Internet usage and migration decisions

Evidence from Nigerian micro data

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#ICDE2021
July 1, 2021

Motivation

- Interest in the determinants of recent south-north migration flows among policy maker
  - rising income levels (Clemens, 2014)
  - climate change disproportionately affecting LI countries (Beine and Parson, 2015)
  - demographic imbalances (young vs old population), ...
- Often not considered: Advances in modern ICT—e.g., the Internet—facilitate information diffusion and might affect migration choices(Ortega and Peri, 2015)
  - Individuals compare expected benefits and costs of migrating (Sjaastad, 1962)
  - Internet might reduce costs of migrating (search or psychological costs) or change preferences (i.e., valuation of expected benefits)
- Empirical investigation challenging as Internet use and migration are simultaneously affected by various SE variables (e.g., age, education)

This paper

Objective

- Empirical investigation of the effect of Internet use on migration choices

Approach

- Time and cross-sectional variation in Internet use caused by arrival of submarine Internet cables in Nigeria (Fuzzy DiD) (Hjort and Poulsen 2019)
- Geo-coded Nigerian GHS panel

Findings

- Individuals located close to the cable network respond with larger increase in Internet use and migration rates
- Effect driven by migration out of Africa and larger for individuals from the lower part of the wealth distribution
- Positive effect on subsequent remittances and human capital investments of remaining households

International migration in Nigeria

- Most populous country in Africa; experienced massive population growth
  - Population of 45 mio in 1960s; more than 200 mio today
- Young population and high fertility rates suggest further population growth
  - UN DESA: Population will surpass population of the US in 2050
- Important role in African migration due to size and demographic peculiarities
- "Reversed migration transition" (De Haas 2007) from an immigration to a net emigration country
  - *Diverse* and often permanent cross-boarder migration
  - High-skilled migration mainly to Anglo-Saxon countries
  - Low-skilled migration to Western Europe, Gulf states, and other African countries
  - High willingness to migrate, e.g., 25 % considered moving abroad, 12 % are planning to move within 2 years or are currently making preparations (Afrobarometer 2017)

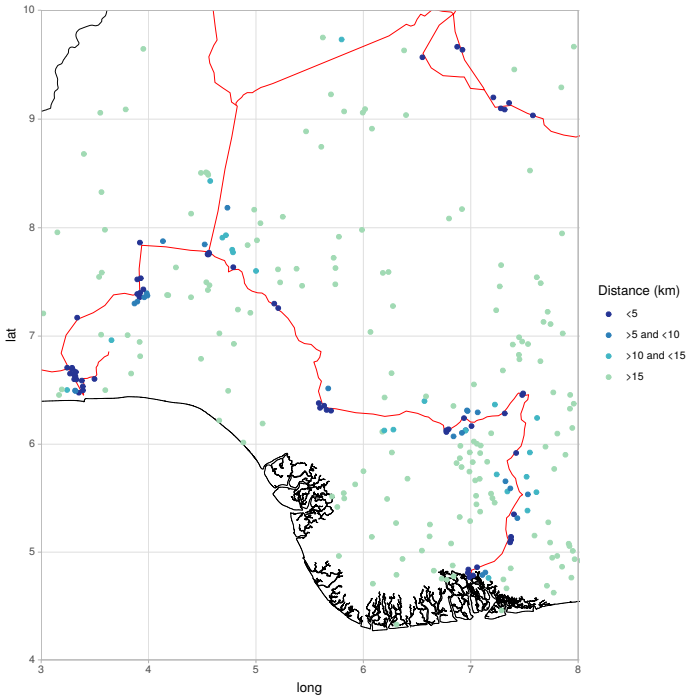
Internet use in Western Africa and Nigeria

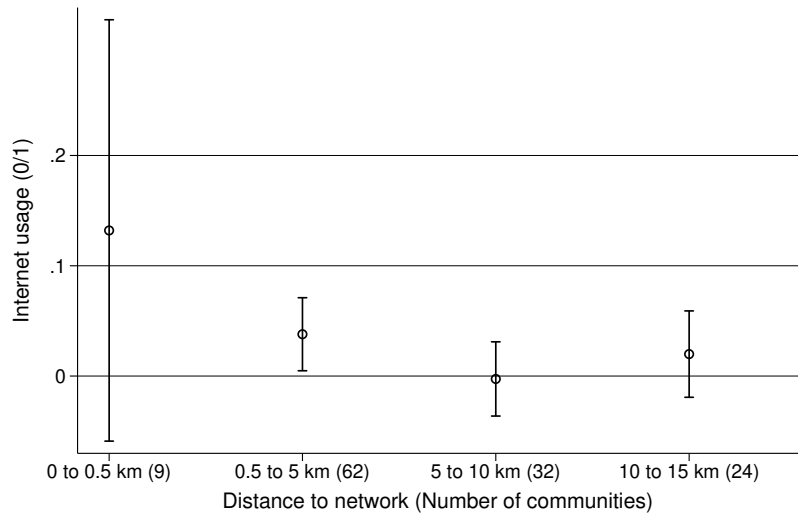
- Large increase in Internet use in Sub-Saharan Africa in the past two decades
  - Basically non-existent in 2000 (EU: 20 %), 7 % (68 %) in 2010, 25 % (82 %) in 2017
  - Much of the growth driven by Internet use in Nigeria
- Internet use in Sub-Saharan Africa depends on submarine Internet cables
  - Starting in 2010, 4 submarine cables connected from Europe to land-based stations in Western Africa
  - Brought faster, cheaper, and more reliable Internet to locations that are connected to the *terrestrial cable network* (drop in bandwidth prices by ca. 50 %)
  - Connection to terrestrial cable network (last mile technology): wireline (e.g., copper cables) or wireless (cell towers, satellites)

Data

- Nigerian geo-coded survey panel data (2010, 2012, 2016) linked to historical maps of terrestrial cable network (Figure)
  - Geo-coded data allows me to calculate distance between community and terrestrial cable network
- Questionnaire on ICT use
  - "Do you have access to the Internet?" (binary)
  - "How often do you use the Internet?" (ordinal)
- Measure of migration
  - Remaining HH members are asked about the whereabouts of individuals
  - Information about migration linked to prior Internet use (Figure)
- Final data: 21,626 obs, 435 communities, 1 before/after observation

Increase in Internet use and distance to terrestrial cable network





Note: Plot on the right shows coefficient estimates for a regression of Internet usage on interactions of a set of binary variables indicating if individual *i* is located within a bin shown on the x-axis and an indicator variable for the year 2012 (baseline: Distance to terrestrial cable network larger than 15 km). All estimates include a year dummy for the year 2012 as well as community fixed effects. Number of observations: 21,626. 95 % confidence intervals are based on cluster-robust standard errors at the community level (435 cluster). (FIGURES)

Estimation

Approach:

- Internet usage and migration simultaneously affected by SE variables suggests that naive OLS estimates are severely biased (Table)
- Exploit differential change in Internet use over time of "connected" and "unconnected" locations as exogenous source of variation in Internet use
- *Fuzzy* difference-in-difference design estimated by 2SLS:
  (De Chaisemartin and d'Haultfoeuille, 2018)

$$Int_{i,c(i),t} = \mu^F_{c(i)} + \beta^F_0 \mathbb{1}[t = 12] + \beta^F_1 \mathbb{1}[t = 12] * Dist_{c(i)} + e_{i,c(i),t}$$

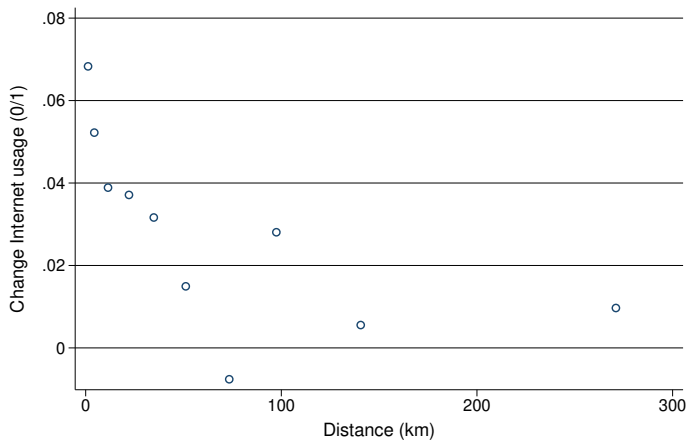
$$Mig_{i,c(i),t+k(t)} = \mu^S_{c(i)} + \beta^S_0 \mathbb{1}[t = 12] + \beta^S_1 \hat{Int}_{i,c(i),t} + \epsilon_{i,c(i),t}$$

Identifying assumption:

