Internet Access, Campaign Spending, and Election Outcomes: Evidence from Peruvian Municipal Elections

Author: Bruno Beleván Gamarra Advisors: Claudio Ferraz and Nicole Fortin

Introduction/Motivation

Past Research:

• Internet: Mixed Findings – higher access to internet encourages/discourages participation and election turnovers (Falck et al., 2014; Gavazza et al., 2018; Poy & Schuller, 2020)

• Campaign Spending: Marginal gains on expenditures always positive for candidates (Jacobson, 1978; Stratmann & Francisco, 2006; Milligan & Rekkas, 2008; Avis et al., 2020)

Peru:

• Annual 17.6% internet penetration increase from 2007 to 2017 (INEI, 2018)

• 2015 New District Level Policy

  o Report Spending and Contributions mandatory starting in 2018

  o Improve access to elections data for all Peruvian citizens

• Multiparty System – 157 Political Parties in 2018

Research Questions:

(1) Does higher internet access lead to higher competitive municipal elections?

(2) Do more competitive municipal elections caused by higher internet access diminish the effects of campaign spending on vote share?

Dataset

Novel panel dataset on Peruvian municipal/district elections from 2010-2018.

• Municipality election data from **Observatory for Governability** (2002; 2006; 2010; 2014; 2018)

• Spending and contributions at the candidate level from **Claridad** (2018)

• District-level Census data from **INEI** (2007; 2017)

• District geographical features from **MINSA** (2021)

• Base Transceiver Stations data from **OSIPTEL** (2010; 2014; 2018)

Table I - Descriptive Statistics: Candidate Level (2018) - Mean

	Low Internet	High Internet
Percentage of Votes	18.2%	11.9%
Age	45.1	47.8
Contributions	9,950	18,578
Spending	9,412	17,267
Contributions per Voter	3.66	1.50
Spending per Voter	3.52	1.42
N	5,808	3,248

Notes: High internet: districts with more than 5% of households with access to internet (above mean).

Table II - Descriptive Statistics: District Level - Mean

	Low Internet		High Internet	
	2010	2018	2010	2018
Panel A: Voters				
Participation Rate	85.9%	78.0%	87.6%	82.4%
Percentage of Voters < 29	30.3%	28.1%	31.8%	28.1%
Percentage of Voters > 70	7.6%	11.7%	6.9%	9.0%
Panel B: Competition Outcomes				
Number of Candidates	6.5	6.1	8.3	9.2
Effective Number of Candidates	4.2	3.8	4.5	5.0
Margin of Victory	9%	10%	10%	9%
Max Vote Percentage Received	36%	38%	35%	33%
Panel C: District				
Households with access to Internet	0.1%	1.0%	3.6%	21.0%
Total Base Transceiver Stations	0.5	3.9	6.0	27.7
Income per Capita (1,000 PEN)	0.17	0.45	0.34	0.94
Complete Secondary Education	38%	49%	63%	66%
N	1,195		417	

Notes: High internet: districts with more than 5 percentage point change of households with access to internet (above mean). The sample excludes all districts that are the capital of their respective province (195) and a district with missing data (38).

Figure 1 – Internet Penetration Percentage Point Change

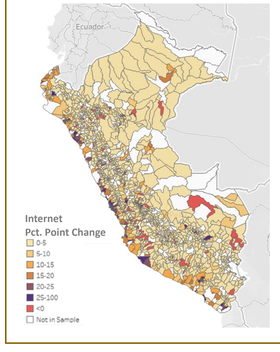
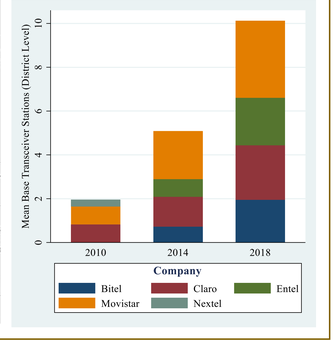


Figure 2 – Mean Base Transceiver Stations at the District Level



Key Findings

1. Higher levels of internet penetration leads to tighter competition outcomes and an increase in electoral participation

For every extra 10 pct. points of households with internet access (SD):

• Tighter competition outcomes - an increase of 0.42 effective candidates and 0.55 total candidates; 1.89 max vote pct. point reduction (Table IV)

• A 0.55 pct. point increase on voter participation (Table V)

• Increment of 0.19 women running for office (Table VII)

2. Higher levels of internet penetration diminish positive marginal effects of campaign spending on vote share

• For every extra 15% of households with internet access (SD), the effect of every 10,000 PEN spent on vote share is reduced by 0.837 pct. points

