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction with (blue) and without presence local media (red), and the corresponding 95% confidence interval. Presence of local media is defined as municipality having AM, FM or community radio, or TV station. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 10: Effect of 3g entry on online and offline behaviour

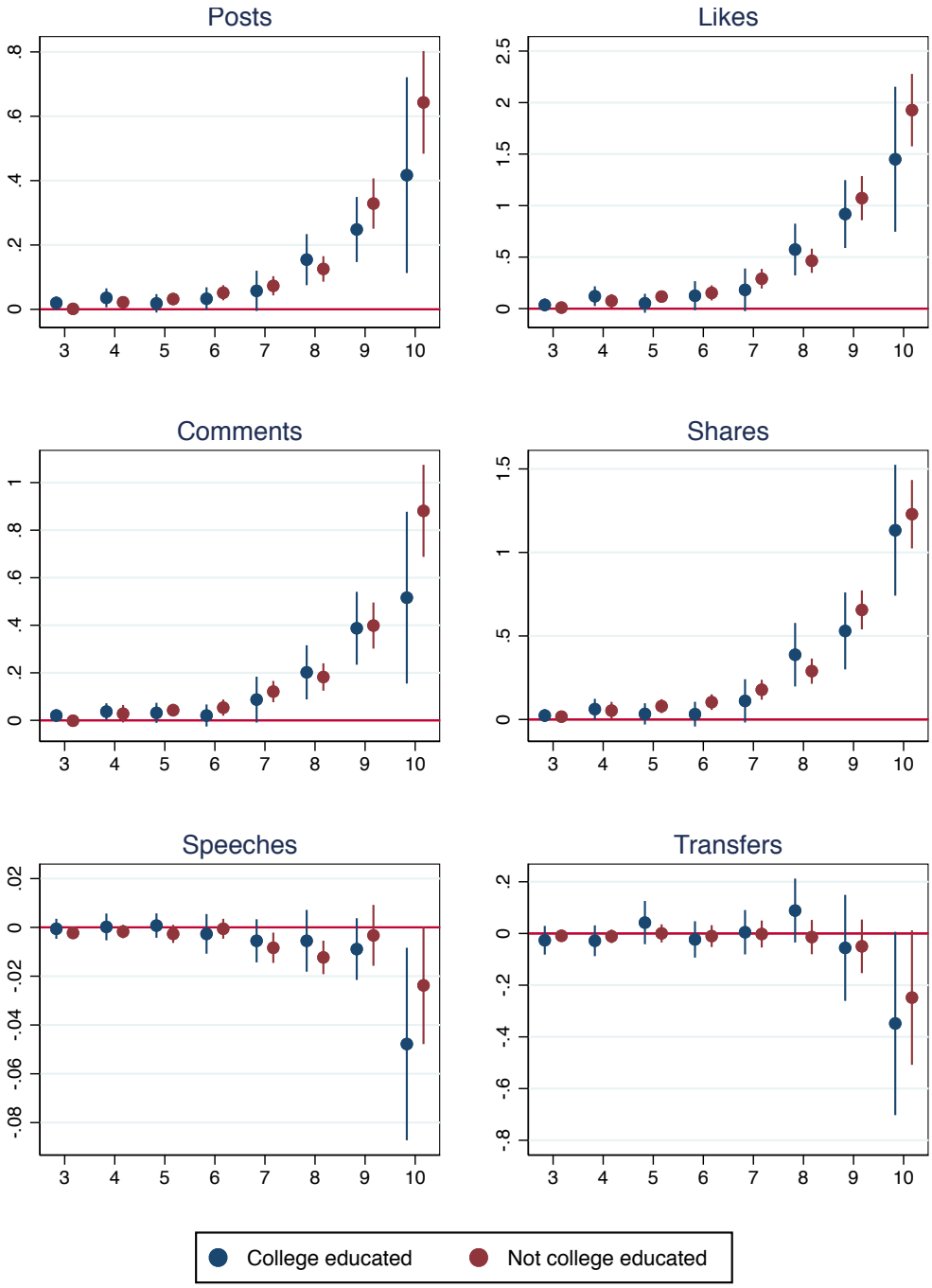
Municipality-politician level regressions, heterogeneous effects by politicians' age



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction above (blue) and below median politicians' age (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 11: Effect of 3g entry on online and offline behaviour

