Connecting the Unconnected: Facebook Access and Female Political Representation in Sub-Saharan Africa

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Motivation

◇ Rapid expansion of internet and social media as a structural transformation.

◇ Facilitated evolution of ideas, perceptions, and attitudes towards women and their role in society (e.g. #MeToo).

◇ Social media : (i) no filtering / no editorial bias ; (ii) user-generated content (iii) diversity :

- information set (Cagé et al. 2022, Hatte et al. 2022)
- coordination device (Enikolopov et al. 2020 ; Tesei and Manacorda 2020)
- in politics : direct political communication (Bessone et al. 2022)

◇ Opened the door to significant potential for :

→ empowerment of women in the political sphere and fostering of more gender-equal political representation.

→ subsequent policy effects, as female political leadership is associated with economic development and societal well-being (Duflo 2012)

The sub-Saharan African context

◇ Under-representation of women in leading political positions : less than 10% of the seats in national parliaments in a number of SSA countries, e.g. Gambia and Nigeria in 2020.

◇ Gender norms : high-level of restrictions → early marriage, physical integrity, son bias, access to ressources and assets, civil liberties (e.g. OECD SIGI report 2015).

◇ Traditional media landscape :

- Control : low freedom of the press
  ↪ 2023 RSF ranking : Ghana 62 ; Nigeria 123 ; Tanzania 143 ; Uganda 133 ; Zambia 87
- Gender discrimination → "Missing women" (Kassova 2020)
  - in the news : women rarely portrayed as protagonists ; more likely to appear in art/media stories than economy ; lower visibility of female politicians
  - in the newsroom : male-dominated, female journalists assigned to lower profile stories

Access to internet and social media in sub-Saharan Africa

Starting in mid-2014, disruptive shock : broader access to a leading social media platform

FACEBOOK

In practice, zero-rating policy "Free Basics" :

- partnerships with local mobile operators, allow regular SIM card owners in areas with at least 2G coverage to access a Facebook-centered "light" version of the internet
- no additional data costs
- big success, documented in this paper

Does broader access to Facebook foster female political representation in SSA ?

This paper

Leverage novel data on staggered introduction of Facebook's Free Basics in sub-Saharan Africa

↪ causal identification : modern DiD setting, multi-country + within-country analysis

1. Size of connectivity shock → explore rich set of survey data to document take-up

2. Effect on female MP election → identify the role of parties as gatekeepers and political experience, and the dynamics of the electoral response over time and across political actors

3. Connect electoral effects to attitudes towards women, in politics and other contexts

↪ demand for female leaders as a fertile ground for female political representation

4. Transmission channel : transfers of gender norms → exposure to content from progressive regions

Main findings

1. Free Basics connect people to Facebook in sub-Saharan Africa :
   - larger social media - Facebook - consumption : twice as large after 6 years
2. Broader access to Facebook fosters election of female MPs...
   - Effect appears in the second election following Free Basics' entry
   - Sizeable impact : persuasion rate of 16%
   - Driven by women running with established parties and new candidates
3. ... which echoes a positive effect of Facebook on attitudes towards female leadership and larger demand for a renewal of the political class
4. When Facebook exposes citizens to content produced in progressice countries : larger positive effect

Literature review

This paper builds primarily on two flourishing literatures documenting :

1. Women as political leaders, striking gap between :

   – Beneficial effect of putting women into power [e.g. Chattopadhyay and Duflo 2004 ; Bhalotra and Clot-Figueras 2014 ; Bhalotra et al. 2023 ; Brollo and Troiano 2016 ; Baskaran et al. 2021]

   – Rich evidence of the struggle of women in politics [e.g. Bagues and Campa 2020, 2021 ; Baskaran and Hessami 2022 ; Daniele et al. 2023 ; Goddard 2019 ; Gulzar 2021 ; Krook Mona and O'Brien 2012 ; Krook 2018 ; Le Barbanchon and Sauvagnat 2021]

2. Effects of internet and social media in fragile democracies and autocratic regimes, where these platforms can

   – Help inform voters who struggle to get political information [Guriev et al. 2020 ; Cariolle et al. 2023],

   – Fueling governmental disapproval, protests and violence [Enikolopov et al. 2020 ; Fergusson and Molina 2021 ; Tahtinen 2022]

We find a positive and large effect of providing Facebook accessibility to citizens on female political representation, in the context of sub-Saharan Africa.

Literature review

3. Media can impact gender norms (Chong and La Ferrara 2009 ; La Ferrara et al. 2012, Okuyama 2023), hence supporting the "stepping" stones to norm transitions (Gulesci et al. 2023)

   → We show that Facebook affects gender norms significantly.

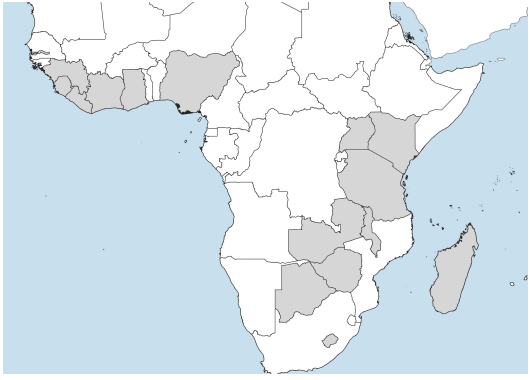
4. "Missing women" in the news :
   - legacy media : gender imbalance in political news – quantity, topics and stereotypes (Van der Pas et al 2020), and impact on stereotyped behaviors (Ward et al. 2020).
   - social media : nuanced, context-dependent conclusions (Bode et al. 2016, Evans et al. 2016, Vasarhelyi 2021, Yarchi et al. 2019, Vochocova et al. 2016)

5. Electoral politics in Africa : large turnover and accountability (Bowles and Marx 2021), elections as incentives (Marx 2018), effect on public good provision / economic performance (e.g. Bates and Block 2013 ; Burgess et al. 2015 ; Acemoglu et al. 2016), effect of television during political crisis (Mougin 2023)

Data

Data : Parliamentary Elections 1/2

- Sample : 17 countries
- Electoral system :
  Single-member constituencies
  and First-Past-The-Post voting
- Unit of observation :
  Constituency $\times$ election-year level
- Data collection :
  Archives (CLEA + A. Carr)
  + electoral commission websites



Data : Parliamentary Elections 2/2

- 64 elections over 2001-2022
- 8,360 constituencies $\times$ electoral races [2,365 distinct constituencies]
- We exploit information on winner identity + presence on the ballot and vote shares across
  - Gender $\Rightarrow$ we predict gender based on first name when missing, Gender API
  - Party
  - Incumbency status
  - Political experience

Female MP election in sub-Saharan Africa

Summary statistics : constituency $\times$ election-year level

	Obs	Mean	SD	Min	Max
Panel A : Full sample					
Winner is a woman	8360	0.11	0.31	0	1
At least one woman on the ballot	8360	0.46	0.50	0	1
Panel B : Races with at least one woman on the ballot					
Winner is a woman	3852	0.24	0.43	0	1

Facebook access in sub-Saharan Africa : context and data

◇ Internet use gap :

- Population covered by mobile broadband internet (>80% today)
- only half uses internet

◇ Why ? → Internet data is unaffordable.

- Mobile broadband subscription is 3.4% of GNI in 2021 [Gambia : 11%, Uganda : 20%]
- Less than 1% in the US and Europe

◇ Created a market for zero-rating policies → Facebook's Free Basics initiative (Nothias 2020)

◇ Drivers of partnerships (suggestive evidence) timing of partnerships

- market potential : country size (+), population on internet (+), mobile ownership (+)
- relevance of zero-rating : GDP per cap (−), internet infrastructure (−)
- mobile operators : covering larger communities, including in more rural places

Original data : Geolocating Free Basics' availability

We create measures of Free Basics coverage at cell (1kmx1km) $\times$ year level :

1. We collect individual information on partnerships with Facebook
   - 28 deals, starting in mid-2014 detailed list
2. GPS coordinates of mobile phone towers, Open Cell ID
   - $\star$ time-varying individual information at mobile operator level
3. Fine-grained information on spatial dispersion of population, WorldPop
4. We compute : **estimated % of population covered by Free Basics at cell-year level**

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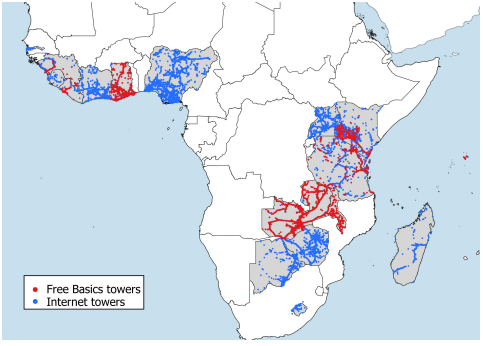
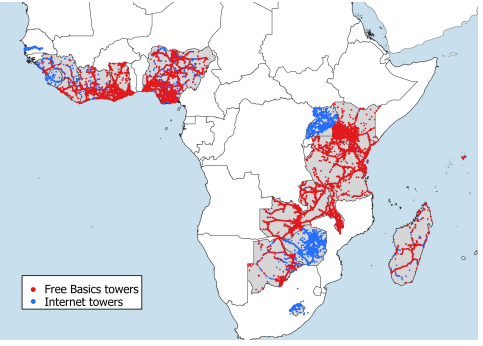
+ We aggregate the measures of Free Basics coverage at constituency $\times$ year level
timing of internet and Free Basics roll-out