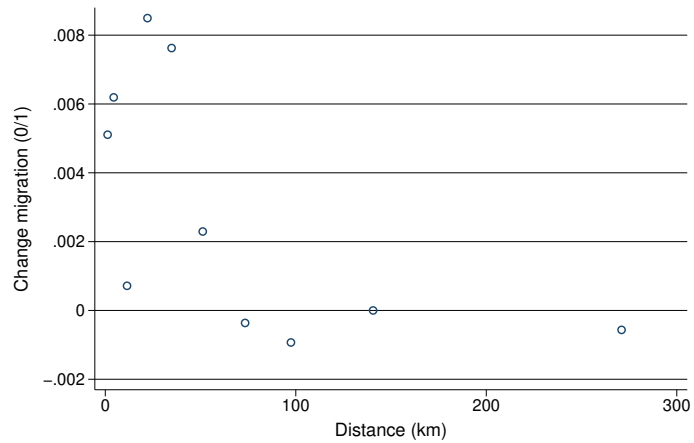
- Migration rates would have evolved similarly if the share of Internet users had not expanded differently across locations

$\rightarrow \beta^S_1$ estimates the effect of *Int* on *Mig* for compliers/switchers in connected areas

Illustration of first-stage and reduced form relationship



(a) Change in Internet use



(b) Change in migration rate

Note: Binned scatter plot (10 equally sized bins) of difference in community mean Internet usage (left) and migration (right) between 2012 and 2010 and distance to terrestrial cable network in kilometers. 435 communities included. (FIGURES)

Main findings, robustness, and further results

Main results

- Individuals located close to the cable network respond with larger increase in Internet use and migration rates
  - 2SLS estimate: Internet use increases migration by 10pp (Table) (Table reduced)

Robustness

- Exclude observations close to (Table) or remote from connected areas (Table)
- Add placebo treatment variables (Table)
- Exclude locations in connected area with employment growth (Table)
- Test for differential trends in observable variables (Table)
- Check pre-treatment trend for outcome variable (Table)

Further results

- Effect driven by for migration out of Africa (Table) and larger for individuals from the lower part of the wealth distribution (Table)
- Positive effect on subsequent remittances and human capital investments of remaining households (Table)

Appendix

Internet usage and migration decisions

Mean values of selected variables by Internet usage

	No Internet usage	Internet usage
Socio-economic		
Age	32.56	29.13
Female	0.53	0.35
Household member		
Head	0.26	0.23
Spouse	0.34	0.09
Son/Daugther	0.35	0.61
Other	0.05	0.08
Currently enrolled	0.22	0.45
Highest education		
No schooling	0.37	0.02
Some schooling	0.25	0.04
Secondary education	0.35	0.66
University degree	0.02	0.28
Number of wealth items		
0	0.25	0.02
1	0.31	0.06
2	0.28	0.31
3	0.14	0.53
4	0.02	0.09
Other ICT usage		
Television	0.51	0.97
Mobile phone	0.80	0.99
Location		
Urban	0.24	0.64
Distance next road	14.62	7.33
Internet usage frequency		
At least once a month	0.00	0.34
At least once a week	0.00	0.45
Daily	0.00	0.21
Outcome		
International Migration (in %)	0.18	1.23
Observations		
Total	20,328	1,298
Share in 2012	0.50	0.60

Note: Mean values of covariates by Internet usage.

go back

Internet usage and migration decisions

OLS: International migration (binary) on Internet usage and Internet usage frequency

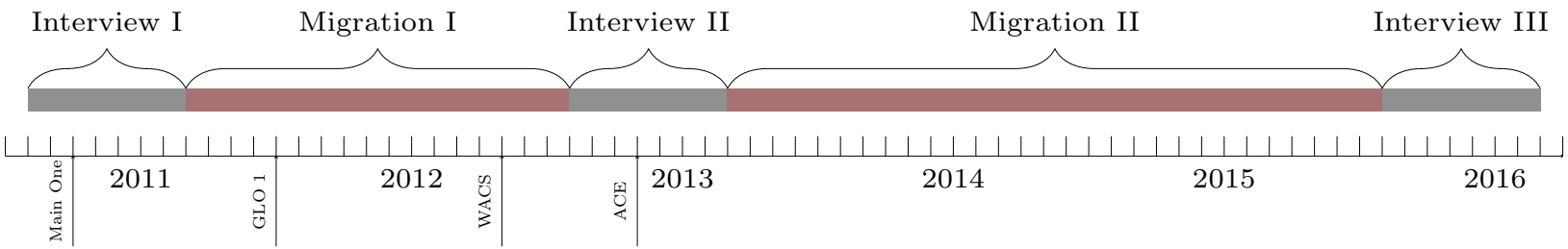
	(1)	(2)	(3)	(4)	(5)
Panel A					
Internet usage	0.0103***	0.0082**	0.0082**	0.0085**	0.0080**
	(0.0039)	(0.0039)	(0.0039)	(0.0038)	(0.0037)
Panel B					
Internet usage frequency	0.0051***	0.0041**	0.0042**	0.0044**	0.0043**
	(0.0019)	(0.0020)	(0.0020)	(0.0020)	(0.0020)
Year 12 FE	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes	Yes
State FE	No	No	Yes	No	No
County FE	No	No	No	Yes	No
Community FE	No	No	No	No	Yes
Observations	21,626	21,626	21,626	21,626	21,626
Cluster	435	435	435	435	435

Note: Regression of a binary variable indicating whether an individual moved to another country on Internet usage and Internet usage frequency in the previous wave. Internet usage frequency is a ordinal measure (0 = less than a month / no access, 1 = at least once a month, 2 = at least once a week, 3 = daily). Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Time line of events: Arrival of submarine Internet cables and survey waves

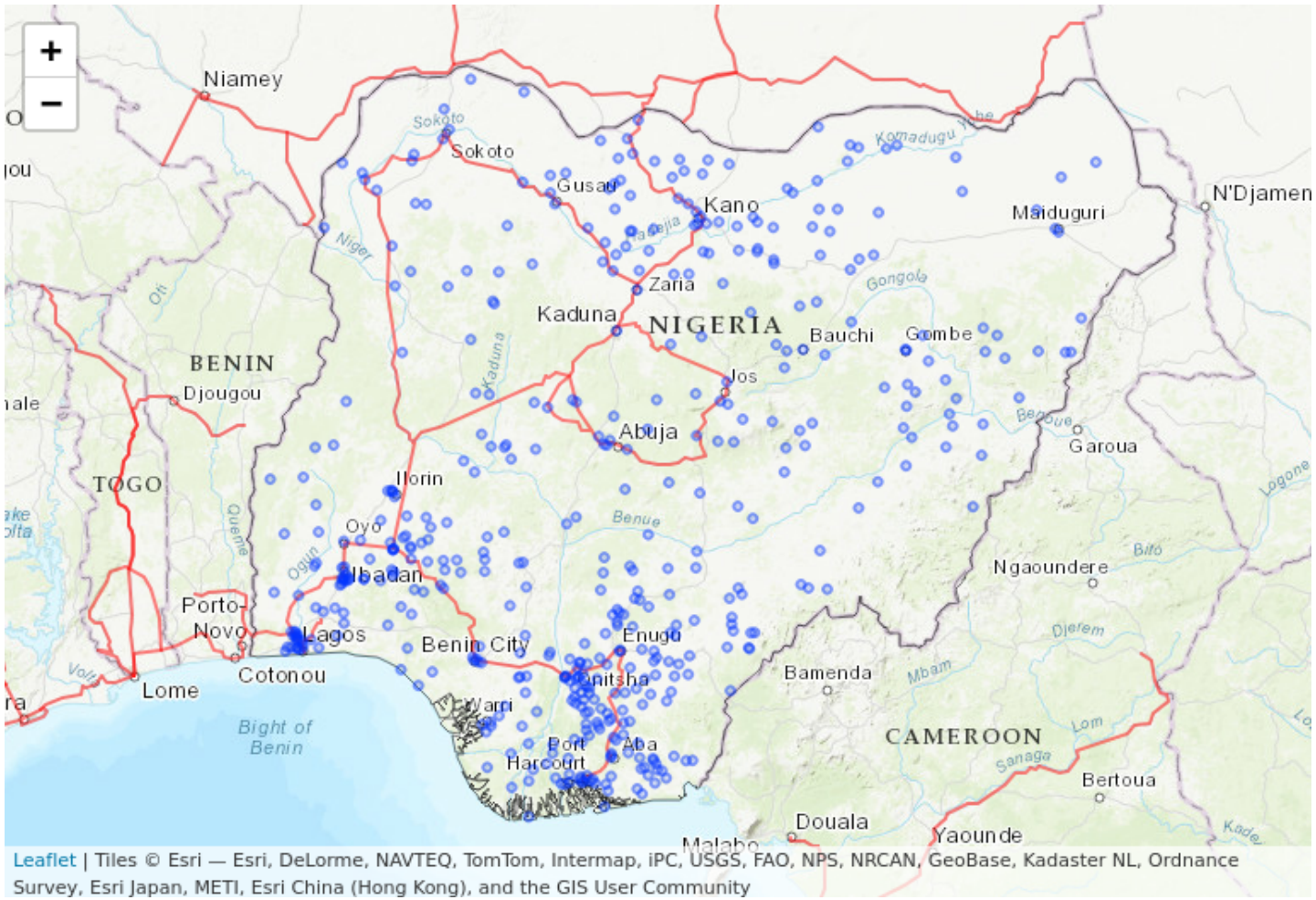


Sources: Stanley et al. 2018, Hjort and Poulsen 2019, Nigerian GHS panel.