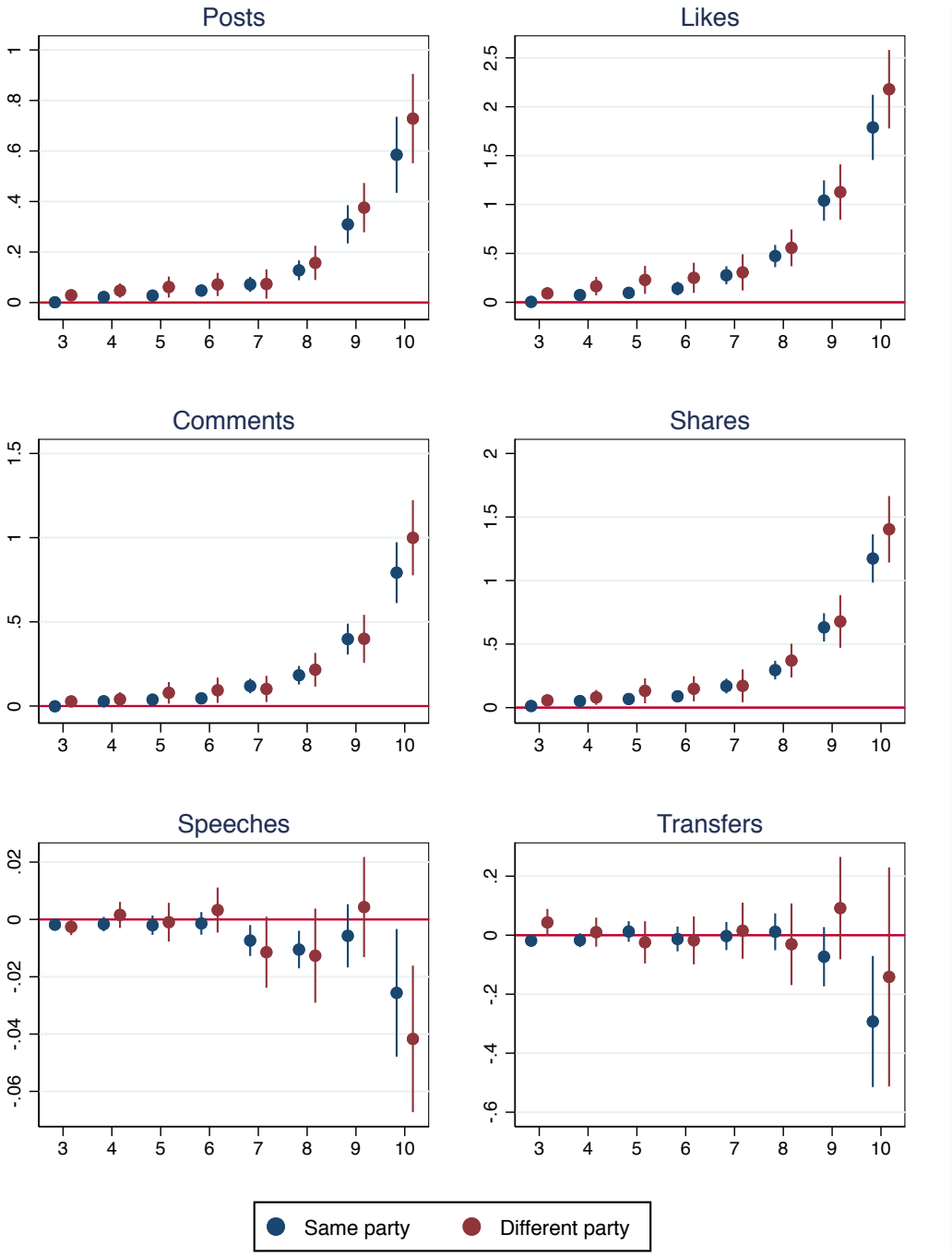
Municipality-politician level regressions, heterogeneous effects by politicians' education



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction with (blue) and without college education (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 12: Effect of 3g entry on online and offline behaviour

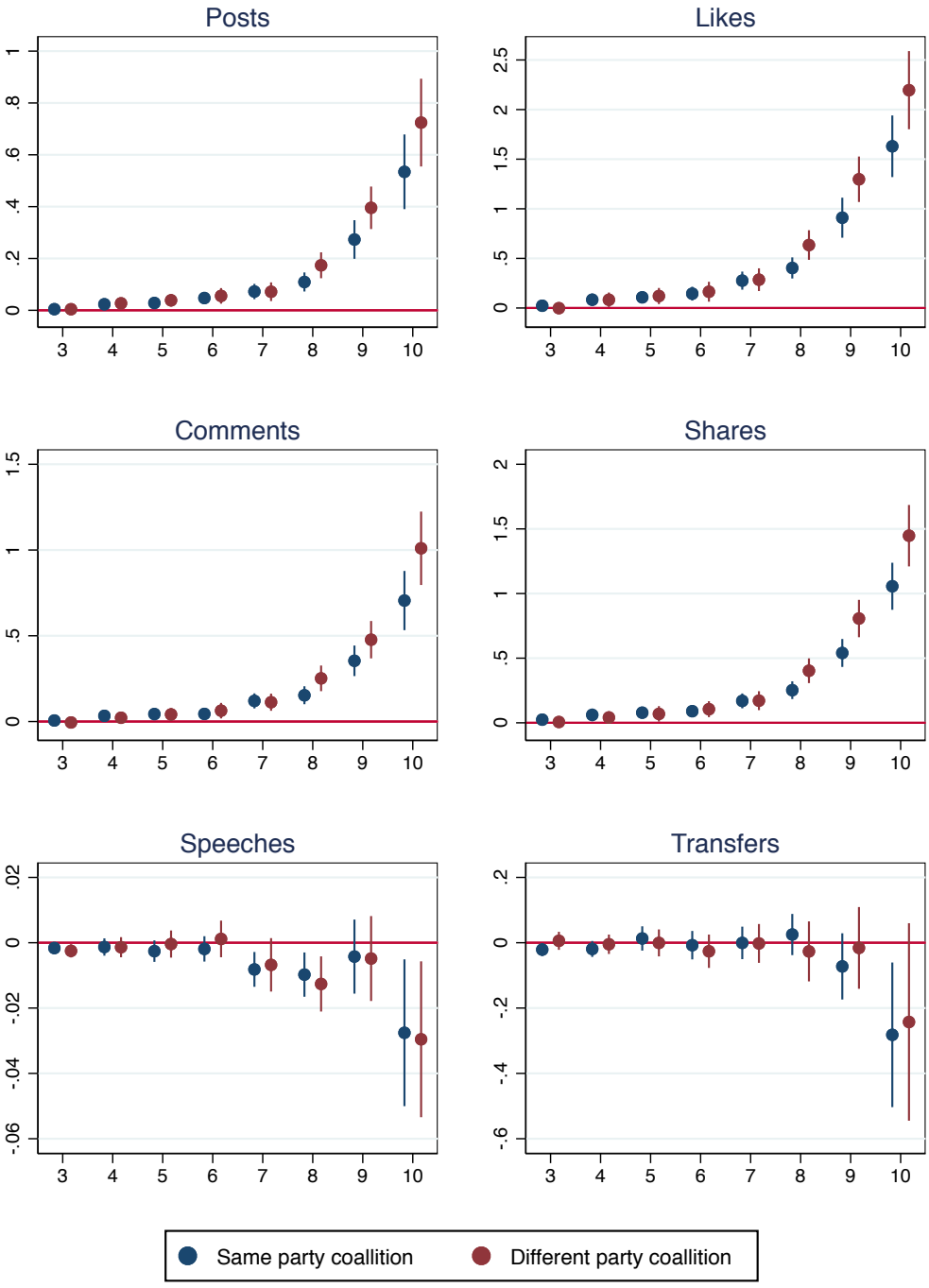
Municipality-politician level regressions, heterogeneous effects for party similarity between Congressman and mayor



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction if Congressman and mayor are affiliated to the same party (blue) and if they are not (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 13: Effect of 3g entry on online and offline behaviour