$\star$ geolocation of constituency boundaries, data collection from multiple sources

Spatial distribution of mobile internet and Free Basics

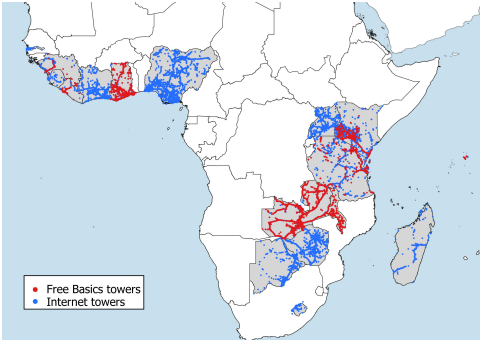


Year 2016



Year 2022

Spatial distribution of mobile internet and Free Basics



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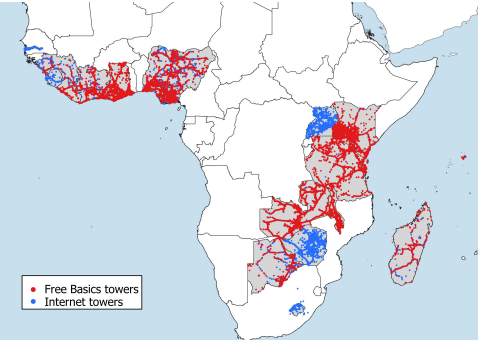


Year 2022

Population covered by Free Basics :

→ 84% of population in median constituency in the first election ;

→ 97% for the second election Free Basics coverage at constituency-level : distribution

→ baseline : binary treatment

Does Free Basics connect people to Facebook ?

Data : individual-level connectivity measures

- Geolocated individual survey data [2014-2021]
- Source : Afrobarometer (rounds 6 to 8)
- We focus on our subsample of 17 SSA countries, except Seychelles
- 63,700 respondents in 2,239 constituencies
- Focus on social media / internet questions :
  1. Uses social media as a source of information at least a few times a month (yes/no)
  2. Uses internet as a source of information at least a few times a month (yes/no)
  3. Uses internet at least a few times a week (yes/no)
  4. Personally owns a mobile phone (yes/no)

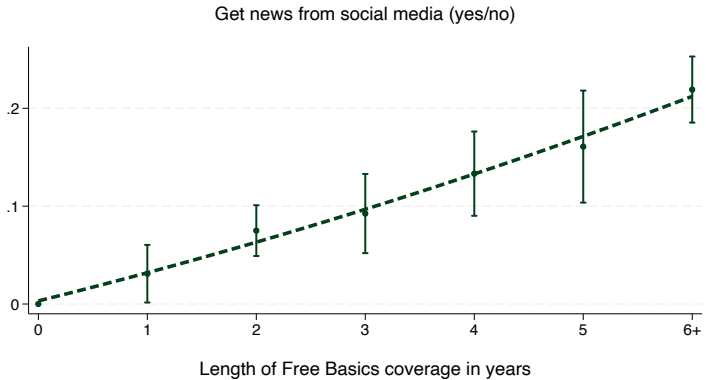
Identification : connectivity shock generated by Free Basics

$$OnlineBehavior_{i,t} = \beta\, FreeBasics_{i,t} + \mathbf{C}_{i,t}.\,\gamma + \mathbf{C}_{j,t}.\,\lambda + \eta_{c,t} + \varepsilon_{i,t} \quad (1)$$

where i = individual ; j = constituency ; c = country ; t = year

- $OnlineBehavior_{i,t} = 1$ if, alternatively :
  - news consumption from social media or internet + frequent use of internet
- $FreeBasics_{i,t} = 1$ if respondent covered by Free Basics operator at time t.
- $\mathbf{C}_{i,t}$ includes : age, primary education, religion, gender (respondent + interviewer).
- $\mathbf{C}_{j,t}$ includes : internet coverage, population-density-weighted mean nighttime light.
- $\eta_{c,t}$: country × year FEs.
- Standard errors clustered two-way at constituency and country-year level [+ spatial clustering in robustness]

Free Basics fuels connectivity



– No Free Basics coverage : only 21% of the individuals get news from social media.
– Estimated connectivity shock : +44% in 3 years, +105% in 6 years. alternative outcomes compliers

Exposure to Facebook and female MP election

Our aim is to estimate

$$Y_{j,t} = \beta\, FreeBasics_{j,t} + \mathbf{X}_{j,t}\,.\,\delta + \phi_j + \eta_{c,t} + \varepsilon_{j,t} \tag{2}$$

where j = constituency ; t = election year ; c = country

◇ $Y_{j,t}$ is alternatively whether winner is a woman, vote share of (first-ranked) woman, and presence on the ballot of a woman, across different parties or candidate types :

- Parliamentary party vs independent / minor party
- Incumbent party
- 1st-time vs 2nd-time+ candidate

◇ $Free\ Basics_{j,t} = 1$ if constituency j is covered by Free Basics at election-year t

◇ $\mathbf{X}_{j,t}$ includes : log of population density, nighttime light (weighted), internet coverage

◇ ϕ_j : Constituency FEs

◇ $\eta_{c,t}$: Country $\times$ election year FEs

◇ $\varepsilon_{j,t}$ = Two-way standard errors clustering (constituency and country-year) or spatial clustering

Causality of the Free Basics effect

Identification strategy :

- Staggered roll-out of Free Basics + panel structure of constituencies $\times$ elections
  $\rightarrow$ large set of FEs :
  - within constituency analysis (ϕ_j) controlling for slow moving constituency characteristics : culture (e.g. matri- vs patrilineality, conservatism), ethnic / religious composition ; local political competition
  - within country $\times$ election year analysis ($\eta_{c,t}$) controlling for differences in institutions, fairness of elections, control over offline and online content, ..
  - crucially, we control also for the staggered roll-out of local internet

- Standard staggered DiD concern : heterogeneous treatment effects (Callaway and Sant'Anna (2020) ; de Chaisemartin and D'Haultfoeuille (2020) ; Sun and Abraham (2020) ; Goodman-Bacon (2021))

Identification strategy

$$Y_{j,t+k} - Y_{j,t-1} = \beta_k^{\text{LP-DiD}} \, \Delta \, FreeBasics_{j,t} + \mathbf{X}_{j,t} \, . \, \delta^{\mathbf{k}} + \eta_{c,t}^{k} + \varepsilon_{j,t}^{k} \qquad (3)$$

where j = constituency ; t = election year ; c = country, and k = {-3, -2, 0, 1}

+ we restrict the sample to observations that satisfy either of two conditions :

$$\begin{cases} \text{treatment} & \Delta \, FreeBasics_{j,t} = 1 \\ \text{clean control} & FreeBasics_{j,t+k} = 0 \end{cases}$$

◇ Local Projection Approach to DiD (Dube et al. 2023), clean control builds on Cengiz et al. (2019).

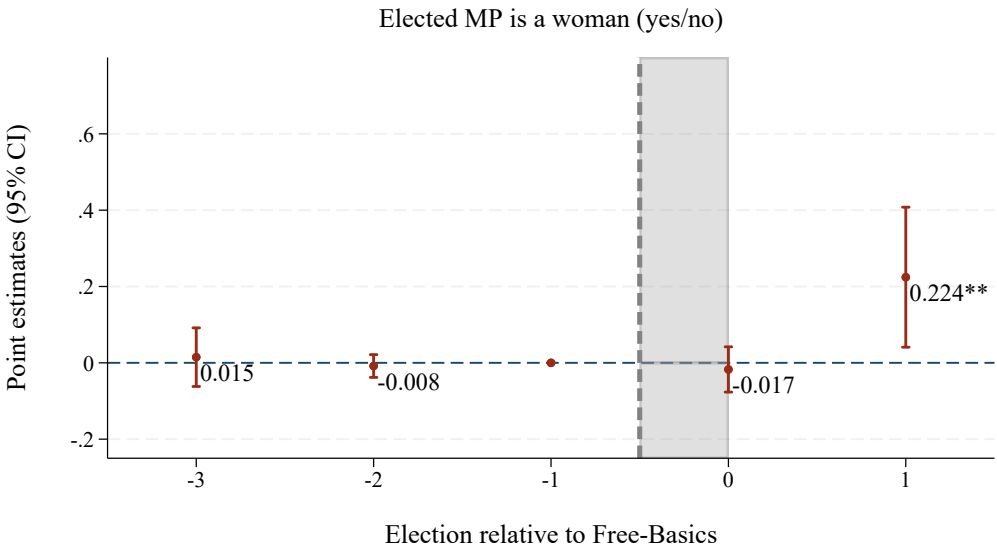
◇ Long difference → control for time-invariant characteristics at constituency level

◇ $\eta_{c,t}^{k}$: Country × election year FEs

◇ Controls in $\mathbf{X}_{j,t}$ measured in $t-1$ and in difference between election-year and $t-1$
→ compare constituencies on similar dynamics of population / econ development / internet coverage

