

It is never too late

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Motivation

- Literacy is a key skill in knowledge-based economy: social, political, and civic life
- Yet:
 - UNESCO (2015), OECD (2019): worldwide 757 million adults are illiterate, high even in advanced economies
 - U.S. Dept. of Education (2015): 1 in 6 US adults has low literacy, 1 in 3 has low numeracy
- Global cost of illiteracy $\approx$ \$1.19 trillion
 - reduced civic participation, worse health outcomes, limited economic self-sufficiency

Reading Is Hard. Watching Is Not.

Reading has been on the decline since the advent of television, and now it's only getting worse. On "Interesting Times," the Times of London columnist James Marriott explains why we'd rather watch videos than read books.

October 8, 2026

The New York Times, Opinion

Television and the decline of reading

- TV often blamed
 - From the 1960s to the 1990s, Americans' new free time went almost entirely to television
Putnam, *Bowling Alone* (2000)
 - Is the problem television, or its content?
- Technology creates cost-effective learning opportunities: wide reach at low marginal cost
 - Television can overcome spatial barriers to knowledge
 - Particularly important in areas with limited educational infrastructure
 - Almost all the evidence is on *children* (e.g. *Sesame Street*)
 - But can adults actually learn from a screen?

This paper

Can educational television raise adult literacy, and reduce geographic inequalities in human capital?

1. Did television raise **adult literacy**? (long differences across three censuses)
2. Did the gains reach the **labor market**? (participation, employment, sectors)
3. **Who** benefited? (women, places that started behind, listening spots)
4. Did the gains **spill over** to neighboring towns? (human-capital externalities)

Setting: Italian educational TV in the 1960s, with exogenous variation in reception from terrain — the first large-scale study of educational TV on **adults**, linking media to the **geography of human capital**.

It is never too late



Alberto Manzi teaching adults to read on TV (1960–68)

"Only education can enable all humanity to live better"

Preview of findings

- 1 **Literacy rises.** +0.18 pp per SD of signal, robust across specifications, small towns and neighbor pairs
- 2 **Labor market and firms respond.** LFP +1.0 pp, women +1.4 pp; out of agriculture; manufacturing firms enter
- 3 **Gains spill over** to towns within ≈ 15 km. The implied social return is several times any private return
- 4 **Who wins.** Women; towns that started behind (literacy); towns with one listening spot

Related literature and contribution

- **Mass media and society**

- Information diffusion (DellaVigna & Gentzkow 2015); civic engagement and political attitudes (Gentzkow 2006; Prat & Strömberg 2015; Durante, Pinotti & Tesei 2019); social norms and family choices (Olken 2009; Chong & La Ferrara 2009; La Ferrara et al. 2012; Kearney & Levine 2015)
- This paper: **educational TV**, on a broad **adult** population, not just children (cf. Gentzkow & Shapiro 2008; Kearney & Levine 2019)

- **Media effects from terrain-based signal**

- Social capital (Olken 2009); attitudes and voting (Durante, Pinotti & Tesei 2019); fertility (La Ferrara et al. 2012)
- This paper: same design, new outcome — **skills** rather than attitudes or votes

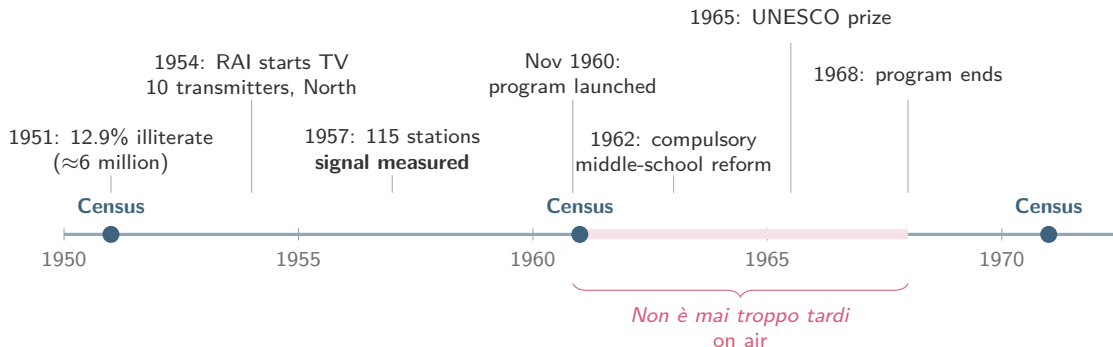
- **Geography of human capital**

- Local spillovers and persistent differences across places (Glaeser et al. 1995; Moretti 2004, 2012; Acemoglu & Angrist 2000); place- vs. people-based policy
- This paper: TV as a **spatial equalizer**, with a directly measured **social return**