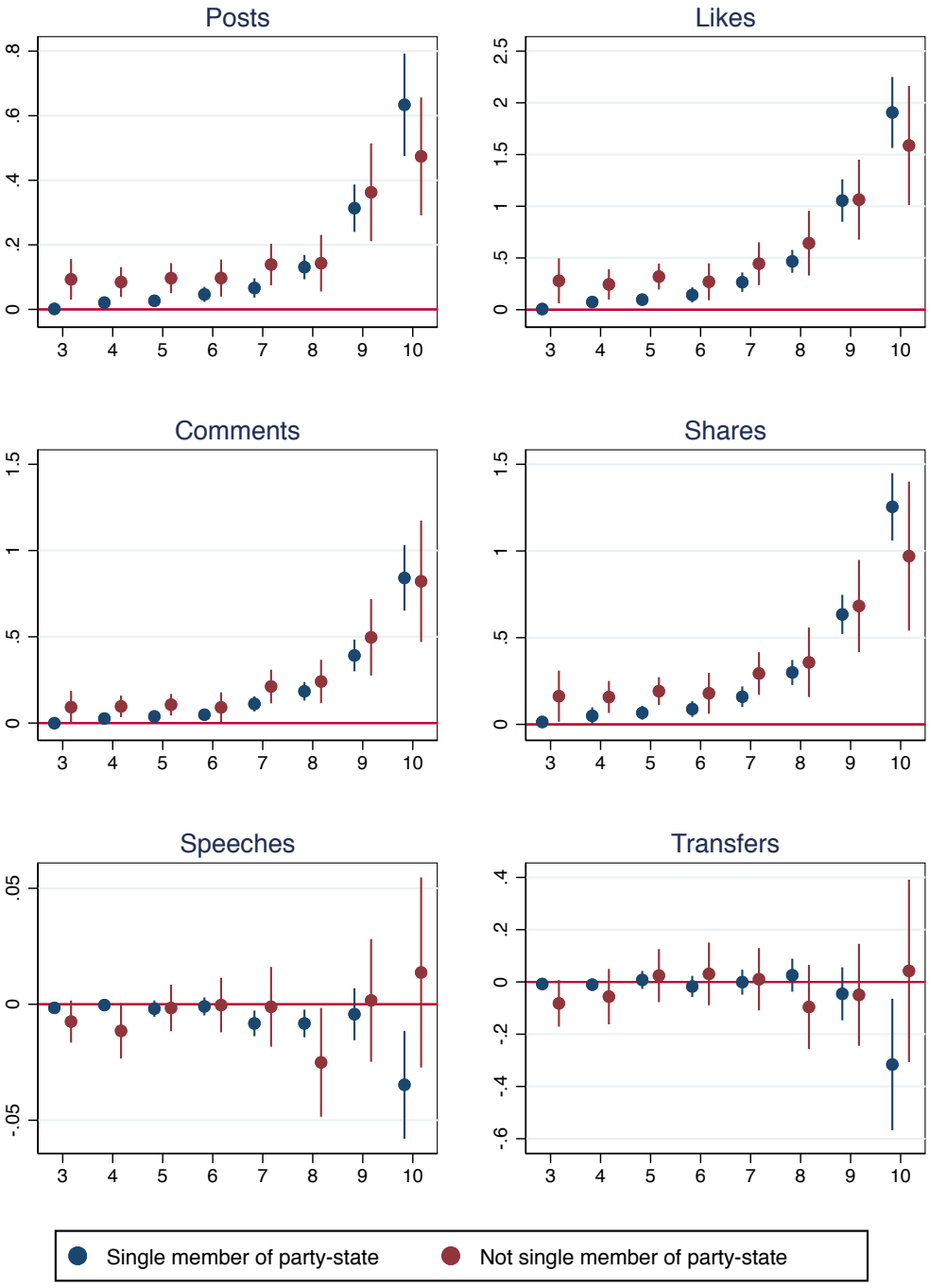
Municipality-politician level regressions, heterogeneous effects for party coallition similarity between Congressman and mayor



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction if Congressman and mayor are affiliated to the same coallition of parties (blue) and if they are not (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 14: Effect of 3g entry on online and offline behaviour

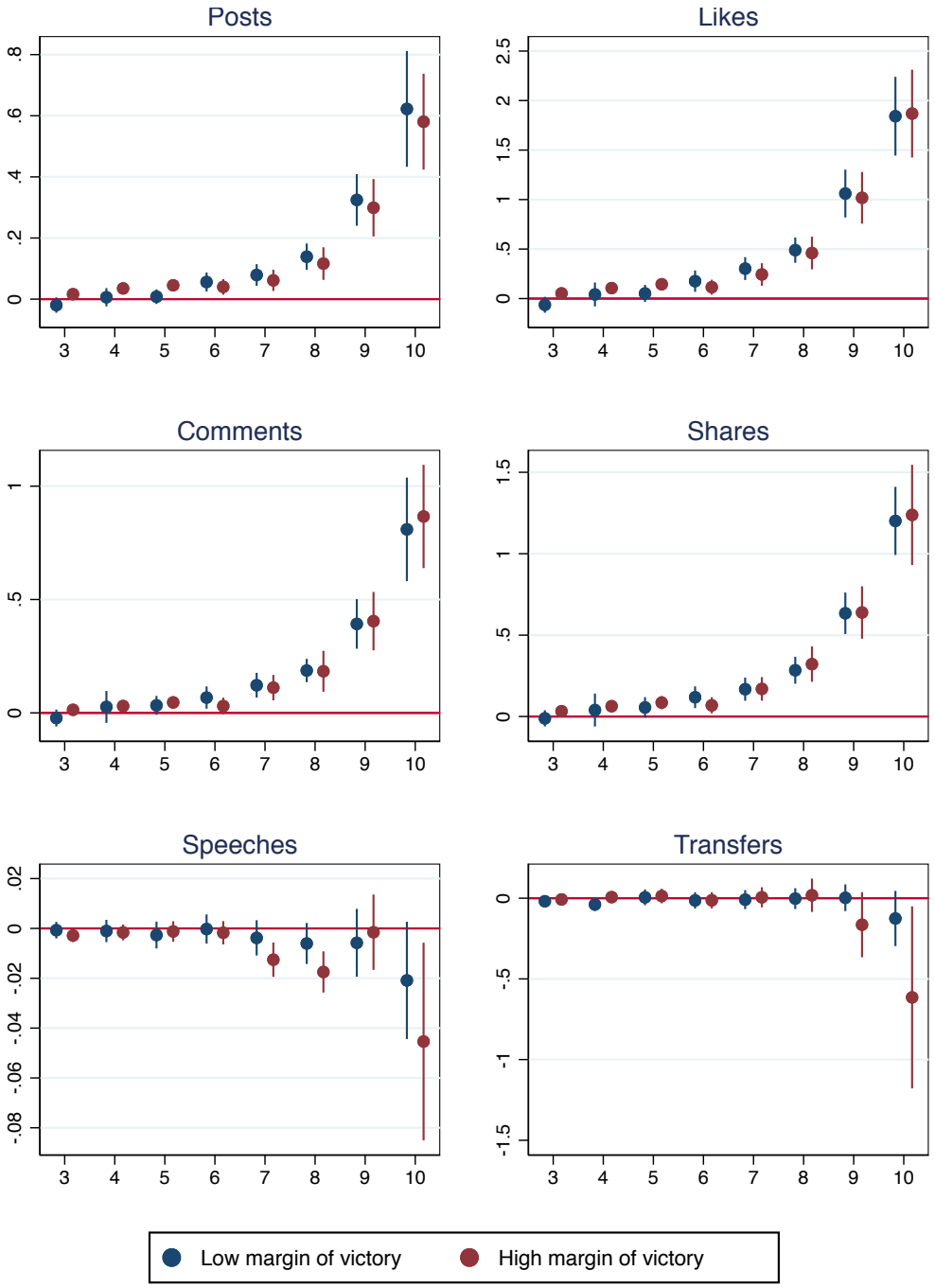
Municipality-politician level regressions, heterogeneous effects if politician is single member of party-state