◇ $\varepsilon_{j,t}^{k}$ = Two-way standard errors clustering (constituency and country-year) or spatial clustering

Female MP election more likely with access to Facebook



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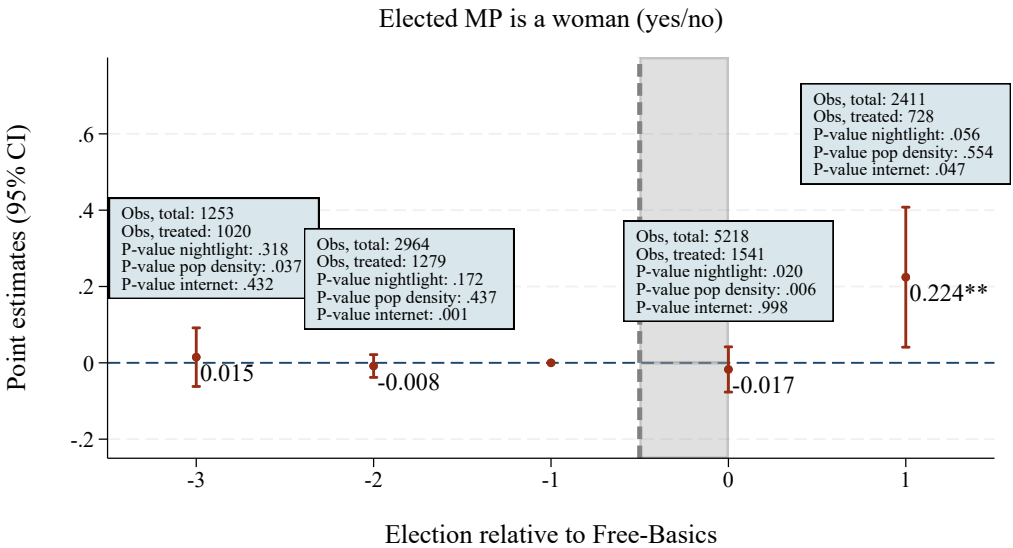
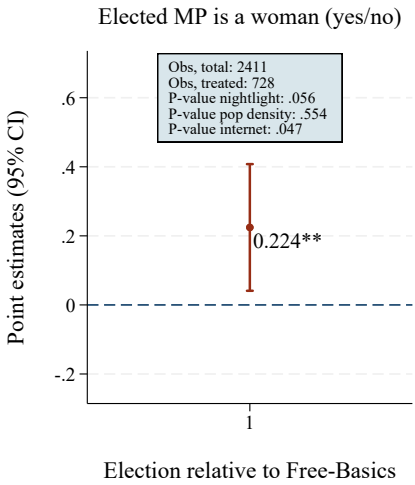


Female MP election more likely with access to Facebook

Magnitude

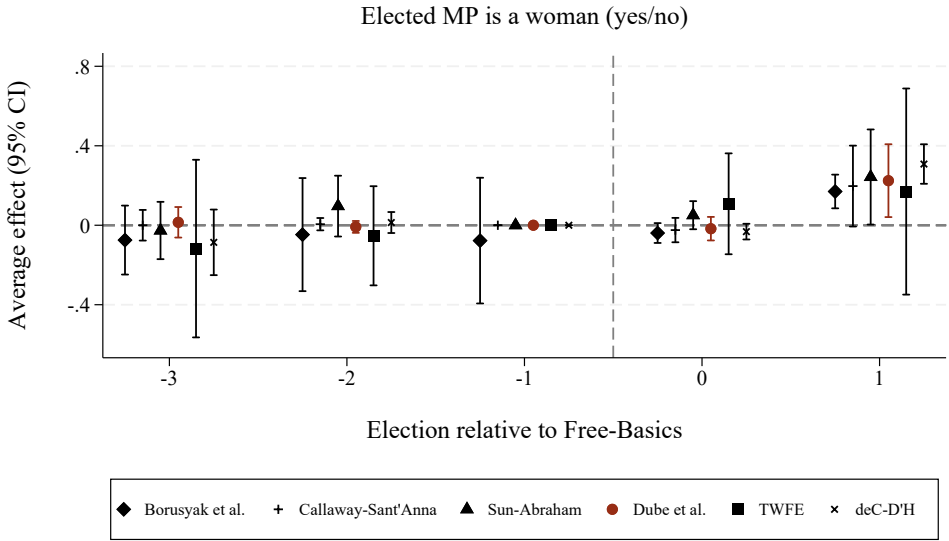


Connecting people to Facebook generates :

- positive effect on female MP election...
- ... in second election after Free Basics introduction, $\sim$ 6 years of exposure
- $\uparrow$ by 22.4pp : $\sim 1/2$ of a standard deviation
- persuasion rate of 16.4% [2.3% - 30.5%] :

$$\frac{y_T - y_C}{\Delta e_{T-C}} \times \frac{turnout}{(1 - y_C)} = \frac{0.224}{1} \times \frac{0.66}{0.90}$$

Alternative DiD estimators yield similar results



Additional results and robustness checks

1. Composition effects :
   - ◇ Constant sample of countries — fixed set : country-level
   - ◇ Constant sample of constituencies — fixed set : constituency-level

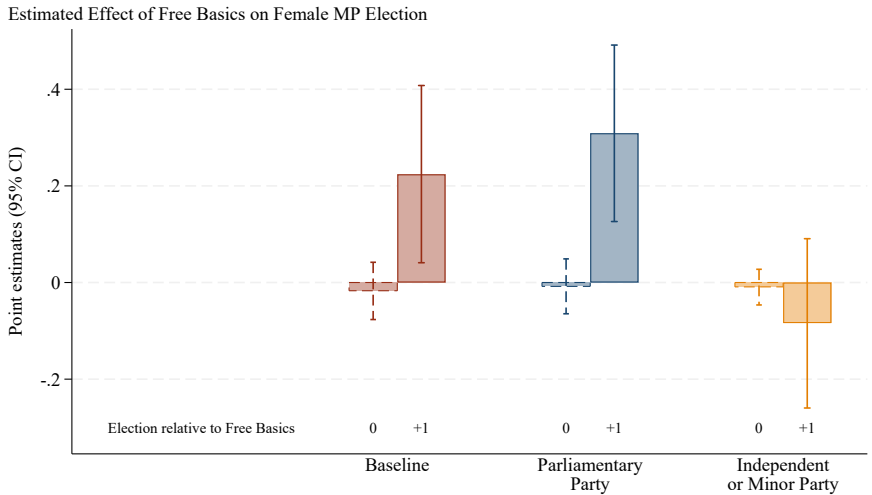
2. Electoral system :
   - ◇ Countries with seats reserved for women → similar effect in magnitude — reservation
   - ◇ FPTP versus mixed-system → effect driven by FTPT-only countries — mixed-system

   quality of democracy — fairness of elections

3. Treatment dose and lenght of exposure — coverage of Free Basics — length of exposure
   ↪ effect driven by constituencies with larger coverage of the Free Basics operators
   ↪ effect encapsulated within electoral cycles

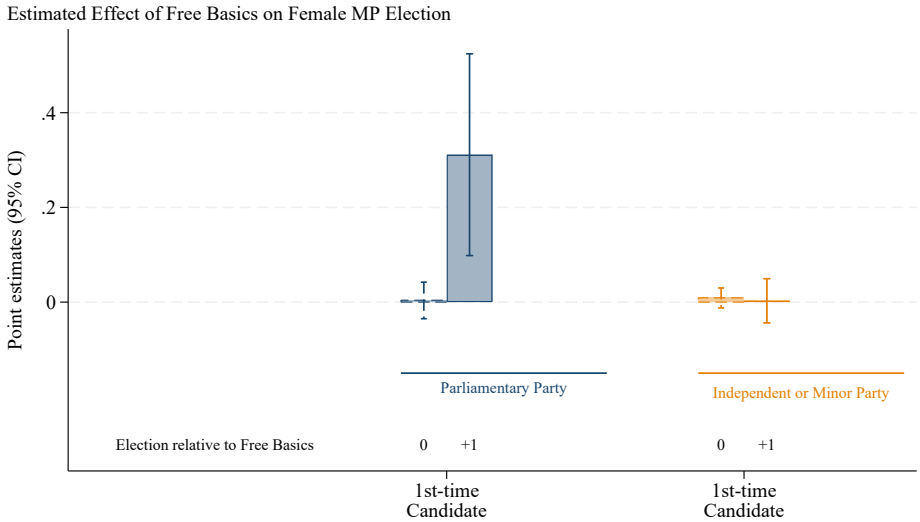
4. Var-cov matrix
   - ◇ Spatial clustering — distance thresholds
   - ◇ Cluster at level of operator-mix [on-going]