Context

Post-war illiteracy and a TV classroom for adults

Timeline



Signal is measured in 1957, **three years before** the program existed. 1951→61 is the pre-period (census taken months after launch); **1961→71 is the program decade.**

The program on air (1960–1968)

- First episode **15 November 1960**; a “corso di istruzione popolare per adulti analfabeti”
- Target: adults **without a primary-school certificate**
- Separate tracks: a “first course” (reading/writing) and a “second course” (exam subjects)
- Late-afternoon slot so that workers could watch; at its peak **one-third of RAI airtime**
- Nearly **500 episodes** over eight years; 1965 **UNESCO prize**

Manzi pioneered the first overhead projector on Italian TV and charcoal “image-dictionary” sketches, and helped spread standard Italian alongside dialects (Rai Teche, 2025).

The Flagship Program: “Never Too Late”

Program details (1960-1968):

- Target: adults without primary certificate
- Different levels (illiterate & semi-literate)
- Late afternoon scheduling for workers
- Peak: ~33% of RAI's total airtime

Motto: *“Learning to read and write to get to know the rest of humanity”*

Impact Claims

- 1.5 million earned primary-school degree
- 1965 UNESCO prize for best TV program fighting illiteracy

Innovation: Television “Listening Spots”

- Over 2,000 centers across Italy
 - **Locations:** Schools, Union halls, Parish buildings
 - **Function:**
 - Collective viewing
 - Trained teacher present
 - Tutoring & reinforcement
 - Prep for national exam
- ⇒ New archival data on listening spots enables study of local infrastructure effects

The program on the ground: listening spots

- Most homes had no TV set, so $\approx$ **2,000** collective **listening spots** (*punti di ascolto*) were set up: parishes, schools, union halls
- A trained teacher watched the lesson with the group and tutored
- Learners sat a national exam for the **elementary certificate**
- **35,000** certified in the **first year** alone; RAI's lifetime claim: **1.5 million** (Rai Teche, 2025)

We digitized the list of 1,140 spots across 943 towns. Hosts: $\approx$ 40% parishes, $\approx$ 15% schools.

It made the news

Italian TV Tunes Villagers In on Nation's Life

By JACK GOULD

Special to The New York Times

... Equally striking are the early evening programs, gracefully entitled "Never Too Late," intended to aid the illiterate and semi-literate. Under a monopo-

New York Times, 1962

Data and design

Where could you receive the signal, and why

Data I: TV signal and program infrastructure

- **RAI transmitters active by 1957**
 - Location, altitude, height, power, frequency
 - RAI Yearbooks, *Gazzetta Ufficiale*, RAI financial statements, technical journals
- **Listening spots:** location and number, by town
- **Geography:** area, altitude, ruggedness, town coordinates

Data II: outcomes

- **Population Censuses** 1951, 1961, 1971
 - Literacy and highest degree, by gender
 - LFP, employment, sector of employment
- **Industrial Censuses** 1951, 1961, 1971
 - Firms (local units) and employees, by sector
- **ASET** 1951-1971
 - infrastructure projects financed by *Cassa del Mezzogiorno*
 - firm subsidies financed by *Cassa del Mezzogiorno*

≈7,700 municipalities, digitized and harmonized across three censuses

Listening Spot Data and Primary Schools Digitization

Provincia di Bologna	
PAT n. 653	<i>Scuole Elementari</i> , Coord. Edonardo Monari, CASALECCHIO DI RENO
PAT n. 584	<i>Circolo A.C.L.I.</i> , Via A. Saffi 76, Coord. Irene Colazzi, MEDICINA
PAT n. 567	<i>Parrocchia</i> , Via Garibaldi, Coord. Paola Milani, MONGHI-DORO
PAT n. 362	<i>Circolo A.C.L.I.</i> , Coord. Paolo Vignali, SASSOMOLARE DI CASTEL D'AIANO
PAT n. 293	<i>Cinema Comunale</i> , Coord. Ins. Umberto Gardini, SAVIGNO
Provincia di Ferrara	
PAT n. 413	<i>Circolo «Silvano Baldoni»</i> , Via Mascherano 4, Coord. Pasquino Ferrioli, FERRARA
PAT n. 691	<i>Circolo A.C.L.I.</i> , Piazza Principale, Coord. Umberto Dalla Libera, AMBROGIO DI COPPARO
PAT n. 46	<i>Scuole Elementari</i> , Via Matteotti, Coord. Agide Ricci, ARGENTA
PAT n. 25	<i>Scuole Elementari</i> , Via Comunale, Coord. Giuseppina Soriani Poli, RAVALLE