go back

Internet usage and migration decisions

Nigeria, terrestrial cable network, and included communities

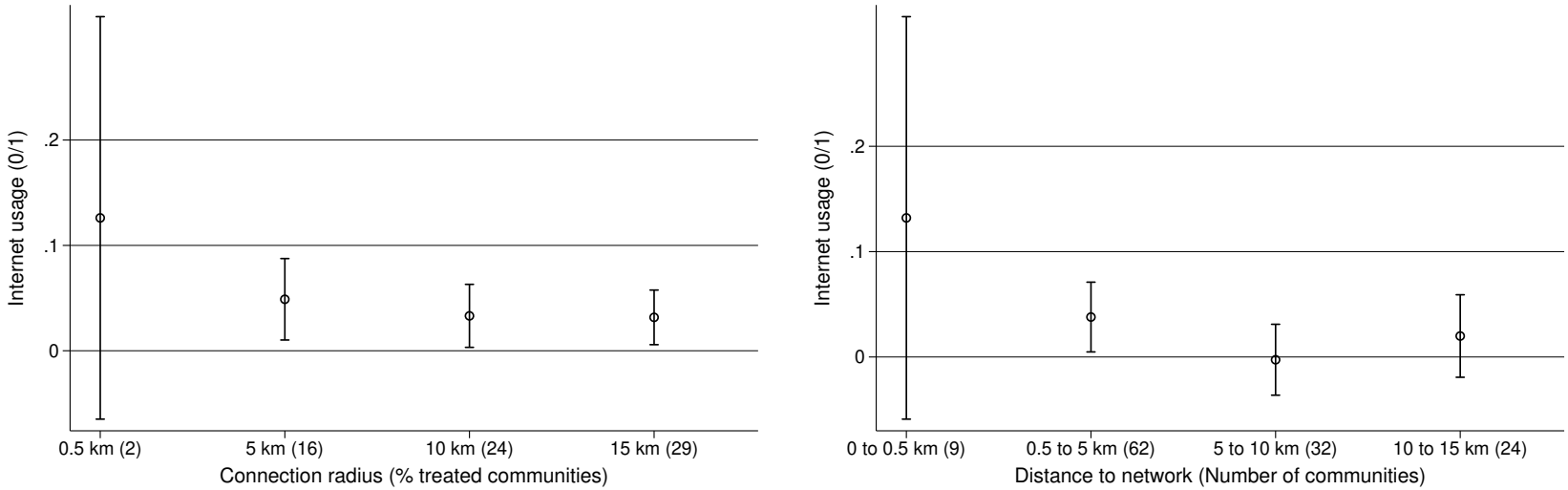


Notes: Red lines illustrate the diffusion of the terrestrial cable network in Nigeria and neighbouring countries. Blue dots indicate communities that are included in the final data set. Sources: Mapcruzin.com, Hjort and Poulsen 2019, Nigerian GHS panel.

go back

Internet usage and migration decisions

Internet usage and distance to terrestrial cable network, 2010-12 change

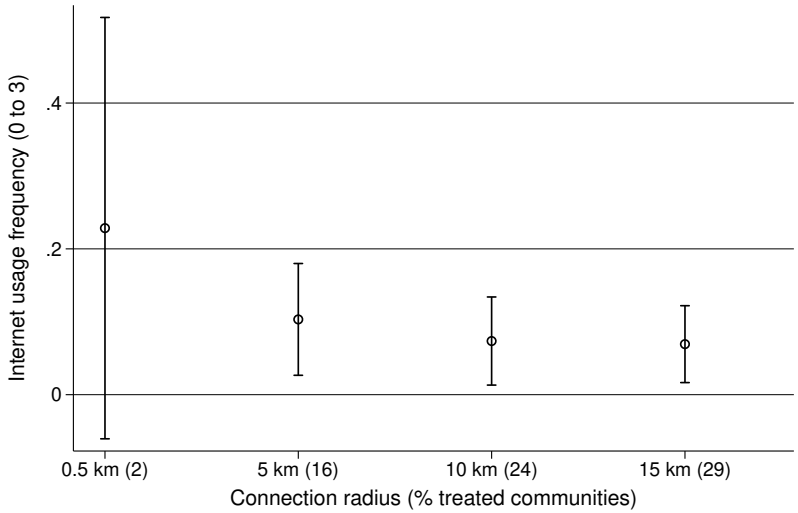


Note: Plot on the left shows coefficient estimates for four separate regressions of Internet usage on an interaction term of a binary variable indicating if individual *i* is located in a community within the connection radius shown on the x-axis to the terrestrial cable network and an indicator variable for the year 2012. Plot on the right shows coefficient estimates for a regression of Internet usage on a set of binary variables indicating if individual *i* is located within a bin shown on the x-axis (baseline: Distance to terrestrial cable network larger than 15 km). All estimates include a year dummy for the year 2012 as well as community fixed effects. Number of observations: 21,626. 95 % confidence intervals are based on cluster-robust standard errors at the community level (435 cluster).

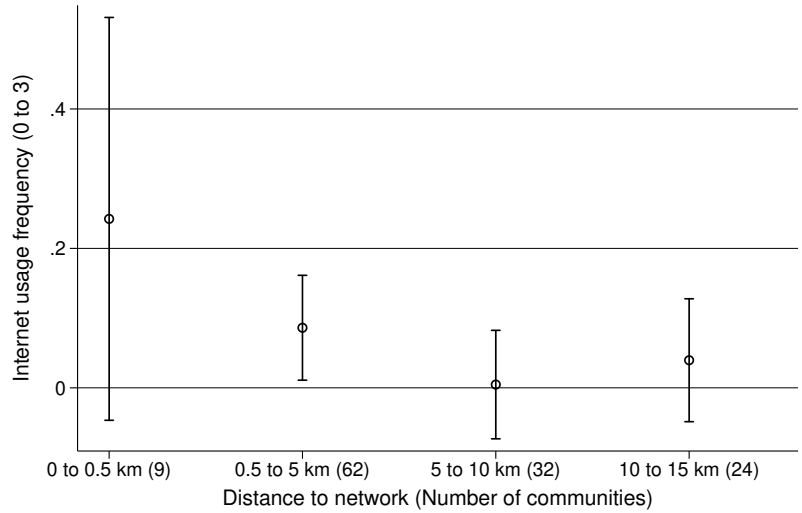
go back

Internet usage and migration decisions

Internet usage and distance to terrestrial cable network, 2010-12 change



(a) Full sample, Internet usage frequency



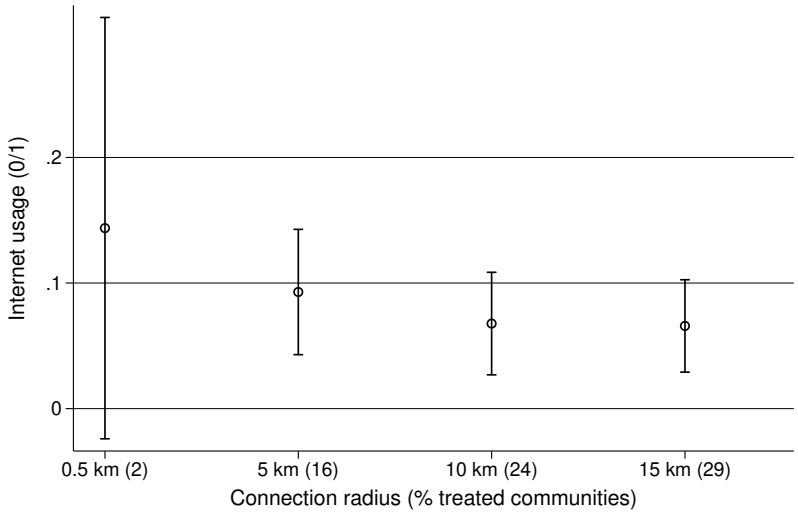
(b) Full sample, Internet usage frequency

Note: Plots on the left show coefficient estimates for four separate regressions of Internet usage or Internet usage frequency on an interaction term of a binary variable indicating if individual *i* is located in a community within the connection radius shown on the x-axis to the terrestrial cable network times an indicator variable for the year 2012. Plots on the right show coefficient estimates for a regression of Internet usage or Internet usage frequency on a set of binary variables indicating if individual *i* is located within a bin shown on the x-axis (baseline: Distance to terrestrial cable network larger than 15 km). All estimates include a year dummy for the year 2012 as well as community fixed effects. Young individuals are between 20 and 35 at interview date. Number of observations: 21,626 (full sample), 8,963 (young individuals). 95 % confidence intervals are based on cluster-robust standard errors at the community level (435 cluster).