Facebook Access and Female MP Election : Political Parties



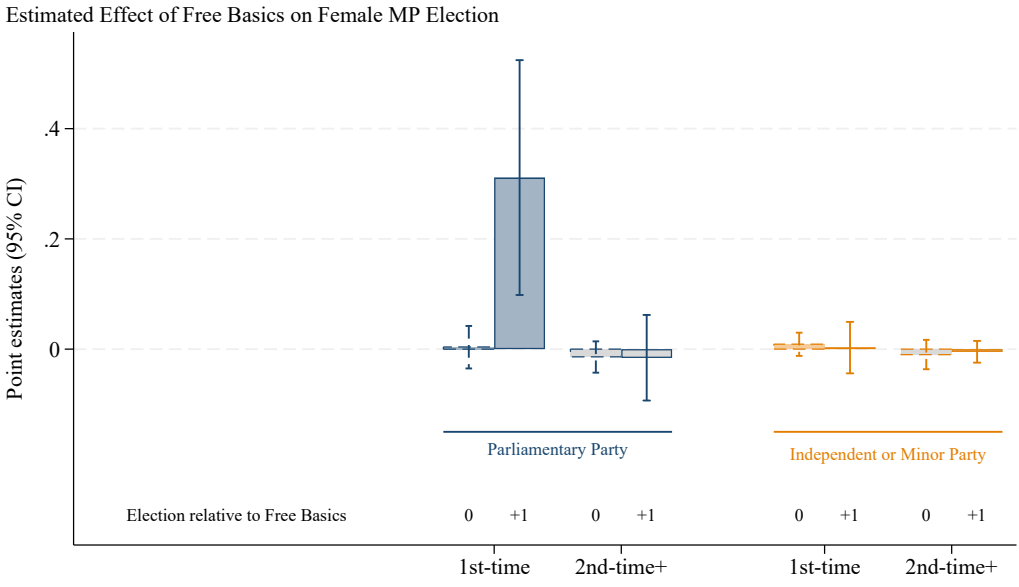
→ Facebook fosters election of female politicians endorsed by established parties.

Facebook Access and Election of New Female Candidates



→ Facebook fosters election of new female politicians endorsed by established parties.

Facebook Access and Female MP Election : Parties and Experience



Additional results

- Electoral performance of male candidates mirror those of their female counterparts :
  - Males from established parties are less likely to win the elections
  - No significant effect on males running as independent or with a minor party
- In the first election with greater Facebook access :
  - Vote shares of first-ranked males endorsed by established parties decreases significantly
- Political parties play a crucial role $\rightarrow$ we can follow their strategies across time and space
  - Next : Facebook access and selection of candidates by parties

Party-level endorsement strategies

$$Y_{p,j,t+k} - Y_{p,j,t-1} = \beta_k^{\text{LP-DiD}} \, \Delta \, FreeBasics_{j,t} + \mathbf{X}_{j,t} \, . \, \delta^{\mathbf{k}} + \omega_{p,t}^{k} + \varepsilon_{p,j,t}^{k} \qquad (4)$$

where p = party ; j = constituency ; t = election year ; c = country, and k = {-3, -2, 0, 1}

◇ Unit of observation is party × constituency × election

◇ Long difference → control for time-invariant characteristics at party-constituency level

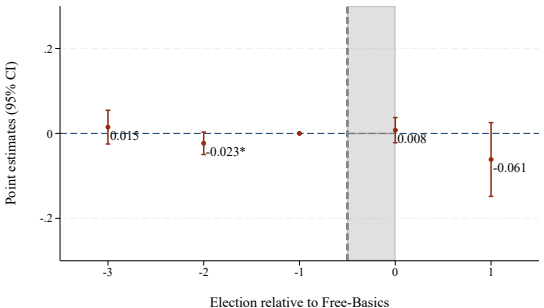
◇ $\omega_{p,t}^{k}$: Party × election year FEs

◇ Controls in $\mathbf{X}_{j,t}$ measured in $t-1$ and in difference between election-year and $t-1$
→ compare constituencies on similar dynamics of population / econ development / internet coverage

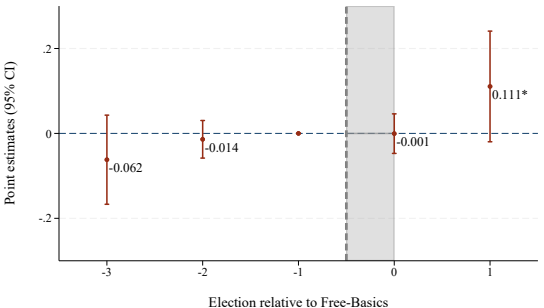
◇ $\varepsilon_{j,t}^{k}$ = Two-way standard errors clustering (constituency and country-year) or spatial clustering

Endorsement strategies with Facebook access

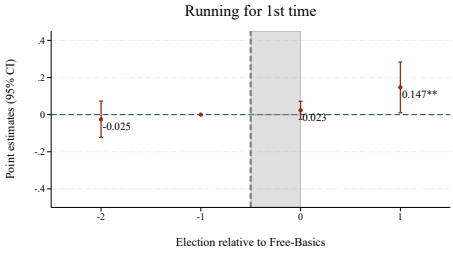
Panel A : Party-candidate on the ballot (yes/no)

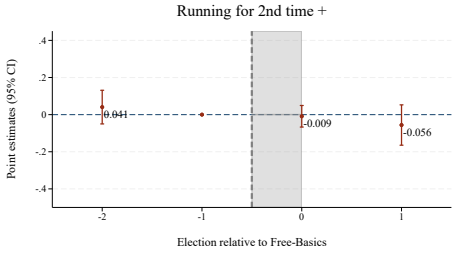


Panel B : Party-candidate is a woman cond. on candidacy (yes/no)

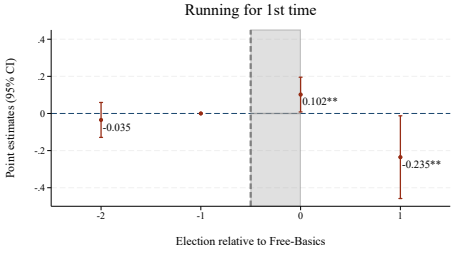


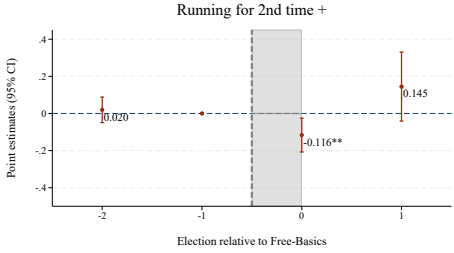
Panel A : Party-candidate is a woman (yes/no)





Panel B : Party-candidate is a man (yes/no)





Aggregate effect of Facebook access on female election

Does Free Basics increase the number of female politicians elected in total ?

- Related to SUTVA (Rubin 1977)
- Threat to our identification : parties may endorse female candidates strategically, to win more seats $\rightarrow$ SUTVA may be violated !
- Particularly relevant if (i) shortage of female politicians or (ii) lower (endogenous) demand for female leaders in non-treated constituencies
- We exploit variation in the share of constituencies covered at regional (admin1) level to uncover the effect of Free Basics on female election at aggregate level

Aggregate effect of Free Basics on female election : estimation

$$Y_{p,r,t+k} - Y_{p,r,t-1} = \beta_k^{\text{LP-DiD}} \, \Delta \, FreeBasics_{r,t} + \mathbf{X}_{r,t} \, . \, \delta^{\mathbf{k}} + \omega_{p,t}^{k} + \varepsilon_{p,r,t}^{k} \qquad (5)$$

where p = party ; r = region (admin1) ; t = election year ; c = country, and k = {-3, -2, 0, 1}

◇ Unit of observation is party × region × election

◇ $Y_{p,r,t}$ is the share of female MP elected among the party-candidates in region r and election-year t

◇ $FreeBasics_{r,t}$ is the share of constituencies with Free Basics in region r and election-year t

◇ Long difference → control for time-invariant characteristics at party-region level

◇ $\omega_{p,t}^{k}$: Party × election year FEs

◇ Controls in $\mathbf{X}_{r,t}$ measured in $t-1$ and in difference between election-year and $t-1$
→ compare regions on similar dynamics of population / econ development / internet coverage

◇ $\varepsilon_{j,t}^{k}$ = Two-way standard errors clustering (region and country-year) or spatial clustering

Facebook access increases female election at party × region level

Dependent variable	Share of women elected among party-candidates			
Specification	Election			
	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
% of constituencies with Free Basics	0.007	–0.004	–0.012	0.041***
	(0.044)	(0.024)	(0.012)	(0.014)
Mean dep. var.	0.031	0.029	0.020	0.021
Controls : internet, nighttime light, pop density	✓	✓	✓	✓
Party-year FEs	✓	✓	✓	✓
Observations	550	1365	2672	1126
Treated observations	372	595	924	329
Regions	160	265	286	242
Political parties	44	73	121	71
Countries	10	14	16	14

A 1-SD ↑ in % constituencies covered by Free Basics ↑ % female MP by 4pp at party-region level (2/3 of a SD).

Facebook access increases female election at regional level

Dependent variable	Share of women elected among party-candidates			
Specification	Election			
	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
% of constituencies with Free Basics	–0.100	–0.041	–0.039	0.176***
	(0.070)	(0.069)	(0.045)	(0.037)
Mean dep. var.	0.103	0.101	0.100	0.094
Controls : internet, nighttime light, pop density	✓	✓	✓	✓
Country-year FEs	✓	✓	✓	✓
Observations	183	447	756	348
Treated observations	141	187	229	90
Regions	165	265	284	244
Countries	10	14	16	14

A 1-SD ↑ in % constituencies covered by Free Basics ↑ % female MP by 17pp at region level (144% of a SD).