(a) Listening Spots

DOCUMENTI DI 1° GRADO 1980

NOME COMUNI	SCUOLE DEL GRADO ELEMENTARE		SCUOLE ELEMENTARI				L. 10.10.1971 di 1° ALTERNANZA TRA 1958-59	ALTERNANZA CON CORR. ALUMNI TARI	SCUOLE MEDIE INFERIORI			
	N	Alunni	N	Alunni	Alunni	Imp. Quota			Avvicinamento professionale	Media		
										N	Alunni	N

Provincia di TORINO

1. Agliè	1	80	3	7	103	7	36	—	—	—	—
2. Airolo	1	26	2	7	112	7	25	1	35	—	—
3. Ala di Stura	1	12	2	4	42	4	6	—	—	—	—
4. Albino d'Intra	1	48	1	6	109	6	19	25	—	—	—
5. Alcega	1	15	1	2	33	2	4	—	—	—	—
6. Alghero	1	26	2	11	104	11	20	23	—	—	—
7. Alghero	—	—	1	3	31	1	3	—	—	—	—
8. Alghero	1	20	1	10	403	14	55	—	—	—	—

(b) Primary School data

Ideal (yet, unfeasible) Identification

- If we could reconstruct the educational history and TV habits of each individual, we would use a LPM or a probit/logit model to estimate

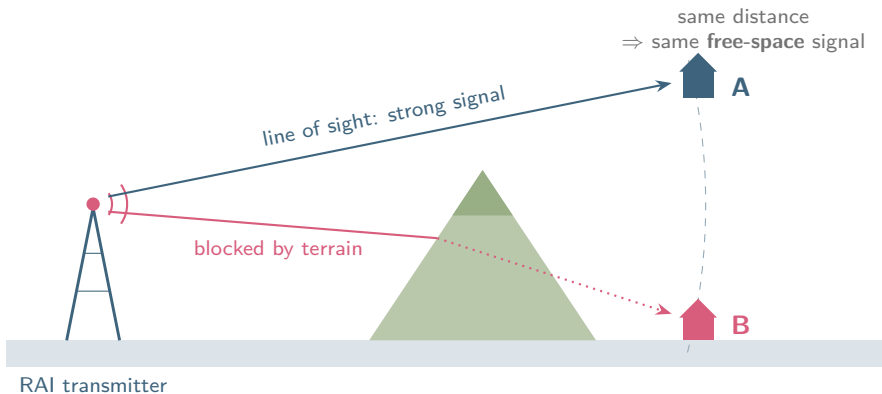
$$\mathbb{P}[L_{imt} = 1 \mid D_{imt}, \mathbf{X}_{imt}, \mathbb{1}_i, \mathbb{1}_t] = F(D_{imt}\tau + \mathbf{X}_{imt}'\boldsymbol{\beta} + \alpha_t + \alpha_i)$$

- Three Problems:
 1. L_{imt} not observed
 2. D_{imt} not observed
 3. $(\mathbf{X}_{imt}, \mathbb{1}_i, \mathbb{1}_t)$ might not be enough to guarantee strict exogeneity