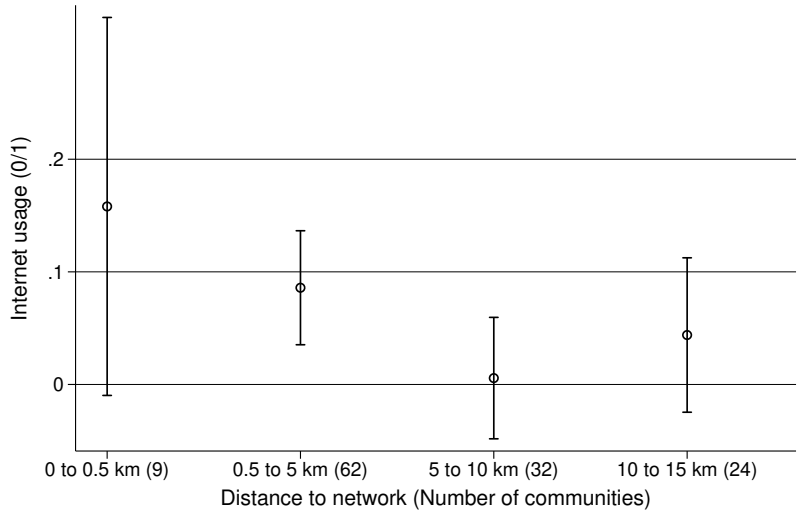
go back

Internet usage and migration decisions

Internet usage and distance to terrestrial cable network, 2010-12 change



(a) Young individuals, Internet usage



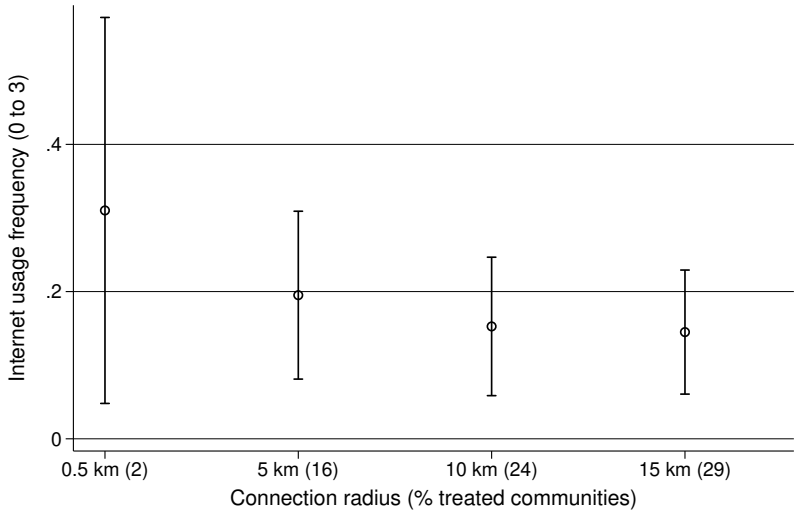
(b) Young individuals, Internet usage

Note: Plots on the left show coefficient estimates for four separate regressions of Internet usage or Internet usage frequency on an interaction term of a binary variable indicating if individual *i* is located in a community within the connection radius shown on the x-axis to the terrestrial cable network times an indicator variable for the year 2012. Plots on the right show coefficient estimates for a regression of Internet usage or Internet usage frequency on a set of binary variables indicating if individual *i* is located within a bin shown on the x-axis (baseline: Distance to terrestrial cable network larger than 15 km). All estimates include a year dummy for the year 2012 as well as community fixed effects. Young individuals are between 20 and 35 at interview date. Number of observations: 21,626 (full sample), 8,963 (young individuals). 95 % confidence intervals are based on cluster-robust standard errors at the community level (435 cluster).

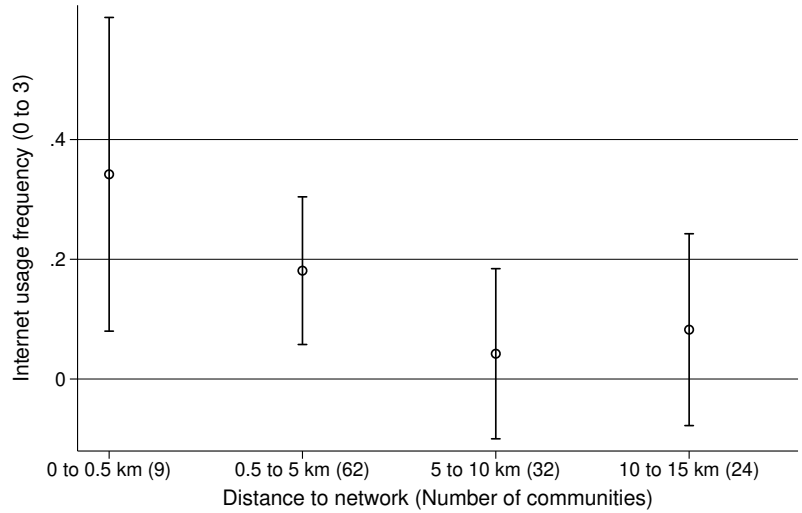
go back

Internet usage and migration decisions

Internet usage and distance to terrestrial cable network, 2010-12 change



(a) Young individuals, Internet usage frequency



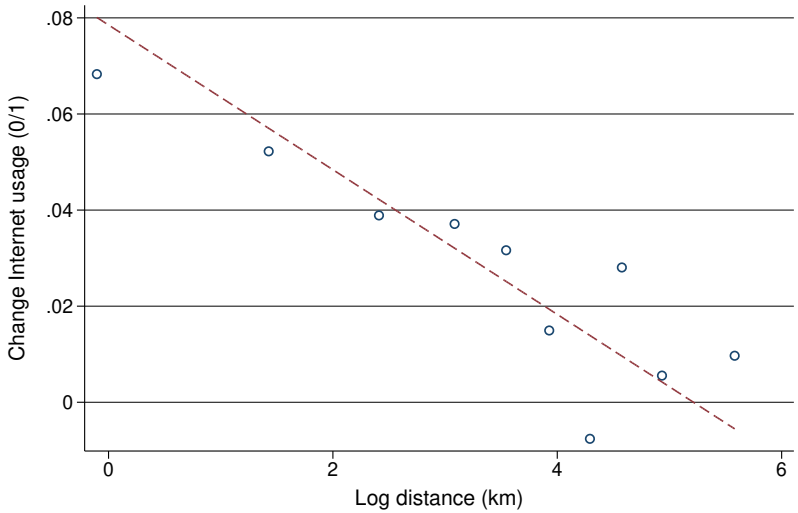
(b) Young individuals, Internet usage frequency

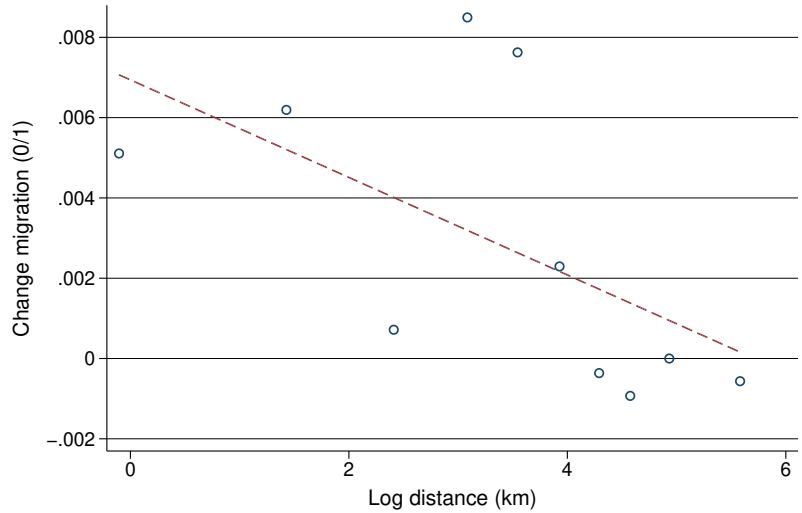
Note: Plots on the left show coefficient estimates for four separate regressions of Internet usage or Internet usage frequency on an interaction term of a binary variable indicating if individual *i* is located in a community within the connection radius shown on the x-axis to the terrestrial cable network times an indicator variable for the year 2012. Plots on the right show coefficient estimates for a regression of Internet usage or Internet usage frequency on a set of binary variables indicating if individual *i* is located within a bin shown on the x-axis (baseline: Distance to terrestrial cable network larger than 15 km). All estimates include a year dummy for the year 2012 as well as community fixed effects. Young individuals are between 20 and 35 at interview date. Number of observations: 21,626 (full sample), 8,963 (young individuals). 95 % confidence intervals are based on cluster-robust standard errors at the community level (435 cluster).

go back

Internet usage and migration decisions

Internet usage, migration, and distance to terrestrial cable network, 2010-12 change