Demand for female political leaders

Data : gender and political attitudes at individual-level

- Geolocated individual survey data [baseline : 2014-2021, robustness : 2005-2021]
- Source : Afrobarometer [baseline : rounds 6 to 8, robustness : 3 to 8]
- **Focus on gender/political attitudes :**
  1. Women should have same chance of being elected to political office as men (yes/no)
  2. MPs are corrupt (yes/no)
  3. Disapproves the way own MP has performed his job in the last 12 months (yes/no)
  4. Trusts the parliament (yes/no)
  5. Voted in last national election (yes/no)
- ... as well as other **gender norms :**
  1. Men should have more right to a job than women when jobs are scarce (yes/no)
  2. Women should have the same rights as men to own and inherit land (yes/no)
  3. Better if woman takes care of household and children (yes/no)
  4. never justified for men to beat their wives (yes/no)

Identification : Free Basics, social media consumption and attitudes

$$\textit{Political Attitudes}_{i,t} = \beta\, \textit{FreeBasics}_{i,t} + \mathbf{C}_{i,t}.\,\gamma + \mathbf{C}_{j,t}.\,\lambda + \eta_{c,t} + \varepsilon_{i,t} \tag{6}$$

where i = individual ; j = constituency ; c = country ; t = year

- $\textit{PoliticalAttitudes}_{i,t}$ measures alternatively gender/political attitudes.
- $\textit{FreeBasics}_{i,t} = 1$ if respondent covered by Free Basics operator at time t.
- $\mathbf{C}_{i,t}$ includes : age, primary education, religion, and gender (respondent + interviewer).
- $\mathbf{C}_{j,t}$ includes : internet coverage, population-density-weighted mean nightime light.
- $\eta_{c,t}$: country $\times$ year FEs.
- Standard errors clustered two-way at constituency and country-year level
  [+ spatial clustering in robustness]

Facebook generates demand for gender/political renewal

	Women leadership in politics (1)	Thinks MPs are corrupt (2)	Disapproves MP (3)	Trusts the parliament (4)	Voted in the last national election (5)
	Panel A : OLS				
Social media	0.056***	0.040***	0.032***	–0.056***	–0.033***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.008)
	Panel B : IV-2SLS				
Social media	0.182*	0.238*	0.227	–0.314***	–0.260***
	(0.092)	(0.122)	(0.143)	(0.079)	(0.097)
First-stage F-stat	93.66	78.72	78.72	78.72	78.72
	Panel C : Reduced form				
Free Basics	0.020*	0.033*	0.032	–0.044***	–0.036***
	(0.011)	(0.018)	(0.020)	(0.010)	(0.013)
All panels					
Individual controls	✓	✓	✓	✓	✓
Constituency controls	✓	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓	✓
Observations	42911	53747	53747	53747	53747
Mean dep. var.	0.501	0.403	0.567	0.238	0.729

heterogeneities

Facebook fosters more favourable attitudes towards women (suggestive)

	Prioritizes men on labor market (1)	Equal land rights for women (2)	Women should take care of HH (3)	Beating wife never justified (4)
	Panel A : OLS			
Social media	–0.081***	0.022**	–0.032**	0.024[a]
	(0.012)	(0.009)	(0.012)	(0.014)
	Panel B : IV-2SLS			
Social media	–0.181	–0.133	–0.122	0.253
	(0.149)	(0.089)	(0.108)	(0.172)
First-stage F-stat	66.62	66.62	66.62	66.62
	Panel C : Reduced form			
Free Basics	–0.018	–0.014	–0.012	0.026
	(0.015)	(0.009)	(0.011)	(0.019)
All panels				
Individual controls	✓	✓	✓	✓
Constituency controls	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓
Observations	16964	16964	16964	16964
Mean dep. var.	0.412	0.791	0.520	0.767

Transmission channel : Transfer of gender norms

Facebook access generates larger effect when the press is censored

Dependent variable	Winner is a woman (yes/no)			
Election relative to first treated election (t_0)	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
Free Basics × high freedom of press index	0.054	–0.000	–0.052	0.036
	(0.041)	(0.019)	(0.048)	(0.022)
Free Basics × low freedom of press index	–0.025	–0.014	0.012	0.345***
	(0.021)	(0.020)	(0.025)	(0.093)
p-value : test for equality of coefficients	0.07	0.59	0.24	0.00
Controls : internet, nighttime light, population	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓
Observations	1269	2982	5224	2185
Treated observations	1034	1295	1544	461
Constituencies	1191	1766	2353	1702
Countries	10	14	17	15

Connecting citizens to other countries matters

Data

Dependent variable	Winner is a woman (yes/no)		
Specification	Election $t_0 + 1$		
	(1)	(2)	(3)
Free Basics	0.238**	0.276**	0.231*
	(0.096)	(0.118)	(0.115)
... × FB social connectedness with people in			
... other countries (/1,000)	0.150**		0.150**
	(0.067)		(0.071)
... home country (/100,000)		–0.000	–0.000
		(0.002)	(0.002)
Controls : internet, nighttime light, population	✓	✓	✓
Country-year fixed effects	✓	✓	✓
Observations	2120	2120	2120
Treated observations	461	461	461
Constituencies	1639	1639	1639
Countries	15	15	15

→ A 1-SD ↑ in social connectedness at mean value increases female MP election by 9p.p.

Connecting citizens to progressive countries matters

Dependent variable	Winner is a woman (yes/no)				
Specification	Election $t_0 + 1$				
Global Gender Gap Scores	Overall	Politics	Education	Economy	Health
	(1)	(2)	(3)	(4)	(5)
Free Basics	0.279***	0.301**	0.314***	0.273***	0.291**
	(0.097)	(0.110)	(0.080)	(0.093)	(0.115)
... × FB social connectedness (/1,000)					
... with bottom countries	–0.043	0.011	–0.007	0.045	–0.065*
	(0.065)	(0.073)	(0.023)	(0.154)	(0.035)
... with intermediary countries	–0.065	–0.151*	–0.007	–0.015	0.140***
	(0.059)	(0.083)	(0.058)	(0.064)	(0.050)
... with top countries	0.122*	0.115**	0.175***	0.048**	–0.019
	(0.060)	(0.049)	(0.052)	(0.018)	(0.260)
Controls : internet, nighttime light, population	✓	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓	✓
Observations	2120	2120	2120	2120	2120
Treated observations	461	461	461	461	461
Constituencies	1639	1639	1639	1639	1639
Countries	15	15	15	15	15

Conclusion

Conclusion

◇ We document that Free Basics, the leading zero-rating policy led by Facebook, fuels connectivity and social media (Facebook) consumption in sub-Saharan Africa.

◇ Large effect on female political representation in the medium-run, driven by endorsement of new female politicians by established parties.

◇ Electoral effect reflects changes in political demand expressed by Facebook users for a more gender-equal society and a renewal of the political class, in a context of low freedom of the press and gender norms :

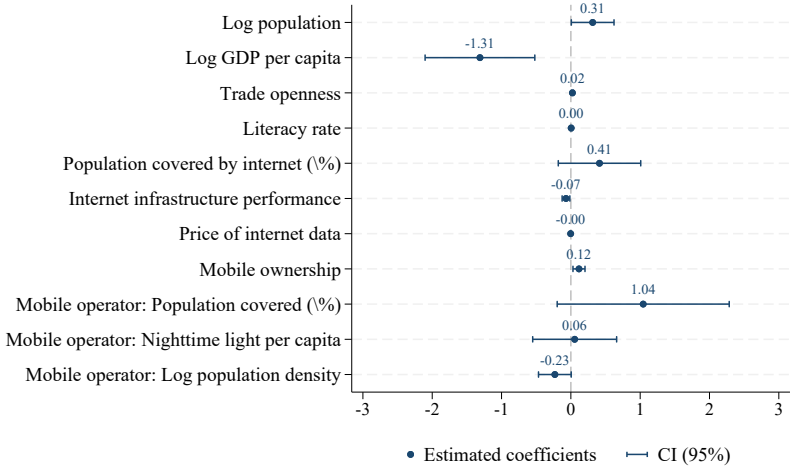
- Facebook exposes citizens to content produced abroad, including in countries with progressive gender norms, which fosters its positive effect on female election.

◇ Calls for a broader understanding of the interplay between social media and norm transition : traditional norms, cultural persistence, harmful attitudes and practices, ethnic sentiment.
↪ on our agenda !