Feasible Identification Strategy

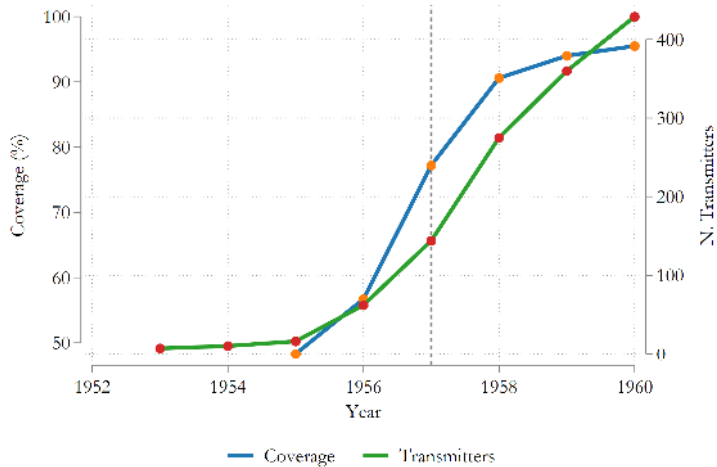
- We use TV signal as an exogenous determinant of TV watching (Olken 2009)
 - Transmitted according to the laws of physics, but its diffusion is conditioned by **topography**
 - Transmitters are not located randomly
- For each municipality, we use the Irregular Terrain Model to calculate:
 - Signal strength (actual)
 - Signal strength in the free space, which captures being close to the transmitter
- Conditional on geography and signal in the free space, variation in actual signal strength is as good as random

Identification

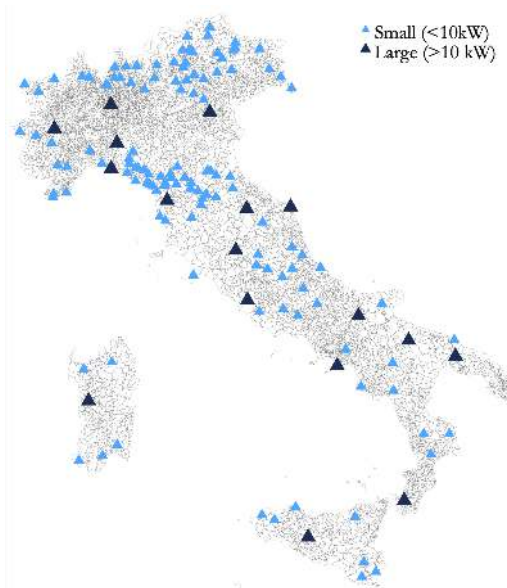


- **Actual signal** SS_i : Longley–Rice irregular terrain model, max over transmitters (Olken 2009)
- **Free-space signal** $SSF S_i$: same transmitters, no terrain; absorbs *where* RAI put antennas

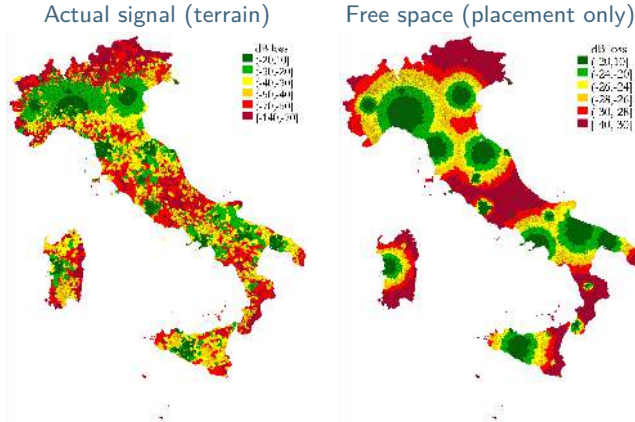
Coverage



RAI Transmitters



The variation: actual vs. free-space signal, 1957



The **difference** between the two maps is our variation. Signal is standardized: $1 \text{ SD} \approx 23 \text{ dB}$.

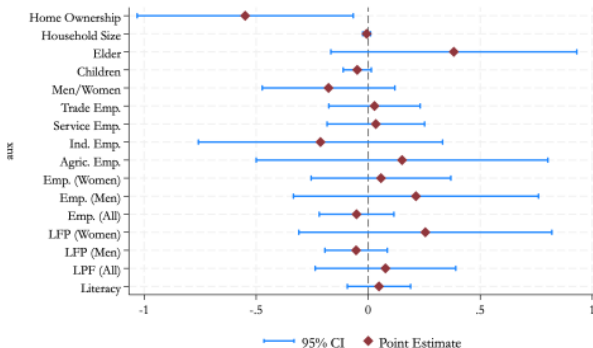
Specification: stacked long differences

$$\Delta Y_{it} = \beta \underbrace{SS_i \times \text{Post}_t}_{\substack{\text{signal} \\ \text{in program decade}}} + \gamma \underbrace{SSFS_i \times \text{Post}_t}_{\substack{\text{free-space} \\ \text{(placement)}}} + \underbrace{\dots}_{\substack{\text{main} \\ \text{effects}}} + X_i' \delta + \mu_{\ell(i)} + \varepsilon_{it}$$