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction if Congressman is single member of party-state (blue) and if he or she is not (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 15: Effect of 3g entry on online and offline behaviour

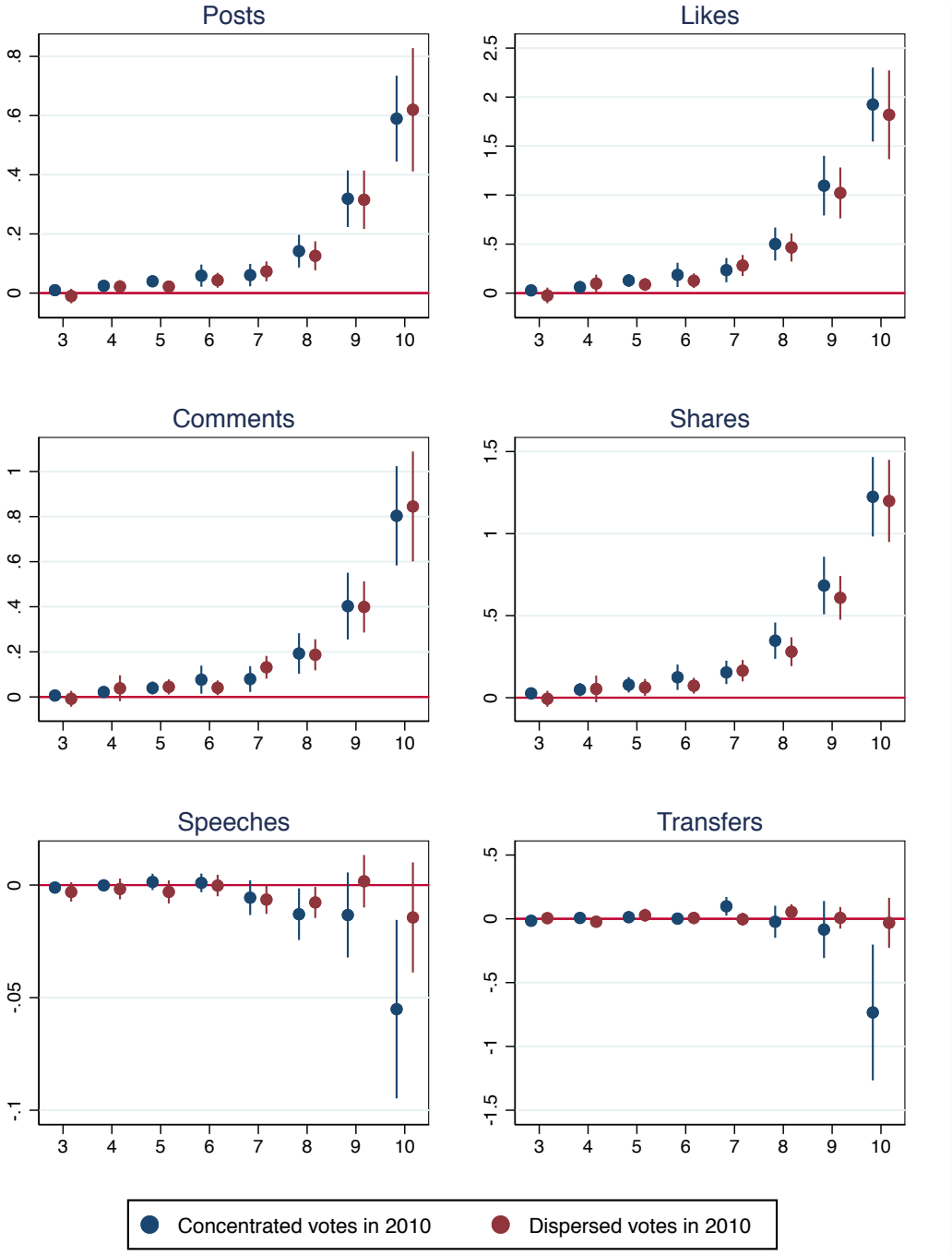
Municipality-politician level regressions, heterogeneous effects by margin of victory



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction if Congressman won by below (blue) or above (red) median margin of victory, and the corresponding 95% confidence interval. Margin of victory are defined as the politicians' total number of votes divided by the electoral coefficient in their states of origin. The electoral coefficient is the number of votes required to obtain a seat in Congress. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 16: Effect of 3g entry on online and offline behaviour