Results on Competition Outcomes

Table III - BTS on Political Outcomes with FE

Competition Outcomes:	Effective Number of Candidates	Number of Candidates	Margin of Victory	Max Vote Percentage
	Average of Each Outcome			
	4.22	6.95	9%	36%
Base Transceiver Stations	0.014***	0 .019***	-0.0002	-0.0006***
	(0.004)	(0.004)	(0.0002)	(0.0002)
Percent Young Voters	0.445	3.860**	0.026	0.009
	(1.072)	(1.704)	(0.085)	(0.092)
Percent Elderly Voters	-1.607	-5.542**	-0.100	-0.040
	(1.587)	(2.338)	(0.129)	(0.132)
Percent Secondary Education	-0.006***	-0.007*	-0.0005**	-0.000
	(0.002)	(0.004)	(0.0002)	(0.011)
Income per Capita (1,000 PEN)	0.649***	1.137***	-0.029**	-0.044***
	(0.152)	(0.246)	(0.011)	(0.011)
R-squared	0.0662	0.2757	0.0001	0.0105

Notes: N = 4,800. District FE, year FE, and control for number of voters included. The sample excludes all districts that are the capital of their respective province. SEs clustered at the district level.

Table IV - Internet Access on Political Outcomes with FE

Competition Outcomes:	Effective Number of Candidates	Number of Candidates	Margin of Victory	Max Vote Percentage
	Average of Each Outcome			
	4.22	6.93	9%	36%
Prop. of Households with Internet	4.204***	5.549***	-0.070*	-0.189***
	(0.650)	(1.022)	(0.041)	(0.040)
Prop. Young Voters	2.798**	8.517***	-0.075	-0.151
	(1.247)	(1.958)	(0.101)	(0.108)
Prop. Elderly Voters	1.408	-0.972	-0.072	-0.052
	(1.830)	(2.796)	(0.149)	(0.155)
Prop. Secondary Education	-0.004	-0.005	-0.001**	-0.00001
	(0.002)	(0.004)	(0.0002)	(0.0002)
Income per Capita (1,000 PEN)	0.537***	0.898***	-0.030**	-0.041***
	(0.177)	(0.285)	(0.014)	(0.014)
R-squared	0.1126	0.3283	0.0000	0.0347

Notes: N = 3,224. District FE, year FE, and control for number of voters included. The sample excludes all districts that are the capital of their respective province. SEs clustered at the district level.

Empirical Strategy

Question One: BTS, Internet Access, and Election Outcomes (TWFE)

$$Y_{dt} = \alpha_d + \gamma_t + \beta Int_{dt} + \mu \boldsymbol{X}_{dt} + \theta \boldsymbol{V}_{dt} + \varepsilon_{dt} \quad (1)$$

$t = 2010, 2018$ *for Internet Access* ; $t = 2010, 2014, 2018$ *for BTS*

d → District

t → Year

α / γ → Year/District fixed effects

Y → Candidates, Effective Candidates, Margin of Victory, Max Vote Percent, etc.

X → District demographics as income, education, etc.

Int →

For BTS: Number of Base Transceiver Stations (Mobile Internet Connection)
For Internet Access: Percentage of Households with Internet (Router)

V → Race fixed effects as number of eligible voters, characteristics of voters, etc.

Question Two: Spending and Internet on Vote Share (IV)

$$\text{OLS:} \quad Y_{id} = \beta Spend_{id} + \lambda Int_d + \delta(Spend_{id} * Int_d) + \gamma \boldsymbol{X}_i + \theta \boldsymbol{V}_d + \quad (2)$$

i → Candidate

d → District

Y → Share of Votes

Spend → Total Spending

Internet → Internet Penetration (%)

X → Candidate characteristics

V → District and Race fixed effects.

$$\text{2SLS:} \quad Y_{id} = \beta Spend_{id} + \lambda \widehat{Int_d} + \delta(Spend_{id} * \widehat{Int_d}) + \gamma \boldsymbol{X}_i + \theta \boldsymbol{V}_d + \varepsilon_{id} \quad (3)$$

• **Instruments:** Altitude in Km & Distance to Port of Callao (Hub for Imports)

Results on Participation Outcomes

Table V - Turnout Outcomes on Internet Access with FE

Turnout Outcomes:	Participation	Valid Votes
	Average of Each Outcome	
	83%	85%
Prop. of Households with Internet	0.055***	-0.097**
	(0.013)	(0.039)
R-squared	0.3363	0.0093

Notes: N = 3,224. District FE, Year FE, and control for number of voters included. The sample excludes all districts that are the capital of their respective province. District Controls: percentage of male voters, percentage of elderly voters, total voters per 10,000, percentage of adult population with complete secondary education, income per capita per 1,000 PEN. SEs clustered at the district level.

BTS/Internet on Total Female and Young Candidates with FE

Table VI - (BTS 2010, 2014, 2018)

Candidate Outcomes:	Female Candidates	Young Candidates
	Average	
	0.54	0.32
Total BTS	0.006**	-0.006***
	(0.002)	(0.001)
R-squared	0.109	0.071
Notes: N = 4,800.		