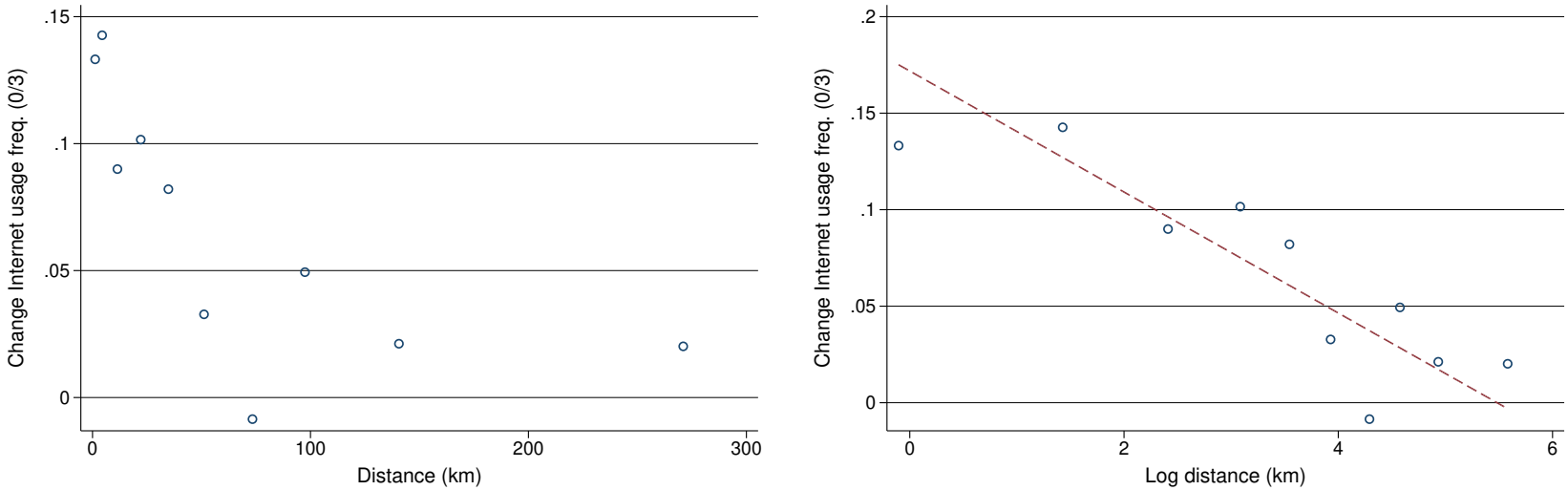


Note: Binned scatter plot (10 equally sized bins) of difference in community mean Internet usage (left) and migration (right) between 2012 and 2010 and logartihmized distance to terrestrial cable network (right). 435 communities included.

go back

Internet usage and migration decisions

Internet usage, migration, and distance to terrestrial cable network, 2010-12 change



Note: Binned scatter plot (10 equally sized bins) of difference in community mean Internet usage frequency between 2012 and 2010 and distance to terrestrial cable network in kilometres (left) and logartihmized distance to terrestrial cable network (right). 435 communities included.

go back

Internet usage and migration decisions

Reduced form estimation: Migration on distance to terrestrial network

	(1)	(2)	(3)	(4)
Log(Distance to network) * Year 12	-0.0014***	-0.0014***	-0.0024***	-0.0024***
	(0.0005)	(0.0005)	(0.0009)	(0.0009)
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Restricted: Age 20 to 35	No	No	Yes	Yes
Observations	21,626	21,626	8,963	8,963
Cluster	435	435	435	435

Note: Dependent variable is a binary variable indicating if an individual migrated to another country. Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Reduced form estimation: Robustness, network distance not logarithmized

	(1)	(2)	(3)	(4)
Distance to network * Year 12	-0.0026***	-0.0027***	-0.0037***	-0.0037***
	(0.0008)	(0.0008)	(0.0012)	(0.0012)
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Restricted: Age 20 to 35	No	No	Yes	Yes
Observations	21,626	21,626	8,963	8,963
Cluster	435	435	435	435

Note: Dependent variable is a binary variable indicating if an individual migrated to another country. Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Reduced form estimation: Robustness, binary measure

	(1)	(2)	(3)	(4)
Panel A: Entire sample				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.0052*	0.0053*	0.0053*	0.0062**
	(0.0029)	(0.0029)	(0.0029)	(0.0029)
Observations	21,626	20,259	18,406	16,721
Cluster	435	403	361	327
Panel B: Age 20 to 35				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.0104*	0.0106*	0.0108*	0.0117**
	(0.0055)	(0.0055)	(0.0055)	(0.0055)
Observations	8,963	8,408	7,682	6,986
Cluster	435	403	361	327
Included covariates (Panel A and B):				
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Excluded observations (Panel A and B):				
Distance between 5 and 10 km	No	Yes	Yes	Yes
Distance between 10 and 20 km	No	No	Yes	Yes
Distance between 20 to 30 km	No	No	No	Yes

Note: Dependent variable is a binary variable indicating if an individual migrated to another country. Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Reduced form estimation: Robustness, binary measure, excluding remote locations

	(1)	(2)	(3)	(4)
Panel A: Entire sample				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.0052*	0.0041	0.0046	0.0049
	(0.0029)	(0.0030)	(0.0034)	(0.0048)
Observations	21,626	15,944	6,492	4,639
Cluster	435	333	145	103
Panel B: Age 20 to 35				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.0104*	0.0093*	0.0085	0.0085
	(0.0055)	(0.0056)	(0.0063)	(0.0080)
Observations	8,963	6,582	2,696	1,970
Cluster	435	333	145	103
Included covariates (Panel A and B):				
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Excluded observations (Panel A and B):				
Distance $>$ 100 km	No	Yes	Yes	Yes
Distance $>$ 20 km	No	No	Yes	Yes
Distance $>$ 10 km	No	No	No	Yes

Note: Dependent variable is a binary variable indicating if an individual migrated to another country. Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Community mean values by distance to the terrestrial cable network

	Distance $>$ 5 km	Distance $<$ 5 km	Mean diff.
Community			
located in states: Lagos, Abuja	0.02	0.17	-0.15***
			(0.03)
located in urban area	0.22	0.73	-0.52***
			(0.05)
with high share of educated individuals in 2010	0.23	0.38	-0.15**
			(0.06)
with high share of Internet user in 2010	0.21	0.49	-0.28***
			(0.06)

Note: Mean values and mean difference tests of selected community characteristics by distance to the terrestrial cable network. A community has a high share of Internet users (educated individuals) if the share of Internet users (college educated individuals) is in the highest quartile in the sample. Sample size: 435 (distance < 5 km: 71).
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Reduced form estimation: Robustness, additional controls (I)

	(1)	(2)	(3)	(4)	(5)
Panel A: Entire sample					
Log(Distance to network) * Year 12	-0.0015***	-0.0011**	-0.0011***	-0.0013***	-0.0011***
	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0004)
Lagos or Abuja * Year 12	-0.0034				-0.0044
	(0.0036)				(0.0038)
Urban * Year 12		0.0026			0.0016
		(0.0020)			(0.0021)
Internet usage year 10 * Year 12			0.0037*		0.0033
			(0.0021)		(0.0026)
Education year 10 * Year 12				0.0014	-0.0003
				(0.0023)	(0.0029)
Observations	21,626	21,626	21,626	21,626	21,626
Cluster	435	435	435	435	435
Included covariates (Panel A and B):					
Year 12 FE	Yes	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable is a binary variable indicating if an individual migrated to another country. Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). *Lagos or Abuja* is a binary variable indicating whether an individual is located either in Logos or Abuja, *Urban* is a binary variable indicating whether an individual resides in an urban area. *Internet usage year 10* is a binary variable indicating whether an individual lives in a community where the share of Internet users in 2010 was in the highest quartile in the sample. *Education year 10* is a binary variable indicating whether an individual lives in a community where the share of college educated individuals in 2010 was in the highest quartile in the sample. Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

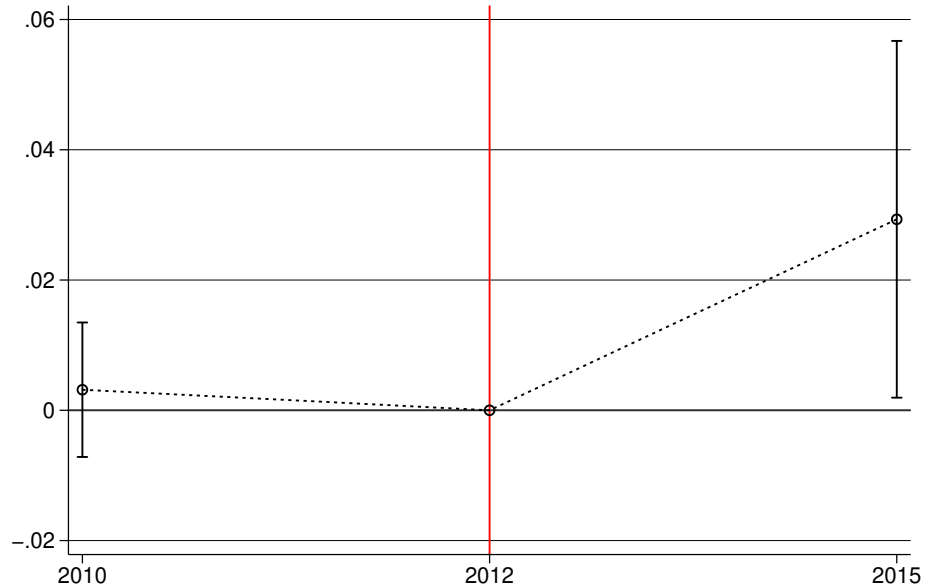
Reduced form estimation: Robustness, additional controls (II)