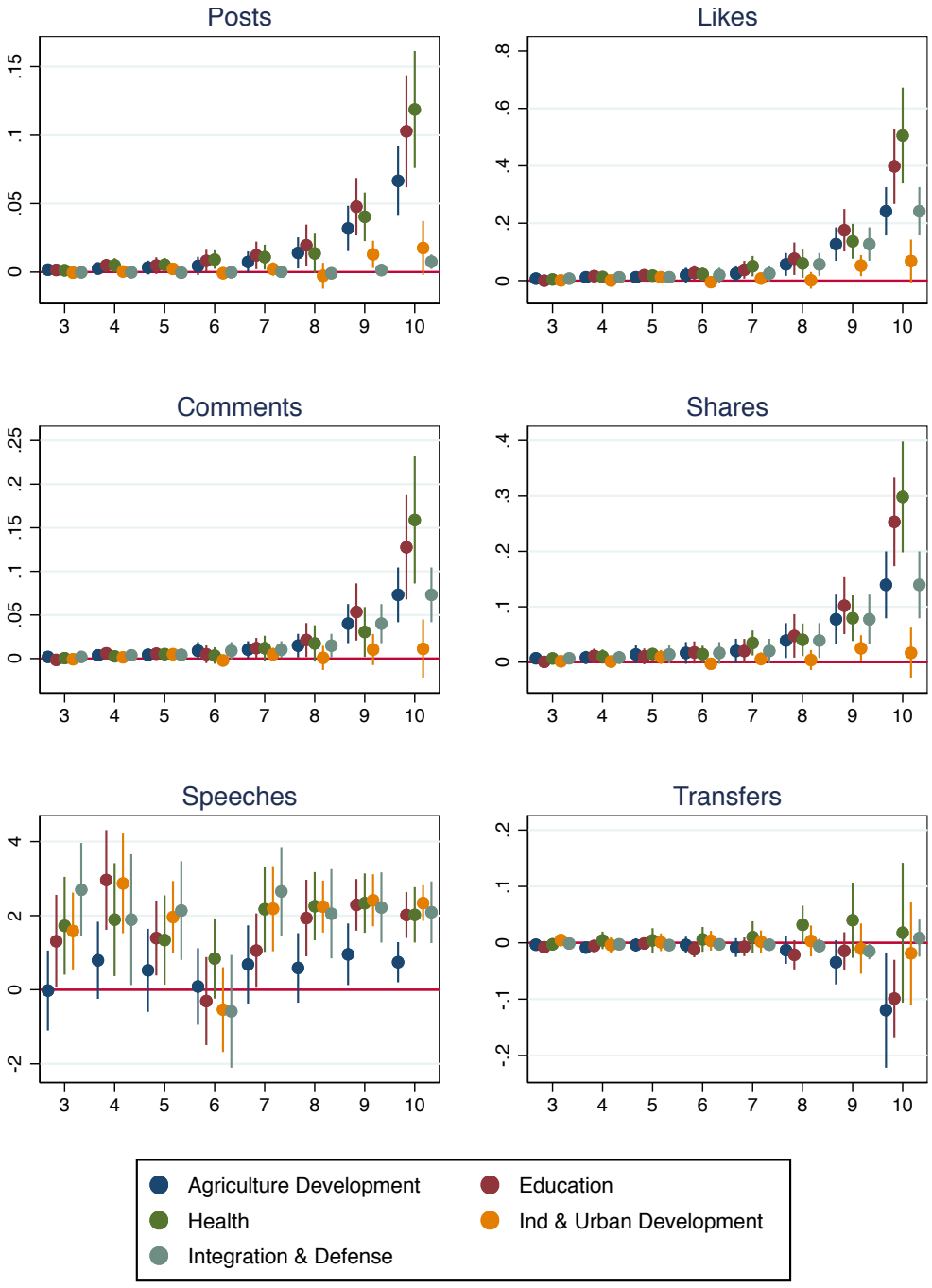
Municipality-politician level regressions, heterogeneous effects for politicians with concentrated and dispersed voting patterns in the 2010 elections



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients of the interaction if politician got elected with has concentrated votes in few municipalities (blue) versus dispersed among many municipalities (red), and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 17: Effect of 3g entry on online and offline behaviour

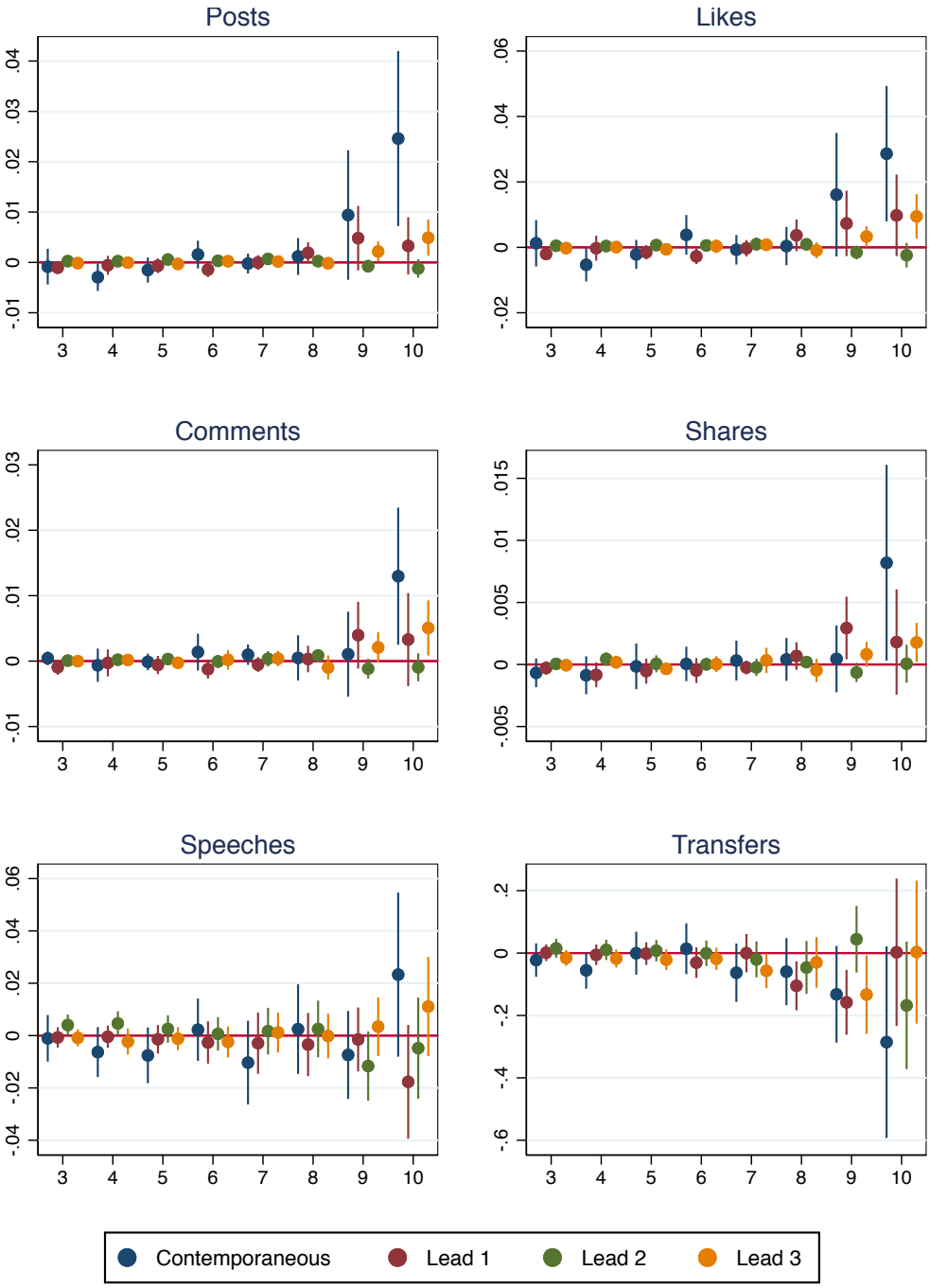
Municipality-politician level regressions, by main topics