Table VII - (Internet 2010, 2018)

Candidate Outcomes:	Female Candidates	Young Candidates
	Average	
	0.542	0.212
Pct. of Internet	1.858***	-0.035
	(0.497)	(0.252)
R-squared	0.1744	0.0088
Notes: N = 3,224.		

Notes: District FE, year FE, and control for number of voters included. The sample excludes all districts that are the capital of their respective province. District Controls: percentage of male voters, percentage of elderly voters, total voters per 10,000, percentage of adult population with complete secondary, income per capita per 1,000 PEN. SEs clustered at the district level.

Table VIII - Spending and Vote Share

OLS	Vote Share Prop.		
	(1)	(2)	(3)
Spending per 10,000	0.0168***	0.017***	0.029***
	(0.006)	(0.006)	(0.005)
Prop. Internet		-0.121***	-0.042
		(0.030)	(0.030)
Spending x Prop. Internet			-0.035***
			(0.008)
Percentage Elderly Voters	0.13*	0.11*	0.15**
	(.072)	(0.068)	(0.070)
Percentage Young Voters	-0.22***	-0.22***	-0.26***
	(0.051)	(0.051)	(0.056)
Percentage Male Voters	0.21***	0.08	0.08
	(0.072)	(0.076)	(0.081)
R-squared	0.3290	0.3316	0.3465

Notes: N = 9,056. District Controls: percentage of male voters, percentage of elderly voters, total voters per 10,000, percentage of adult population with complete secondary education, income per capita per 1,000 PEN. SEs clustered at the district level. Candidate Controls: age, gender. Political party FE included.

Table IX - Spending & Internet on Vote Share (2SLS)

	OLS	2SLS - Altitude and BTS	
	(1)	(2)	(3)
Spending per 10,000 PEN	0.0276***	0.01887***	0.0367***
	(0.001)	(0.0007)	(0.0014)
Prop. of Households with Internet	-0.0665***	-0.3694***	-0.3420***
	(0.0168)	(0.0611)	(0.0591)
Spending x Prop. Internet	-0.0326***		-0.0558***
	(0.0025)		(0.0039)
Underindentification Test Chi-sq(3)		0.0000	0.0000
Overidentification Test Chi-sq(2)		0.9598	0.2356
R-squared	0.2907	0.2591	0.2524

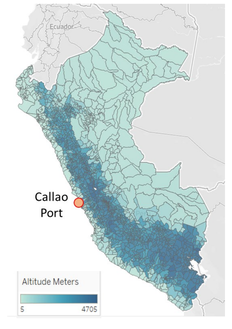
Notes: N = 9,056. District Controls: percentage of male voters, percentage of elderly voters, total voters per 10,000, percentage of adult population with complete secondary education, income per capita per 1,000 PEN. SEs clustered at the district level. Candidate Controls: age, gender. Political party FE included.

Table X - First Stage for IV Regressions

	Prop. of Internet Penetration		
Altitude Km	-0.023***		-0.025***
	(0.001)		(0.0008)
Callao per 100Km		0.049***	-0.002***
		(0.003)	(0.001)
F(2, n)	330.64	3.56	184.91
SW F(1, n)	576.8	3.75	246.40
n	8,898	8,898	8,896

Notes: District Controls: percentage of male voters, percentage of elderly voters, total voters per 10,000, percentage of adult population with complete secondary education, income per capita per 1,000 PEN. SEs clustered at the district level. Candidate Controls: age, gender. Political party FE included.

Figure 3 – Altitude per District (IV)



Conclusions and Future Research

• Higher internet penetration and mobile internet infrastructure are associated with tighter competition, higher electoral participation, and diminishing effects of campaign spending on electoral outcomes

• Future research can concentrate on the interaction the 2015 no-incumbency policy had on political competition and how it possibly positively interacted with the increase of internet

References

Avis, E., Ferraz, C., Finan, F., & Varjão, C. (2017). Money and politics: The effects of campaign spending limits on political competition and incumbency advantage (No. w23508). National Bureau of Economic Research.

Falck, O., Gold, R., & Heblich, S. (2014). E-lections: Voting Behavior and the Internet. American Economic Review, 104(7), 2238-65.

Gavazza, A., Nardotto, M., & Valletti, T. (2019). Internet and politics: Evidence from UK local elections and local government policies. The Review of Economic Studies, 86(5), 2092-2135.

Jacobson, G. C. (1978). The effects of campaign spending in congressional elections. *American Political Science Review*, *72*(2), 469-491.

Milligan, K., & Rekkas, M. (2008). Campaign spending limits, incumbent spending, and election outcomes. Canadian Journal of Economics/Revue canadienne d'économique, 41(4), 1351-1374.

Poy, S., & Schüller, S. (2020). Internet and voting in the social media era: Evidence from a local broadband policy. Research Policy, 49(1), 103861.
Stratmann, T., & Francisco, J. (2006). Competition policy for elections: Do campaign contribution limits matter?. *Public Choice*, *127*(1-2), 177-206.