	(1)	(2)	(3)	(4)	(5)
Panel B: Age 20 to 35					
Log(Distance to network) * Year 12	-0.0027***	-0.0021**	-0.0021***	-0.0021**	-0.0022***
	(0.0010)	(0.0008)	(0.0007)	(0.0008)	(0.0008)
Lagos or Abuja * Year 12	-0.0103***				-0.0124***
	(0.0039)				(0.0048)
Urban * Year 12		0.0030			0.0024
		(0.0038)			(0.0039)
Internet usage year 10 * Year 12			0.0040		-0.0001
			(0.0038)		(0.0045)
Education year 10 * Year 12				0.0064	0.0064
				(0.0041)	(0.0047)
Observations	8,963	8,963	8,963	8,963	8,963
Cluster	435	435	435	435	435
Included covariates (Panel A and B):					
Year 12 FE	Yes	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable is a binary variable indicating if an individual migrated to another country. Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). *Lagos or Abuja* is a binary variable indicating whether an individual is located either in Logos or Abuja, *Urban* is a binary variable indicating whether an individual resides in an urban area. *Internet usage year 10* is a binary variable indicating whether an individual lives in a community where the share of Internet users in 2010 was in the highest quartile in the sample. *Education year 10* is a binary variable indicating whether an individual lives in a community where the share of college educated individuals in 2010 was in the highest quartile in the sample. Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Chapter I: Robustness: Parallel pre-trends, remittances



Note: Plot shows estimated coefficients $\beta_{1,10}$ and $\beta_{1,15}$ of the equation:

$$Remittances_{h,c(h),t} = \mu_c + \sum_{j \in \{10,15\}} \{\beta_{0,j} \mathbb{1}[t = j] + \beta_{1,j} \mathbb{1}[t = j] * \mathbb{1}\left[Distance_{h,c(h)} < 5km\right]\} + \epsilon_{h,c(h),t},$$

where $Remittances_{h,c(h),t}$ is a binary variable indicating whether household h located in community $c(h)$ has received remittances within 12 month before the interview year t, and μ_c represents a set of community fixed effects. 2010 (2012, 2015) refers to the first (second, third) wave of the Nigerian GHS panel. Estimates are based on a sample at household level. Number of observations: 10,414. Plotted 95 % confidence intervals are based on cluster-robust standard errors at the community level (435 cluster).

go back

Internet usage and migration decisions

Instrumental variable estimation: Internet usage on migration

	(1)	(2)	(3)	(4)
First-stage estimates				
Internet usage				
Log(Distance to network) * Year 12	-0.014**	-0.014**	-0.023***	-0.021***
	(0.006)	(0.006)	(0.006)	(0.005)
F statistic	6.06	6.28	16.19	14.06
Internet usage frequency				
Log(Distance to network) * Year 12	-0.029***	-0.029***	-0.047***	-0.044***
	(0.009)	(0.009)	(0.010)	(0.010)
F statistic	9.72	10.26	21.58	18.89
Second-stage estimates				
Internet usage	0.096*	0.098*	0.105**	0.116**
	(0.056)	(0.056)	(0.048)	(0.054)
Internet usage frequency	0.047*	0.048**	0.050**	0.055**
	(0.024)	(0.024)	(0.022)	(0.024)
Year FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Restricted: Age 20 to 35	No	No	Yes	Yes
Observations	21,626	21,626	8,963	8,963
Cluster	435	435	435	435

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Log distance to the terrestrial cable network times an indicator variable for the year 2012. Dependent variable of the first-stage estimates in the first (second) row is Internet usage (Internet usage frequency). Internet usage is a binary variable indicating whether an individual reported in the survey interview that he or she has access to the Internet. Internet usage frequency is an ordinal measure of frequency (0 = less than a month / no access, 1 = at least once a month, 2 = at least once a week, 3 = daily). Dependent variable of the second-stage estimates in the third and fourth rows is a binary variable indicating if an individual migrated to another country. Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). Robust standard errors clustered at the community level in parentheses. go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Instrumental variable estimation: Robustness, binary instrument (I)

	(1)	(2)	(3)	(4)
Panel A: Entire sample				
First-stage estimates				
Internet usage				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.050**	0.050**	0.051**	0.053***
	(0.020)	(0.020)	(0.020)	(0.020)
F statistic	6.24	6.22	6.52	7.01
Internet usage frequency				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.105***	0.106***	0.108***	0.113***
	(0.039)	(0.039)	(0.039)	(0.039)
F statistic	7.23	7.29	7.63	8.37
Second-stage estimates				
Internet usage	0.104	0.106	0.101	0.101
	(0.072)	(0.073)	(0.070)	(0.068)
Internet usage frequency	0.049	0.050	0.047	0.047
	(0.033)	(0.033)	(0.032)	(0.031)
Observations	21,626	20,259	19,202	18,406
Cluster	435	403	379	361
Included covariates (Panel A and B):				
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Excluded observations (Panel A and B):				
Distance between 5 and 10 km	No	Yes	Yes	Yes
Distance between 10 and 15 km	No	No	Yes	Yes
Distance between 15 and 20 km	No	No	No	Yes

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Binary variable indicating if distance to the terrestrial cable network is below 5 km times an indicator variable for the year 2012. Robust standard errors clustered at the community level in parentheses. go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Instrumental variable estimation: Robustness, binary instrument (II)

	(1)	(2)	(3)	(4)
Panel B: Restricted: Age 20 to 35				
First-stage estimates				
Internet usage				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.092***	0.092***	0.094***	0.096***
	(0.026)	(0.026)	(0.026)	(0.026)
F statistic	12.40	12.27	12.99	13.38
Internet usage frequency				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.194***	0.196***	0.200***	0.206***
	(0.058)	(0.058)	(0.058)	(0.058)
F statistic	11.15	11.36	11.94	12.72
Second-stage estimates				
Internet usage	0.112*	0.115*	0.111*	0.112*
	(0.062)	(0.063)	(0.061)	(0.060)
Internet usage frequency	0.053*	0.054*	0.052*	0.052*
	(0.031)	(0.031)	(0.030)	(0.029)
Observations	8,963	8,408	8,014	7,682
Cluster	435	403	379	361
Included covariates (Panel A and B):				
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Excluded observations (Panel A and B):				
Distance between 5 and 10 km	No	Yes	Yes	Yes
Distance between 10 and 15 km	No	No	Yes	Yes
Distance between 15 and 20 km	No	No	No	Yes

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Binary variable indicating if distance to the terrestrial cable network is below 5 km times an indicator variable for the year 2012. Robust standard errors clustered at the community level in parentheses. go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Instrumental variable estimation: Robustness, binary instrument, excluding remote (I)

	(1)	(2)	(3)	(4)
Panel A: Entire sample				
First-stage estimates				
Internet usage				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.050**	0.042**	0.035	0.050*
	(0.020)	(0.020)	(0.023)	(0.027)
F statistic	6.24	4.46	2.43	3.63
Internet usage frequency				
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.105***	0.091**	0.068	0.098*
	(0.039)	(0.039)	(0.046)	(0.055)
F statistic	7.23	5.25	2.16	3.23
Second-stage estimates				
Internet usage	0.104	0.097	0.132	0.097
	(0.072)	(0.084)	(0.127)	(0.105)
Internet usage frequency	0.049	0.045	0.068	0.050
	(0.033)	(0.039)	(0.068)	(0.055)
Observations	21,626	15,944	6,492	4,639
Cluster	435	333	145	103
Included covariates (Panel A and B):				
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Excluded observations (Panel A and B):				
Distance $>$ 100 km	No	Yes	Yes	Yes
Distance $>$ 15km	No	No	Yes	Yes
Distance $>$ 10km	No	No	No	Yes

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Binary variable indicating if distance to the terrestrial cable network is below 5 km times an indicator variable for the year 2012. Robust standard errors clustered at the community level in parentheses. go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Instrumental variable estimation: Robustness, binary instrument, excluding remote (II)

	(1)	(2)	(3)	(4)
Panel B: Restricted: Age 20 to 35				
First-stage estimates				
Internet usage				
$\mathbb{1}$ (Distance to network $<$ 5km) * Year 12	0.092***	0.082***	0.075**	0.100***
	(0.026)	(0.027)	(0.031)	(0.036)
F statistic	12.40	9.47	5.77	7.48
Internet usage frequency				
$\mathbb{1}$ (Distance to network $<$ 5km) * Year 12	0.194***	0.175***	0.136*	0.179**
	(0.058)	(0.059)	(0.072)	(0.088)
F statistic	11.15	8.69	3.55	4.13
Second-stage estimates				
Internet usage	0.112*	0.113	0.112	0.085
	(0.062)	(0.071)	(0.088)	(0.084)
Internet usage frequency	0.053*	0.053	0.062	0.047
	(0.031)	(0.035)	(0.054)	(0.050)
Observations	8,963	6,582	2,696	1,970
Cluster	435	333	145	103
Included covariates (Panel A and B):				
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Excluded observations (Panel A and B):				
Distance $>$ 100 km	No	Yes	Yes	Yes
Distance $>$ 15km	No	No	Yes	Yes
Distance $>$ 10km	No	No	No	Yes