Notes: Panel regressions at the municipality-politician by year levels. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. Regressions for each of the five most common topics. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. Two-way clustered standard errors at the municipality and politician levels.

Figure 18: Effect of 3g entry on online and offline behaviour

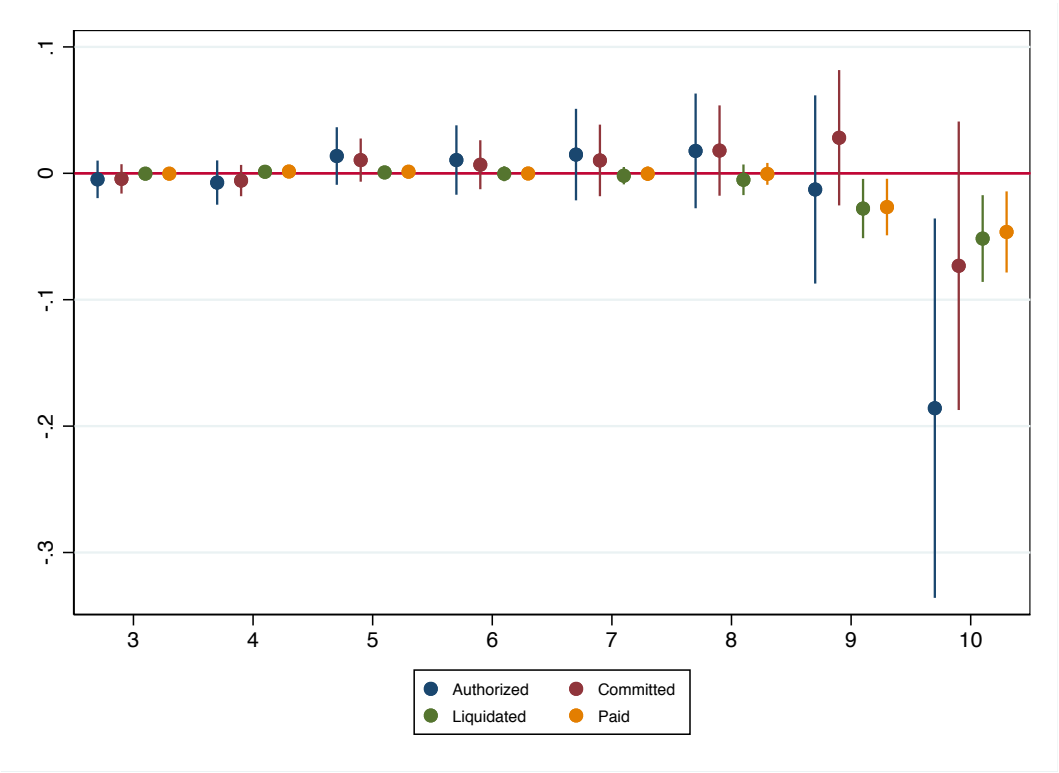
Municipality-politician level regressions, contemporaneous and leads effects



Notes: Panel regressions at the municipality-politician by year levels between 2006 and 2014, only for the politicians that were reelected in the 2010 elections. In the top-left figure, the dependent variables is the inverse haversine transformation (IHS) of the number of politicians' posts mentioning a municipality in a given year, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. Regressions include contemporaneous and three leads of the 3g introduction. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The figures labelled as "likes", "comments", and "shares" use the IHS transformation of the number of likes, comments and shares that those posts obtained. "Speeches" refers to the IHS transformation of the number of politicians' speeches in Congress mentioning a municipality in a given year. Finally, "transfers" refers to the IHS transformation of the value of the earmarked transfers proposed by the politicians. Transfers in Brazilian Reais. The p-values of joint significance of the lead effects across all deciles / only 9th and 10th deciles are: Posts, .120/.156; Likes, .243/.136; Comments, .174/.180; Shares, .311/.296; Speeches, .265/136; Transfers, .011/.007. Two-way clustered standard errors at the municipality and politician levels.