Appendix

Timing of partnerships with Facebook : survival analysis

Back



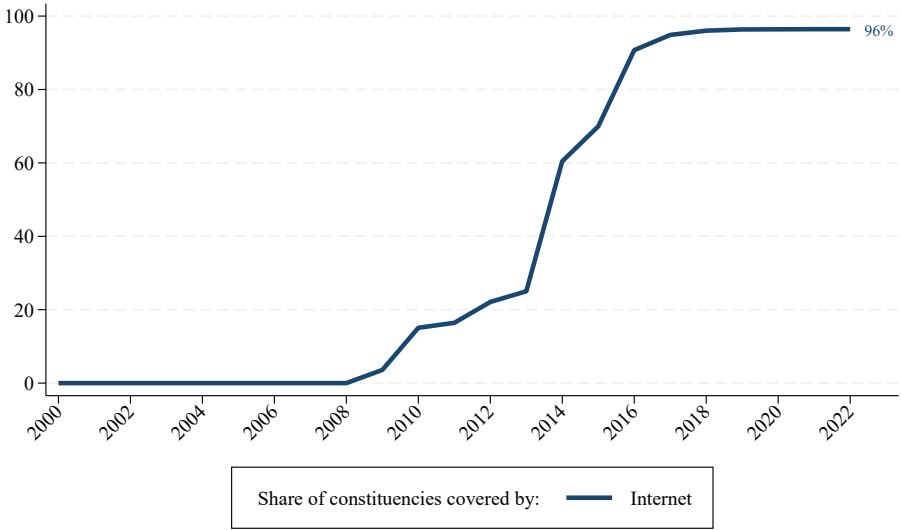
- Unit of obs : mobile operator (53 observations).
- Explanatory variables measured in pre-partnership period (year 2014).

Drivers of partnerships with Facebook

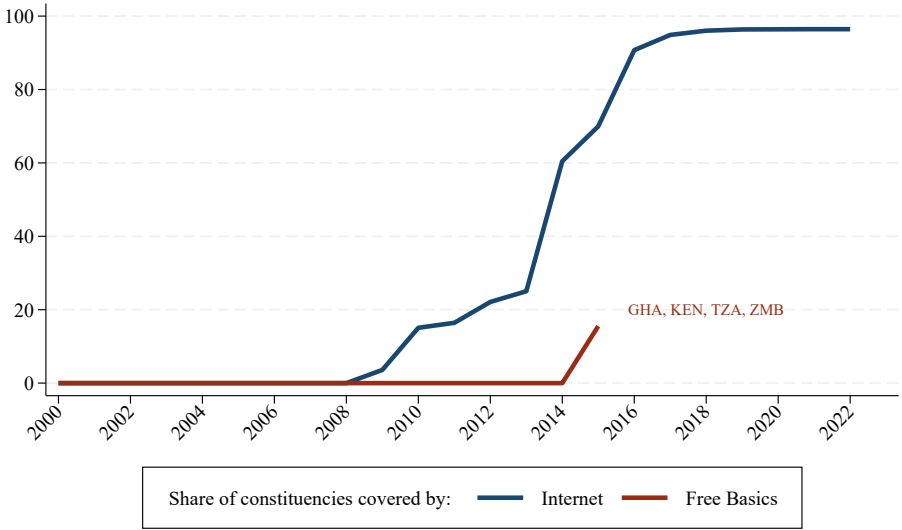
Back

Dependent variable	Signed a partnership with Facebook (Yes/No)			
	(1)	(2)	(3)	(4)
Log population	0.288***	0.197*	0.188	0.157
	(0.081)	(0.107)	(0.117)	(0.114)
Log GDP per capita	–0.087	–0.407*	–0.591**	–0.498*
	(0.127)	(0.210)	(0.257)	(0.278)
Trade openness	0.013***	0.014***	0.011*	0.008
	(0.005)	(0.004)	(0.006)	(0.006)
Literacy rate	–0.006	–0.003	0.003	0.002
	(0.005)	(0.006)	(0.006)	(0.007)
Population covered by internet (%)		0.236**	0.088	0.060
		(0.092)	(0.114)	(0.109)
Internet infrastructure performance		–0.030*	–0.041*	–0.047**
		(0.016)	(0.021)	(0.020)
Price of internet data		–0.001	–0.000	–0.000
		(0.002)	(0.002)	(0.002)
Mobile ownership		0.051*	0.059**	0.050*
		(0.025)	(0.029)	(0.028)
Mobile operator : Population covered (%)			1.025***	1.011***
			(0.328)	(0.329)
Mobile operator : Nighttime light per capita			–0.178	–0.154
			(0.208)	(0.212)
Mobile operator : Log population density			–0.169***	–0.168**
			(0.062)	(0.062)
Mobile operator : Female MPs (%)			–0.634	
			(1.229)	
Mobile operator : Vote share of female candidates (MP)				0.867
				(2.166)
Observations	57	57	53	53
R2	0.182	0.338	0.533	0.533
Mean dep. var.	0.39	0.39	0.39	0.39

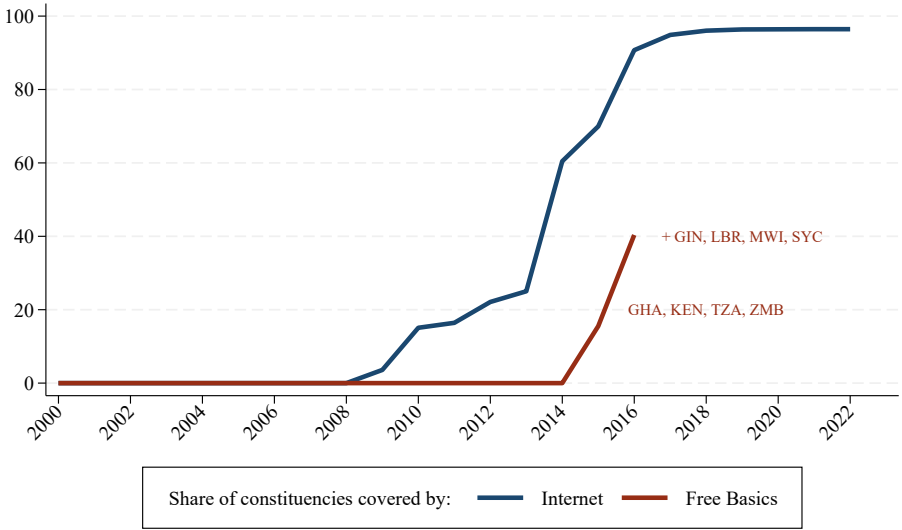
Staggered roll-out of internet



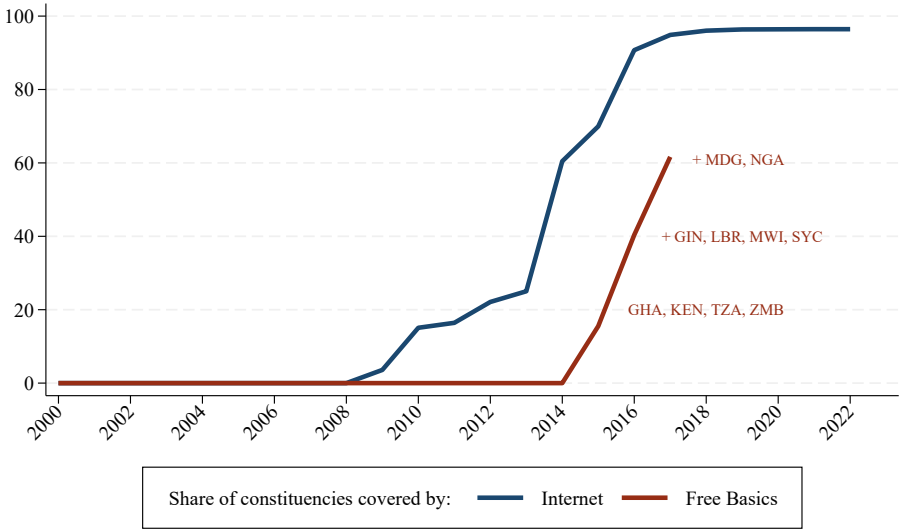
Staggered roll-out of Free Basics : constituency level



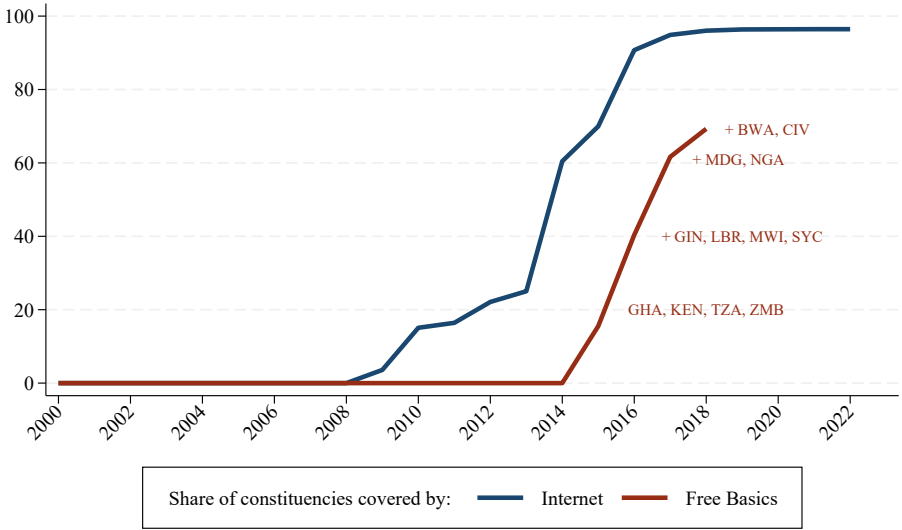
Staggered roll-out of Free Basics : constituency level