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Binary variable indicating if distance to the terrestrial cable network is below 5 km times an indicator variable for the year 2012. Robust standard errors clustered at the community level in parentheses. go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Instrumental variable estimation: Robustness, additional controls (I)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Entire sample						
First-stage estimates						
Internet usage						
Log(Distance to network) * Year 12	-0.014**	-0.010**	-0.012**	-0.015**	-0.014**	-0.009**
	(0.006)	(0.004)	(0.006)	(0.006)	(0.005)	(0.004)
F statistic	6.28	5.74	4.08	6.25	6.11	4.22
Internet usage frequency						
Log(Distance to network) * Year 12	-0.029***	-0.019***	-0.022**	-0.028***	-0.027***	-0.014**
	(0.009)	(0.007)	(0.009)	(0.010)	(0.009)	(0.007)
F statistic	10.26	7.73	5.39	8.59	9.47	3.94
Second-stage estimates						
Internet usage	0.098*	0.150*	0.094	0.074*	0.096*	0.124
	(0.056)	(0.084)	(0.065)	(0.043)	(0.055)	(0.079)
Internet usage frequency	0.048**	0.078*	0.051	0.040*	0.049**	0.079
	(0.024)	(0.040)	(0.033)	(0.021)	(0.025)	(0.051)
Observations	21,626	21,626	21,626	21,626	21,626	21,626
Cluster	435	435	435	435	435	435
Included covariates (Panel A and B):						
Year 12 FE	Yes	Yes	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	No
Lagos or Abuja * Year 12	No	Yes	No	No	No	Yes
Urban * Year 12	No	No	Yes	No	No	Yes
Internet usage year 10 * Year 12	No	No	No	Yes	No	Yes
Education year 10 * Year 12	No	No	No	No	Yes	Yes

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. *Lagos or Abuja* is a binary variable indicating whether an individual is located either in Logos or Abuja. *Urban* is a binary variable indicating whether an individual resides in an urban area. *Internet usage year 10* is a binary variable indicating whether an individual lives in a community where the share of Internet users in 2010 was in the highest quartile in the sample. *Education year 10* is a binary variable indicating whether an individual lives in a community where the share of college educated individuals in 2010 was in the highest quartile in the sample. Robust standard errors clustered at the community level in parentheses.
go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Instrumental variable estimation: Robustness, additional controls (II)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: Restricted: Age 20 to 35						
First-stage estimates						
Internet usage						
Log(Distance to network) * Year 12	-0.021***	-0.016***	-0.016***	-0.021***	-0.019***	-0.013***
	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)
F statistic	14.06	10.40	8.47	13.32	13.17	7.23
Internet usage frequency						
Log(Distance to network) * Year 12	-0.044***	-0.031***	-0.031***	-0.043***	-0.040***	-0.022**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)
F statistic	18.89	10.74	10.07	17.76	17.37	5.92
Second-stage estimates						
Internet usage	0.116**	0.174**	0.127*	0.099**	0.106**	0.171**
	(0.054)	(0.079)	(0.067)	(0.044)	(0.051)	(0.084)
Internet usage frequency	0.055**	0.087**	0.067**	0.050**	0.052**	0.102*
	(0.024)	(0.040)	(0.034)	(0.021)	(0.024)	(0.052)
Observations	8,963	8,963	8,963	8,963	8,963	8,963
Cluster	435	435	435	435	435	435
Included covariates (Panel A and B):						
Year 12 FE	Yes	Yes	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	No
Lagos or Abuja * Year 12	No	Yes	No	No	No	Yes
Urban * Year 12	No	No	Yes	No	No	Yes
Internet usage year 10 * Year 12	No	No	No	Yes	No	Yes
Education year 10 * Year 12	No	No	No	No	Yes	Yes

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. *Lagos or Abuja* is a binary variable indicating whether an individual is located either in Logos or Abuja. *Urban* is a binary variable indicating whether an individual resides in an urban area. *Internet usage year 10* is a binary variable indicating whether an individual lives in a community where the share of Internet users in 2010 was in the highest quartile in the sample. *Education year 10* is a binary variable indicating whether an individual lives in a community where the share of college educated individuals in 2010 was in the highest quartile in the sample. Robust standard errors clustered at the community level in parentheses.

go back

Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Reduced form estimation: Robustness, exclusion restriction

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Entire sample						
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.0079		0.0052*	0.0060		
	(0.0182)		(0.0029)	(0.0042)		
Log(Distance to network) * Year 12		-0.0083**			-0.0014***	-0.0017***
		(0.0037)			(0.0005)	(0.0006)
Observations	21,626	21,626	21,626	20,391	21,626	20,391
Cluster	435	435	435	406	435	406
Panel B: Age 20 to 35						
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	0.0268		0.0105*	0.0117		
	(0.0279)		(0.0055)	(0.0078)		
Log(Distance to network) * Year 12		-0.0100			-0.0024***	-0.0027**
		(0.0061)			(0.0009)	(0.0012)
Observations	8,963	8,963	8,963	8,442	8,963	8,442
Cluster	435	435	435	406	435	406
Included covariates (Panel A and B):						
Year 12 FE	Yes	Yes	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional control: Employment status	No	No	Yes	No	Yes	No
Excluded communities (Panel A and B):						
Distance $<$ 5 km & Empl. growth $>$ 0	No	No	No	Yes	No	Yes
Dependent variable (Panel A and B):						
Employment status	Yes	Yes	No	No	No	No
Migration	No	No	Yes	Yes	Yes	Yes

Note: Dependent variable is either a binary variable indicating whether an individual was employed within the last 7 days or a binary variable indicating if an individual migrated to another country. Control variables included are: Age, sex (binary), household member (binary: head, spouse, son/daughter, other), enrolled in school (binary), highest education (binary: no schooling, some schooling, secondary education, university degree), number of wealth items (binary: 0 to 4), other ICT usage (binary: mobile phone, TV). Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Chapter I: Reduced form estimation: Robustness, exclusion restriction other (I)

	(1)	(2)	(3)	(4)
Dependent variable:				
Age	0.0452	-0.0100	-0.0127	0.2536
	(0.0527)	(0.0455)	(0.2324)	(0.1728)
Female	-0.0006	-0.0015	0.0019	0.0062
	(0.0018)	(0.0029)	(0.0089)	(0.0152)
Household head	-0.0005	-0.0040	-0.0032	0.0039
	(0.0013)	(0.0025)	(0.0064)	(0.0117)
Spouse	-0.0001	-0.0017	0.0009	0.0037
	(0.0016)	(0.0027)	(0.0081)	(0.0129)
Son/Daughter	0.0016	0.0027	0.0034	0.0144
	(0.0021)	(0.0038)	(0.0105)	(0.0180)
Other household member	-0.0010	0.0030	-0.0011	-0.0220**
	(0.0012)	(0.0021)	(0.0053)	(0.0087)
Relation to HH head (ordinal)	0.0001	0.0126**	0.0045	-0.0335
	(0.0035)	(0.0063)	(0.0163)	(0.0279)
No schooling	0.0052	0.0061	-0.0365	-0.0339
	(0.0043)	(0.0044)	(0.0246)	(0.0217)
Some schooling	-0.0105**	-0.0118**	0.0391	0.0435
	(0.0048)	(0.0054)	(0.0264)	(0.0282)
Secondary education	0.0057	0.0093	-0.0088	-0.0182
	(0.0035)	(0.0059)	(0.0164)	(0.0256)
University degree	-0.0003	-0.0037	0.0062	0.0086
	(0.0017)	(0.0033)	(0.0075)	(0.0147)
Reported coefficient:				
Log(Distance to network) * Year 12	Yes	Yes	No	No
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	No	No	Yes	Yes
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Restricted: Age 20 to 35	No	Yes	No	Yes
Observations	21,626	8,963	21,626	8,963
Cluster	435	435	435	435

Note: First column specifies the dependent variable of a regression on measures of distance to the terrestrial cable network times an indicator variable for the year 2012. Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Reduced form estimation: Robustness, exclusion restriction other (II)

	(1)	(2)	(3)	(4)
Dependent variable:				
Education (ordinal)	-0.0002	-0.0042	0.0401	0.0329
	(0.0069)	(0.0087)	(0.0326)	(0.0365)
Wealth items = 0	-0.0029	-0.0029	0.0290**	0.0162
	(0.0044)	(0.0050)	(0.0143)	(0.0162)
Wealth items = 1	0.0070	0.0101	-0.0389	-0.0352
	(0.0071)	(0.0078)	(0.0291)	(0.0322)
Wealth items = 2	-0.0080	-0.0074	0.0354	0.0240
	(0.0066)	(0.0076)	(0.0313)	(0.0357)
Wealth items = 3	0.0039	-0.0006	-0.0346	-0.0052
	(0.0058)	(0.0072)	(0.0291)	(0.0367)
Wealth items = 4	0.0000	0.0008	0.0090	0.0003
	(0.0030)	(0.0034)	(0.0182)	(0.0220)
Wealth items (ordinal)	0.0027	-0.0033	-0.0356	-0.0019
	(0.0109)	(0.0130)	(0.0509)	(0.0584)
Enrolled	-0.0019	-0.0068	-0.0017	0.0025
	(0.0034)	(0.0051)	(0.0162)	(0.0239)
TV usage	0.0013	0.0081	0.0053	-0.0057
	(0.0051)	(0.0059)	(0.0204)	(0.0222)
Mobile phone usage	0.0119**	0.0103*	-0.0081	0.0002
	(0.0060)	(0.0061)	(0.0268)	(0.0271)
Reported coefficient:				
Log(Distance to network) * Year 12	Yes	Yes	No	No
$\mathbb{1}$(Distance to network $<$ 5km) * Year 12	No	No	Yes	Yes
Year 12 FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Restricted: Age 20 to 35	No	Yes	No	Yes
Observations	21,626	8,963	21,626	8,963
Cluster	435	435	435	435