- ΔY_{it} : change over 1951–61 ($\text{Post} = 0$) and 1961–71 ($\text{Post} = 1$). β = **trend break** in high- vs. low-signal places once the program is on air
- X_i : area, altitude, ruggedness (and squares), $\ln \text{Pop}_{1951}$ (in levels)
- μ_{ℓ} : local-labor-market FE

Balance: what signal predicts in 1951

Coefficient on Signal (1 SD) on each 1951 baseline outcome, with free-space signal, geography, and LLM FE



Raw correlations vanish with LLM FE and geography, including 1951 literacy and *Cassa* money. Town size remains: we control for $\ln \text{Pop}_{1951}$ and weight by population. [► Table](#)

Results

Literacy → labor market and firms → spillovers → who gains

Main estimates: literacy and the labor market

Signal $\times$ Post, Δ pp

	(1)	(2)	(3)	(4)	(5) preferred	(6)	(7) pop. weights	(8) winsorized
Literacy rate	0.278*** (0.068)	0.177*** (0.067)	0.193*** (0.068)	0.169** (0.067)	0.177*** (0.068)	0.095* (0.052)	0.271*** (0.105)	0.192*** (0.071)
LFP	0.146 (0.222)	1.017*** (0.244)	0.967*** (0.246)	0.998*** (0.246)	1.018*** (0.248)	0.993*** (0.243)	1.084*** (0.232)	1.117*** (0.260)
LFP, women	0.092 (0.343)	1.400*** (0.381)	1.369*** (0.386)	1.400*** (0.385)	1.433*** (0.388)	1.339*** (0.375)	1.458*** (0.366)	1.593*** (0.405)
Employment rate	-0.131 (0.186)	0.773*** (0.204)	0.743*** (0.206)	0.776*** (0.205)	0.799*** (0.208)	0.791*** (0.208)	0.815*** (0.196)	0.893*** (0.219)
Free-space signal		✓	✓	✓	✓	✓	✓	✓
Geography			✓	✓	✓	✓	✓	✓
LLM FE				✓	✓	✓	✓	✓
ln Pop ₁₉₅₁					✓	✓	✓	✓
Cassa del Mezzogiorno						✓		

Stacked long differences 1951–61 and 1961–71; SE clustered by LLM. Col. 8 winsorizes signal at 2.5/97.5%.

Main estimates: structural change

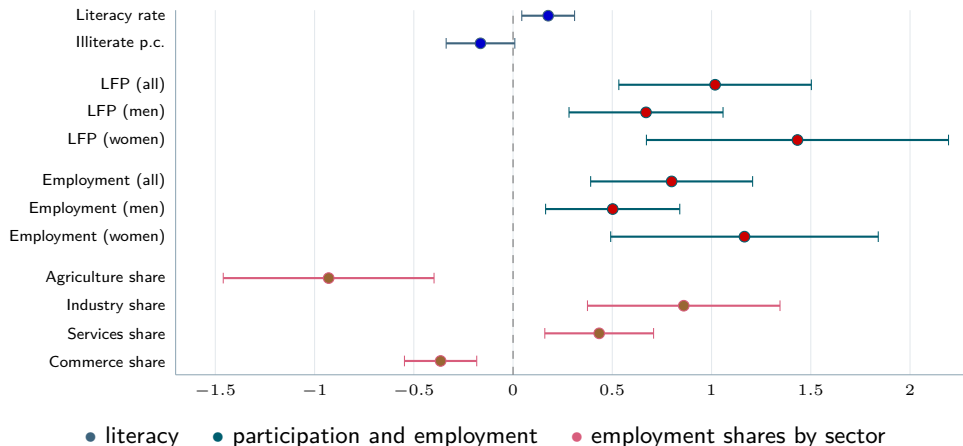
Signal $\times$ Post, Δ pp

	(1)	(2)	(3)	(4)	(5) preferred	(6)	(7) pop. weights	(8) winsorized
Agriculture share	-1.380*** (0.260)	-0.781*** (0.267)	-0.867*** (0.269)	-0.886*** (0.270)	-0.929*** (0.271)	-0.962*** (0.271)	-0.825*** (0.229)	-0.891*** (0.276)
Industry share	1.418*** (0.253)	0.690*** (0.248)	0.789*** (0.246)	0.800*** (0.247)	0.860*** (0.248)	0.821*** (0.246)	0.624*** (0.237)	0.841*** (0.249)
Free-space signal		✓	✓	✓	✓	✓	✓	✓
Geography			✓	✓	✓	✓	✓	✓
LLM FE				✓	✓	✓	✓	✓
ln Pop ₁₉₅₁					✓	✓	✓	✓
Cassa del Mezzogiorno						✓		

Same specifications as the previous slide. Stacked long differences; SE clustered by LLM.