Staggered roll-out of Free Basics : constituency level

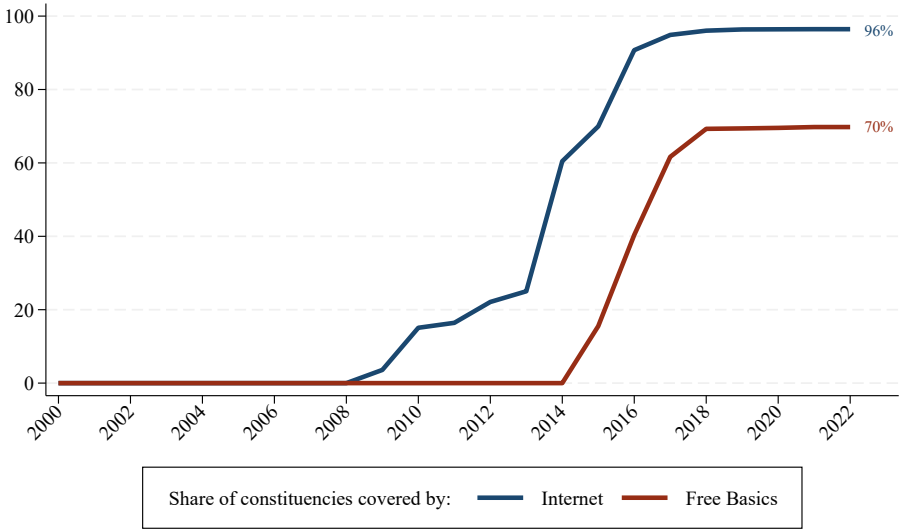


Staggered roll-out of Free Basics : constituency level



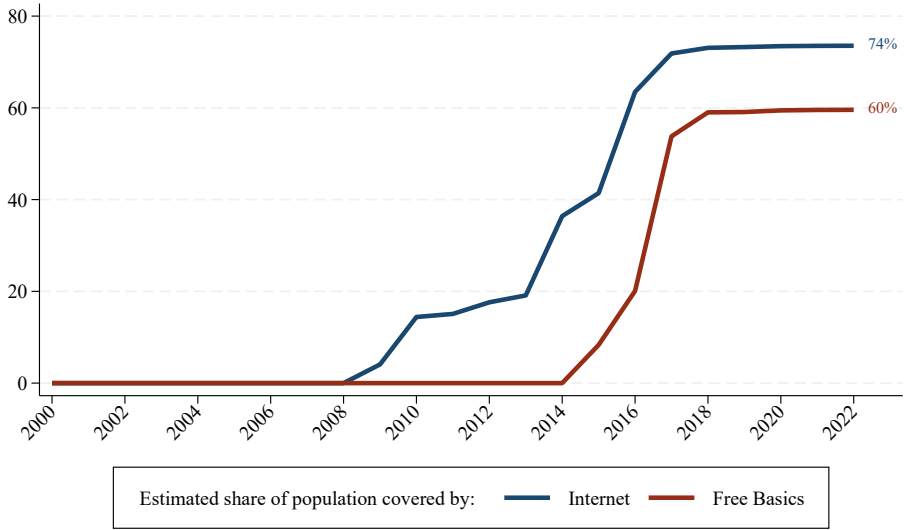
Staggered roll-out of Free Basics : constituency level

Back



Staggered roll-out of Free Basics in million people

Back



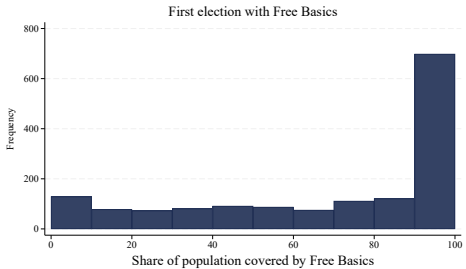
Free Basics roll-out in our sample

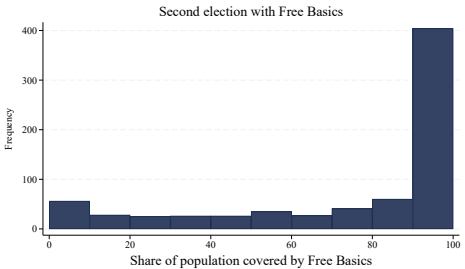
Back

Country	Free Basics	Operators	Partnership Date
Botswana	Yes	BTC	End 2017-Early 2018
Gambia	Never covered		
Ghana	Yes	Airtel	01/2015
		Tigo	10/2014
		MTN	02/2015
		Vodafone	2017
Guinea	Yes	Cellcom	11/2015
Ivory Coast	Yes	MTN	08/2017
		Moov	2019
Kenya	Yes	Airtel	11/2014
		Safaricom	2016
Lesotho	Never covered		
Liberia	Yes	Cellcom	10/2015
		Lonestar cell	06/2020
		Orange	04/2016
Madagascar	Yes	BIP (Blueline)	06/2016
		Orange	08/2016
Malawi	Yes	TNM	05/2015
		Airtel	05/2015
Nigeria	Yes	Airtel	05/2016
		Etisalat	02/2017
		Tizeti	11/2017
		Coollink	08/2016
		9Mobil	07/2017
Seychelles	Yes	Airtel	11/2015
Sierra Leone	Considered but nerver launched		
Tanzania	Yes	Tigo	10/2014
		Airtel	06/2016
		Vodacom	2016 - 2019
Uganda	Considered but never launched		
Zambia	Yes	Airtel	07/2014
		MTN	07/2017
Zimbabwe	Considered but never launched		

Distribution of Free Basics coverage in treated constituencies

Back





Free Basics fuels connectivity and consumption of social media news

Back

Dependent variable	Gets news from social media	Gets news from internet	Uses internet frequently	Owns mobile phone
	(1)	(2)	(3)	(4)
Free Basics	0.137***	0.135***	0.130***	0.087***
	(0.014)	(0.014)	(0.013)	(0.013)
Individual controls	✓	✓	✓	✓
Constituency controls	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓
Observations	63700	63700	63700	63700
Mean dep. var.	0.262	0.247	0.247	0.775
R^2	0.235	0.209	0.214	0.243

Free Basics fuels connectivity - Compliers

Back

Dependent variable	Gets news from social media				
	(1)	(2)	(3)	(4)	(5)
Free Basics	0.070***	0.159***	0.137***	0.090***	0.141***
	(0.018)	(0.014)	(0.014)	(0.018)	(0.014)
Free Basics × Primary education	0.099***				
	(0.023)				
Free Basics × Female		−0.044***			
		(0.012)			
Free Basics × Age (centered)			−0.003***		
			(0.001)		
Free Basics × Catholic				0.045***	
				(0.016)	
Free Basics × Other christian				0.032*	
				(0.017)	
Free Basics × Muslim				0.073***	
				(0.026)	
Free Basics × Nightlight (mean)					−0.000
					(0.000)
Individual controls	✓	✓	✓	✓	✓
Constituency controls	✓	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓	✓
Observations	63700	63700	63700	63700	63700
R^2	0.237	0.236	0.237	0.235	0.236

Heterogeneities :

◇ social media consumption ↑ by 115% of the mean among low educated vs. 47% among educated

◇ connectivity shock decreasing with age (but lower ex-ante take-up for older individuals)

◇ stronger connectivity shock for religious individuals (i.e. + 44% for catholics ; +66% for muslims)

◇ stronger connectivity shock in areas with low nightlight (low ex-ante take-up)

Similar compliance across genders :

◇ ↑ by 52% of the mean for both men and women

Robustness check : composition effects 1/2 Back

Dependent variable	Winner is a woman (yes/no)			
Election relative to first treated election (t_0)	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
Constant sample of countries				
Free Basics	0.015	–0.014	–0.018	0.265**
	(0.039)	(0.017)	(0.039)	(0.102)
Observations	1255	2625	4268	2173
Treated observations	1020	1145	1301	701
Constituencies	1177	1422	1735	1535
Countries	10	10	10	10
Races used in dependent variable	2449	4047	6005	3840
Controls : internet, nighttime light, population	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓

Notes :The following countries are excluded by the sample selection rule : Guinea, Ivory Coast, Liberia, Madagascar, Seychelles, Sierra Leone, and Uganda.

Robustness check : composition effects 2/2

Back

Dependent variable	Winner is a woman (yes/no)			
Election relative to first treated election (t_0)	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
Constant sample of constituencies				
Free Basics	0.019	0.004	–0.072	0.506***
	(0.039)	(0.041)	(0.050)	(0.040)
Observations	1206	2330	3398	1761
Treated observations	993	995	947	434
Constituencies	1128	1128	1128	1128
Countries	10	10	10	10
Races used in dependent variable	2382	3458	4527	3021
Controls : internet, nighttime light, population	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓

Notes : The following countries are excluded by the sample selection rule : Guinea, Ivory Coast, Liberia, Madagascar, Seychelles, Sierra Leone, and Uganda.