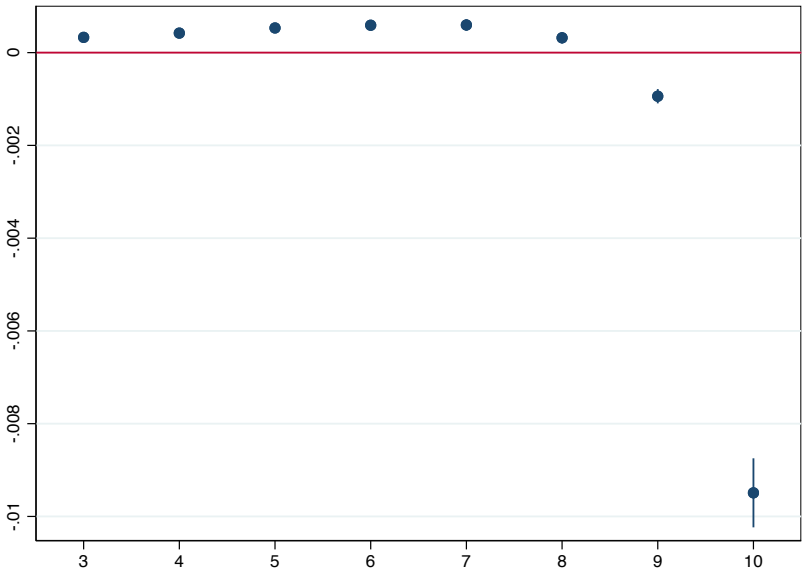
Figure 20: Transfers through various stages of approval process, and public goods

Municipality-politician level regressions



Notes: Panel regressions at the municipality-politician by year levels. Dependent variable is the inverse haversine transformation (IHS) of transfers through the authorization, co mmission, liquidation and payment process, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. Transfers in Brazilian Reais. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. Two-way clustered standard errors at the municipality and politician levels.

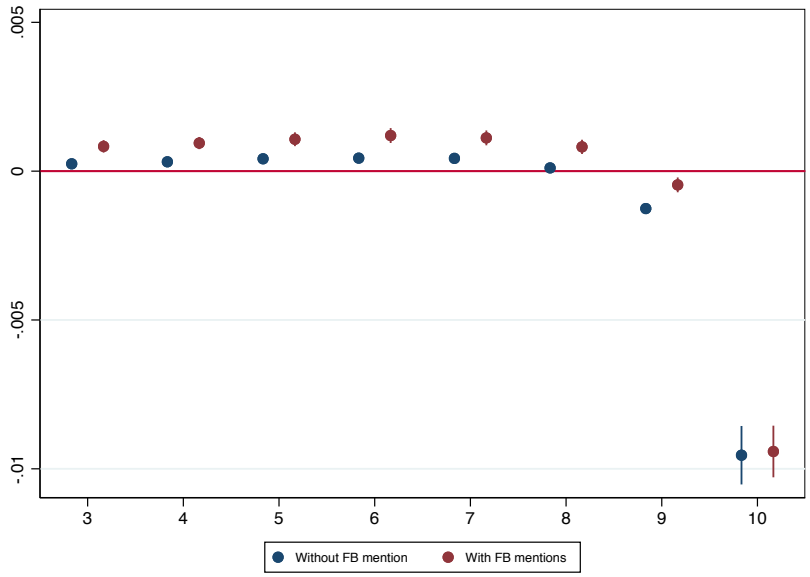
Figure 21: Effect of 3g on electoral outcomes in 2014



Notes: Panel regressions at the municipality-politician, with outcomes as the share of votes that candidates obtained in the 2010 and 2014 elections, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections. The figure plots the coefficients and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. Two-way clustered standard errors at the municipality and politician levels.

Figure 22: Effect of 3g on electoral outcomes in 2014

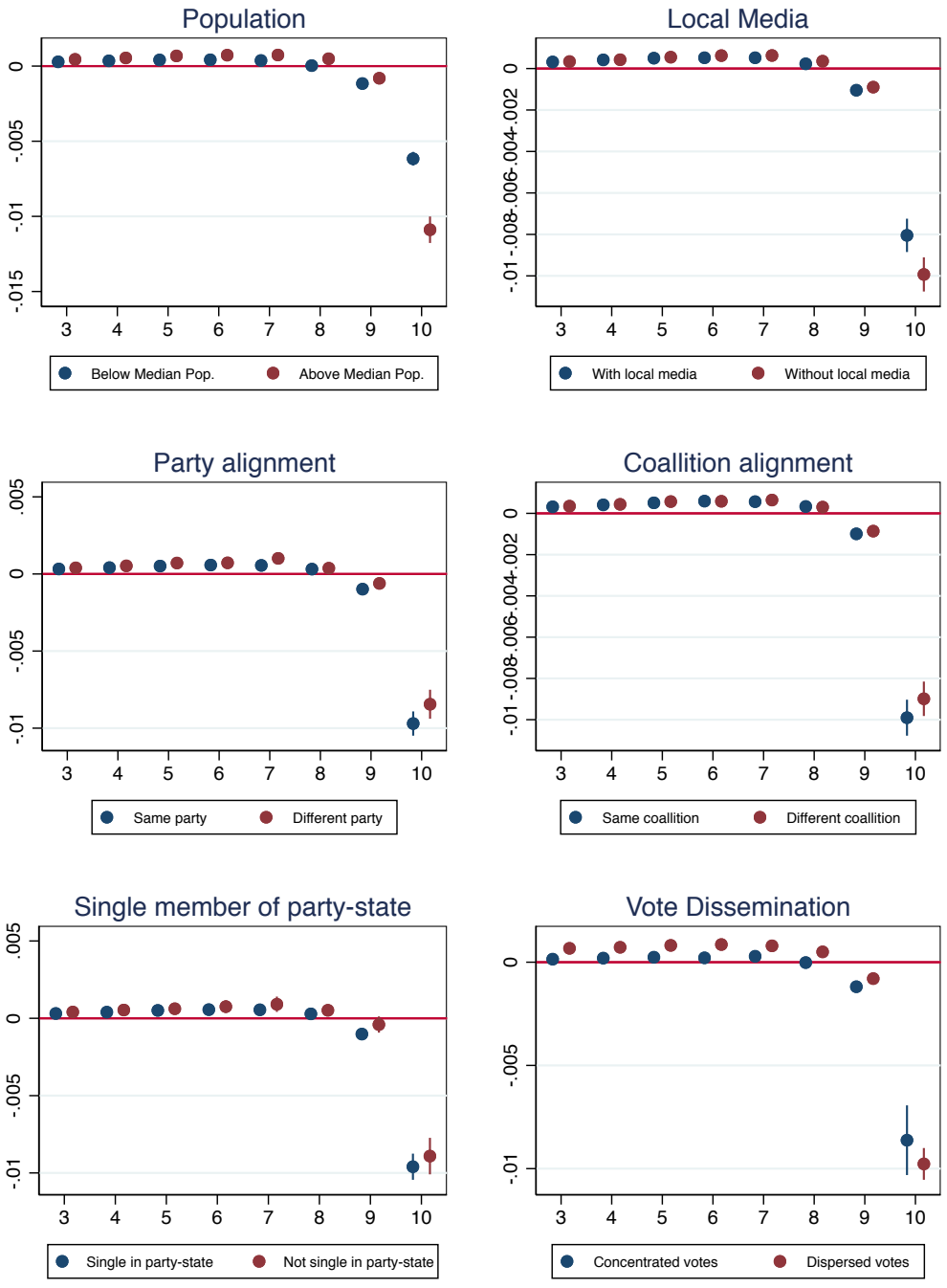
Interacted with Facebook use during the 2014 elections