Note: First column specifies the dependent variable of a regression on measures of distance to the terrestrial cable network times an indicator variable for the year 2012. Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Instrumental variable estimation: Migration out of Africa

	(1)	(2)	(3)	(4)	(5)	(6)
Internet usage	0.116**	0.070*	0.016			
	(0.054)	(0.039)	(0.013)			
Internet usage frequency				0.055**	0.033*	0.008
				(0.024)	(0.017)	(0.006)
Year 12 FE	Yes	Yes	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Restricted: Age 20 to 35	Yes	Yes	Yes	Yes	Yes	Yes
Dependent variable:						
All migration	Yes	No	No	Yes	No	No
Migration out of Africa	No	Yes	No	No	Yes	No
Migration within in Africa	No	No	Yes	No	No	Yes
Observations	8,963	8,957	8,957	8,963	8,957	8,957
Cluster	435	435	435	435	435	435

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Log distance to the terrestrial cable network times an indicator variable for the year 2012. Dependent variable is a binary variable indicating if an individual migrated to (1) another country, (2) out of Africa, and (3) within Africa (migration out of Africa is coded 0 in this case). Internet usage is a binary variable indicating whether an individual reported in the survey interview that he or she has access to the Internet. Internet usage frequency is an ordinal measure of frequency (0 = less than a month / no access, 1 = at least once a month, 2 = at least once a week, 3 = daily). Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Instrumental variable estimation: Migration out of Africa, full sample

	(1)	(2)	(3)	(4)	(5)	(6)
Internet usage	0.098*	0.049	0.016			
	(0.056)	(0.032)	(0.013)			
Internet usage frequency				0.048**	0.024*	0.008
				(0.024)	(0.014)	(0.006)
Year 12 FE	Yes	Yes	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Dependent variable:						
All migration	Yes	No	No	Yes	No	No
Migration out of Africa	No	Yes	No	No	Yes	No
Migration within in Africa	No	No	Yes	No	No	Yes
Observations	21,626	21,612	21,612	21,626	21,612	21,612
Cluster	435	435	435	435	435	435

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Log distance to the terrestrial cable network times an indicator variable for the year 2012. Dependent variable is a binary variable indicating if an individual migrated to (1) another country, (2) out of Africa, and (3) within Africa (migration out of Africa is coded 0 in this case). Internet usage is a binary variable indicating whether an individual reported in the survey interview that he or she has access to the Internet. Internet usage frequency is an ordinal measure of frequency (0 = less than a month / no access, 1 = at least once a month, 2 = at least once a week, 3 = daily). Robust standard errors clustered at the community level in parentheses.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back

Internet usage and migration decisions

Instrumental variable estimation: Relative wealth

	(1)	(2)	(3)
First-stage estimates			
Internet usage			
Log(Distance to network) * Year 12	-0.021***	-0.018**	-0.021***
	(0.005)	(0.007)	(0.007)
F statistic	14.06	6.36	10.02
Internet usage frequency			
Log(Distance to network) * Year 12	-0.044***	-0.041***	-0.048***
	(0.010)	(0.016)	(0.015)
F statistic	18.89	6.77	10.06
Second-stage estimates			
Internet usage	0.116**	0.209**	0.038
	(0.054)	(0.105)	(0.033)
Internet usage frequency	0.055**	0.091**	0.017
	(0.024)	(0.046)	(0.015)
Year 12 FE	Yes	Yes	Yes
Community FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Restricted: Age 20 to 35	Yes	Yes	Yes
Restricted: Low wealth	No	Yes	No
Restricted: High wealth	No	No	Yes
Observations	8,963	3,925	5,038
Cluster	435	414	432

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Log distance to the terrestrial cable network times an indicator variable for the year 2012. Individuals are defined as having *low wealth* if the number of wealth items of their household is below the mean of the number of wealth items in the respective community in which they are living. Individuals with *high wealth* are all other individuals. Robust standard errors clustered at the community level in parentheses. go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Instrumental variable estimation: Relative wealth, full sample

	(1)	(2)	(3)
First-stage estimates			
Internet usage			
Log(Distance to network) * Year 12	-0.014**	-0.008**	-0.012**
	(0.006)	(0.004)	(0.005)
F statistic	6.28	4.28	5.63
Internet usage frequency			
Log(Distance to network) * Year 12	-0.029***	-0.018**	-0.029***
	(0.009)	(0.008)	(0.011)
F statistic	10.26	4.82	7.28
Second-stage estimates			
Internet usage	0.098*	0.273	0.032
	(0.056)	(0.175)	(0.032)
Internet usage frequency	0.048**	0.120	0.014
	(0.024)	(0.073)	(0.013)
Year 12 FE	Yes	Yes	Yes
Community FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Restricted: Low wealth	No	Yes	No
Restricted: High wealth	No	No	Yes
Observations	21,626	9,733	11,893
Cluster	435	421	435

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage frequency on migration decisions. Excluded instrument: Log distance to the terrestrial cable network times an indicator variable for the year 2012. Individuals are defined as having *low wealth* if the number of wealth items of their household is below the mean of the number of wealth items in the respective community in which they are living. Individuals with *high wealth* are all other individuals. Robust standard errors clustered at the community level in parentheses. go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Instrumental variable estimation: Relative wealth, 2 endogenous variables

	(1)	(2)	(3)	(4)	(5)	(6)
First-stage estimate						
Log(Dist. to network) * Year 12	-0.021***	0.001	-0.045***	0.003		
	(0.007)	(0.002)	(0.014)	(0.004)		
Log(Dist. to network) * Year 12 * Low wealth	0.003	-0.019***	0.005	-0.044***		
	(0.010)	(0.006)	(0.021)	(0.014)		
Second-stage estimates						
Internet usage * Low wealth					0.149	
					(0.104)	
Internet usage					0.068	
					(0.050)	
Internet usage frequency * Low wealth						0.064
						(0.045)
Internet usage frequency						0.032
						(0.022)
F-statistic (First stage)					10.80	11.04
Endogenous variable:						
Internet usage	Yes	Yes	No	No	Yes	No
Internet usage frequency	No	No	Yes	Yes	No	Yes
Year 12 FE	Yes	Yes	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Restricted: Age 20 to 35	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,963	8,963	8,963	8,963	8,963	8,963
Cluster	435	435	435	435	435	435

Note: Instrumental variable estimates of the effect of Internet usage and Internet usage times a binary variable indicating low wealth and Internet usage frequency and Internet usage frequency times an binary variable indicating low wealth on migration decisions. Excluded instruments: Log distance to the terrestrial cable network times an indicator variable for the year 2012 and an interaction with a binary variable indicating low wealth. Internet usage is a binary variable indicating whether an individual reported in the survey interview that he or she has access to the Internet. Internet usage frequency is an ordinal measure of frequency (0 = less than a month / no access, 1 = at least once a month, 2 = at least once a week, 3 = daily). Dependent variable of the second-stage estimates in the third and fourth rows is a binary variable indicating if an individual migrated to another country. Individuals are defined as having *low wealth* if the number of wealth items of their household is below the mean of the number of wealth items in the respective community in which they are living. Individuals with *high wealth* are all other individuals. Robust standard errors clustered at the community level in parentheses. go back
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Internet usage and migration decisions

Feedback effects: Migration and economic development

	(1)	(2)	(3)	(4)
$\mathbb{1}$(Distance to network $<$ 5km) * Year 15	0.029**	-0.077	0.022	0.093*
	(0.014)	(0.056)	(0.021)	(0.055)
$\mathbb{1}$(Distance to network $<$ 5km) * Year 10	0.003	0.027	0.009	-0.028
	(0.005)	(0.046)	(0.024)	(0.063)
Year FE	Yes	Yes	Yes	Yes
Community FE	Yes	Yes	Yes	Yes
Dependent variable:				
Remittances	Yes	No	No	No
Wealth items	No	Yes	No	No
Share HH member enrolled (age 10 to 18)	No	No	Yes	No
Share HH member enrolled (age 15 to 18)	No	No	No	Yes
Observations	10,414	10,414	8,031	3,196
Cluster	436	436	435	432

Note: Estimate of various outcome variables on interactions between a binary variable indicating whether a household is located within a 5 km radius around the terrestrial cable network and year dummies for the year 2010 and 2015. Number of observations is smaller in the third and fourth column as not all households have children in the depicted age bracket. Robust standard errors clustered at the community level in parentheses. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

go back