Robustness check : electoral rules 1/2

Back

Dependent variable	Winner is a woman (yes/no)			
Election relative to first treated election (t_0)	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
Free Basics × no reserved seats	0.024	–0.021	–0.045	0.297
	(0.042)	(0.026)	(0.042)	(0.182)
Free Basics × reserved seats	–0.049	0.006	0.019	0.179**
	(0.034)	(0.014)	(0.017)	(0.077)
p-value : test for equality of coefficients	0.12	0.36	0.15	0.54
Controls : internet, nighttime light, population	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓
Observations	1253	2964	5224	2411
Treated observations	1020	1279	1544	728
Constituencies	1177	1764	2353	1773
Countries	10	14	17	15

Notes : Countries with reserved seats for women are : Kenya, Tanzania, Uganda and Zimbabwe.

Robustness check : electoral rules 2/2

Back

Dependent variable	Winner is a woman (yes/no)			
Election relative to first treated election (t_0)	t_0-3	t_0-2	t_0	t_0+1
	(1)	(2)	(3)	(4)
Free Basics × FPTP only	0.024	–0.036	–0.079	0.524***
	(0.042)	(0.030)	(0.050)	(0.035)
Free Basics × Mixed system	–0.049	0.012	0.020	0.147*
	(0.034)	(0.016)	(0.019)	(0.073)
p-value : test for equality of coefficients	0.12	0.15	0.06	0.00
Controls : internet, nighttime light, population	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓
Observations	1253	2964	5224	2411
Treated observations	1020	1279	1544	728
Constituencies	1177	1764	2353	1773
Countries	10	14	17	15

Notes : Countries with mixed electoral systems are : Guinea (FPTP + one national constituency with PR), Ivory Coast (FPTP + multi-member constituencies with winner take all), Kenya (FPTP + reserved seats), Lesotho (FPTP + PR), Madagascar (FPTP + + multi-member constituencies with PR), Seychelles (FPTP + additional seats attributed to parties with PR), Sierra Leone (FPTP + seats attributed at province level), Tanzania (FPTP + reserved seats), Uganda (FPTP + reserved seats) and Zimbabwe (FPTP + reserved seats).

Heterogeneity : quality of democracy

Back

Dependent variable	Winner is a woman (yes/no)			
Election relative to first treated election (t_0)	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
Free Basics × high democracy index	0.002	–0.089	0.045	0.280
	(0.027)	(0.108)	(0.050)	(0.190)
Free Basics × low democracy index	0.020	0.002	–0.028	0.185**
	(0.050)	(0.012)	(0.036)	(0.068)
p-value : test for equality of coefficients	0.70	0.42	0.23	0.63
Controls : internet, nighttime light, population	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓
Observations	1269	2982	5224	2185
Treated observations	1034	1295	1544	461
Constituencies	1191	1766	2353	1702
Countries	10	14	17	15

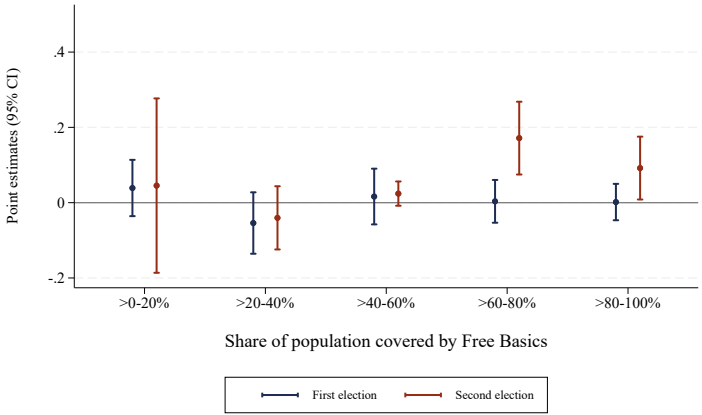
Heterogeneity : fairness of election

Back

Dependent variable	Winner is a woman (yes/no)			
Election relative to first treated election (t_0)	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
Free Basics × fair election	0.039	–0.009	–0.019	0.274***
	(0.040)	(0.017)	(0.033)	(0.094)
Free Basics × unfair election	–0.036**	–0.005	–0.007	0.035
	(0.015)	(0.008)	(0.075)	(0.029)
p-value : test for equality of coefficients	0.04	0.87	0.89	0.01
Controls : internet, nighttime light, population	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓
Observations	1269	2982	5224	2185
Treated observations	1034	1295	1544	461
Constituencies	1191	1766	2353	1702
Countries	10	14	17	15

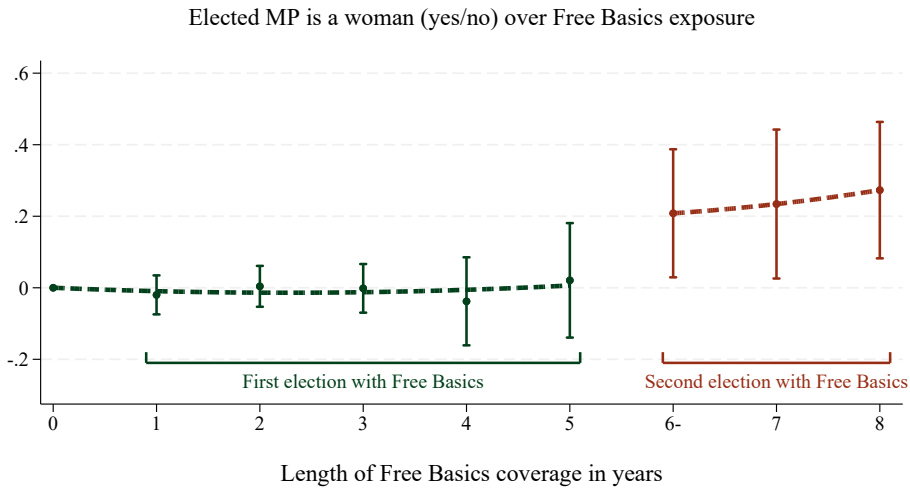
Heterogeneity : treatment intensity

Back



Heterogeneity : length of exposure to treatment

Back



Robustness check : spatial clustering

Back

Dependent variable	Winner is a woman (yes/no)			
Election relative to first treated election (t_0)	$t_0 - 3$	$t_0 - 2$	t_0	$t_0 + 1$
	(1)	(2)	(3)	(4)
Free Basics	0.012	–0.020	–0.021	0.239**
	(0.058)	(0.019)	(0.029)	(0.088)
	[0.839]	[0.301]	[0.461]	[0.012]
spatial clustering, distance threshold : 250km	[0.790]	[0.685]	[0.592]	[0.102]
... : 500km	[0.775]	[0.677]	[0.514]	[0.033]
... : 750km	[0.731]	[0.594]	[0.479]	[0.025]
Controls : internet, nighttime light, population	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓
Observations	1269	2982	5224	2185
Treated observations	1034	1295	1544	461
Constituencies	1191	1766	2353	1702
Countries	10	14	17	15

Attitudes towards female leaders - Heterogeneities (reduced form)

Back

Dependent variable	Women leadership in politics				
	(1)	(2)	(3)	(4)	(5)
Free Basics	0.031*	0.021	0.020*	0.038*	0.020*
	(0.015)	(0.016)	(0.011)	(0.022)	(0.011)
Free Basics × Primary education	–0.017				
	(0.022)				
Free Basics × Female		–0.002			
		(0.025)			
Free Basics × Age (centered)			0.001		
			(0.001)		
Free Basics × Catholic				–0.005	
				(0.026)	
Free Basics × Other christian				–0.023	
				(0.022)	
Free Basics × Muslim				–0.038	
				(0.033)	
Free Basics × Nightlight (mean)					–0.000
					(0.000)
Individual controls	✓	✓	✓	✓	✓
Constituency controls	✓	✓	✓	✓	✓
Country-year fixed effects	✓	✓	✓	✓	✓
Observations	42911	42911	42911	42911	42911
R^2	0.085	0.085	0.085	0.085	0.085

No evidence of heterogeneities :

◇ social media may change individuals' attitudes by exposing them to alternative opinions

◇ social media may also create so-called "echo chambers" preventing people from learning about opinions different from their own

◇ differences across segments of the population in pre-existing attitudes towards women in politics add another layer of complexity in predicting heterogeneities in the effect of social media consumption

Additional data used in Transmission channel 1 Back

◇ Facebook social connectedness index :

- Region i to region j index :

$$SCI_{ij} = \frac{\#connectedusers_{ij}}{\#users_i \times \#users_j}$$

- Scaled between 1 and 1,000,000 ; adding noise to ensure anonymity ; exclude a few outlier countries (e.g. Facebook not allowed in China)
- Step 1 : we compute SCI between users in SSA region i and country k, as mean SCI between i and the different regions in k (weighted by regional population)
- Step 2 : we take mean SCI with users in other countries and average SCI with users in home country

Additional data used in Transmission channel 1 Back

◇ Global Gender Gap Scores (WEF) aggregate various indicators :

- Political empowerment :
  - Female with seats at parliament
  - Female with ministerial level
  - Nb of years with a female head of state
- Economic Participation and Opportunity :
  - Female labor force participation over male
  - Wage equality for similar work
  - etc.
- Educational Attainment
  - Female literacy rate over male
  - Female net primary enrolment rate over male
  - etc.
- Health and Survival
  - Sex ratio at birth
  - Female healthy life expectancy over male