Notes: Panel regressions at the municipality-politician, with outcomes as the share of votes that candidates obtained in the 2014 elections, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections, and use of Facebook during the 2014 campaign. The figure plots the coefficients and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. The null hypothesis that the sum of the coefficients is equal to zero is rejected at 1% level. Two-way clustered standard errors at the municipality and politician levels.

Figure 23: Effect of 3g on electoral outcomes in 2014

Other heterogeneities



Notes: Panel regressions at the municipality-politician, with outcomes as the share of votes that candidates obtained in the 2010 and 2014 elections, explained by presence of 3G dummy variable interacted with the importance of the municipality for the politician (vote shares decile) in the 2010 elections, and heterogeneous effects. The figure plots the coefficients and the corresponding 95% confidence interval. All specifications includes municipality-time, municipality-politician and politician-time fixed effects. Two-way clustered standard errors at the municipality and politician levels.

A Appendix: Tables and Figures

Table 8: Politician-level regressions

	(i) FB Open	(ii) Posts	(iii) Likes	(iv) Shares	(v) Comments	(vi) Speeches	(vii) Transfers
Panel A. Extensive margin, binary dependent variable							
Vote share with 3G	.576*	.473	.431	.328	.340	.326	.075
	(.333)	(.341)	(.345)	(.352)	(.351)	(.264)	(.261)
Mean of dep. var.	.641	.628	.627	.620	.616	.815	.808
Panel B. Intensive and extensive margins, IHS of dependent variable							
Vote share with 3G	–	.708	-.819	-1.481	-1.253	.452	1.720
	–	(1.680)	(2.590)	(2.273)	(1.977)	(.813)	(4.021)
Mean of dep. var.	–	109.9	11.67k	4.61k	1.04k	24.68	R$ 5.67m
Observations	1,329	1,329	1,329	1,329	1,329	1,329	1,329

Notes: Panel regressions at the politician by year levels, explained by the share of municipalities with 3G weighted by the politicians' vote share, with municipality and state-year fixed effects. In Panel A, dependent variable is binary. In column *(i)*, it is equal to one if the politician had an active Facebook profile, defined by having posted at least once in the year. In column *(ii)* it is equal to one if a given municipality was cited at least once in Facebook in a given year. Dependent variables in columns *(iii)*, *(iv)* and *(v)* are equal to one if those posts obtained at least one like, share or comment, respectively. Dependent variable in column *(vi)* is equal to one if the municipality was cited at least once on Congressional speeches. Column *(vii)* is equal to one the given municipality was targeted by transfers, and zero otherwise. "Mean of dep. var." refers to the mean of the dependent variable, averaged across the 2011-2014 period. In Panel B, dependent variables are the inverse haversine transformation of the number of earmarked transfers proposed to the municipality in a given year, speeches delivered in the Congress and Facebook posts that mentioned the municipality, likes, shares and comments that those posts obtained. "Mean of dep. var." refers to the raw numbers, without the inverse haversine transformation, and averaged across the 2011-2014 period. Transfers in Brazilian Reais. Clustered standard errors at the municipality level.

B Appendix: Algorithm to detect citations to municipalities in posts

The algorithm works following the steps:

1. Find municipalities names contained in the post string

Example: "Congresswoman Iara Bernardi (PT) meets the mayors of Capela do Alto, Iperó, Cedral, Cunha and Arocoiaba da Serra to assess the impact of the mining industry in Ipanema National Forest." Matched municipalities: Capela (SE), Capela (AL), Capela do Alto (SP), Iperó (SP), Cedral (MA), Cedral (SP), Cunha (SP), Arocoiaba da Serra (SP), Ipanema (MG).

2. Disconsider strings contained in longer strings which were also previously matched;

Drop matches: Capela (SE), Capela (AL).

3. Duplicate names are kept only if cities belong to the Congressman's state of origin.

Drop matches: Iara Bernardi was elected in São Paulo (SP), so drop Cedral (MA).

4. Citations to dubious names are kept if immediately preceded by term indicating a municipality

Example: "Congresswoman Iara Bernardi (PT) meets the mayors of Capela do Alto, Iperó, Cedral, Cunha and Arocoiaba da Serra to assess the impact of the mining industry in Ipanema National Forest." "Cunha" and "Ipanema" were classified as dubious names. The list in which "Cunha" is contained is preceded by "mayors of", which is not true for "Ipanema". Final matched municipalities: Capela do Alto (SP), Iperó (SP), Cedral (SP), Cunha (SP), Arocoiaba da Serra (SP).

On a sampled evaluation of the performance of the algorithm on 250 posts, 89.09% of the true mentions were identified, and only 2.00% of the posts contained one or more false matches.

Table 9: Performance of the matching algorithm

Number of true mentions in post	Frequency	Correctly classified true mentions	Posts with false matches
0	62.80%	–	1.91%
1	28.40%	87.32%	2.82%
2	6.40%	86.67%	0.00%
3	1.60%	91.67%	0.00%
4 or more	0.80%	92.31%	0.00%
any	100.00%	88.89%	0.00%