Results at a glance

Preferred specification: 1 SD of signal, Δ pp in 1961–71 relative to 1951–61. 95% CI



1. Television raised adult literacy

	Literacy rate	Illiterate p.c.
Signal $\times$ Post	0.177*** (0.068)	-0.164* (0.088)
Free-space $\times$ Post	0.162** (0.082)	-0.381*** (0.118)
Mean 1951	87.6	
Mean Δ 1961-71	+2.6	
Obs.	15,362	15,070

How big? Moving a town from the 10th to the 90th percentile of signal (2.5 SD, +0.45 pp) delivers **17%** of the average 1961-71 literacy gain.

Literacy by education level

Signal $\times$ Post, Δ pp per capita, 1961–71 relative to 1951–61

	Primary cert.	Middle school	HS diploma	University
Signal $\times$ Post	3.20** (1.42)	0.09 (0.07)	-0.02 (0.04)	-0.04 (0.08)

The response is at the **elementary** margin the program targeted. **University does not move** — the natural placebo for a primary-school program.

2. Television drew adults into the labor force

Labor-force participation, Δ pp, 1961–71 relative to 1951–61

	All	Men	Women
Signal $\times$ Post	1.018*** (0.248)	0.670*** (0.198)	1.433*** (0.388)
Mean Δ 1961–71	–1.0	–3.5	+1.9

1 SD of signal adds **1.4 pp to women's participation**, against an average rise of 1.9 pp. For men it slows a 3.5 pp decline by 0.7 pp.

3. ... and into employment

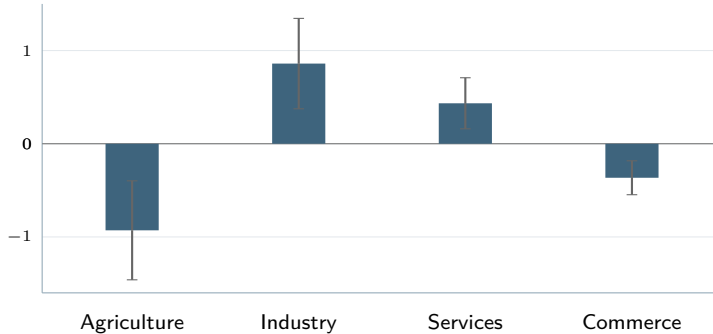
Employment rate, Δ pp, 1961–71 relative to 1951–61

	All	Men	Women
Signal $\times$ Post	0.799*** (0.208)	0.502*** (0.173)	1.166*** (0.344)
Mean Δ 1961–71	–1.8		

Employment rises most for **women** (+1.2 pp per SD), the group furthest from the labor market in 1951.

4. Structural change: out of agriculture

Δ pp share of employment by sector per 1 SD of signal, 1961–71 relative to 1951–61. 95% CI



Agriculture -0.93 pp, industry $+0.86$ pp, non-traded services $+0.43$ pp: literacy as a ticket out of the fields.

Unpacking the service sector further, the gains concentrate in **public administration and services**.

Robustness: smaller and smaller towns

Signal $\times$ Post, Δ pp

	All	No province	Population in 1951 below			
	(preferred)	capitals	50,000	20,000	10,000	5,000
Literacy rate	0.177*** (0.068)	0.175** (0.068)	0.176*** (0.068)	0.176** (0.068)	0.166** (0.070)	0.123 (0.075)
LFP	1.018*** (0.248)	1.022*** (0.250)	1.022*** (0.249)	1.011*** (0.250)	1.008*** (0.255)	0.981*** (0.273)
LFP, women	1.433*** (0.388)	1.440*** (0.392)	1.440*** (0.391)	1.419*** (0.391)	1.423*** (0.396)	1.414*** (0.427)
Employment rate	0.799*** (0.208)	0.799*** (0.210)	0.801*** (0.209)	0.788*** (0.210)	0.788*** (0.215)	0.766*** (0.238)
Agriculture share	-0.929*** (0.271)	-0.919*** (0.273)	-0.927*** (0.272)	-0.911*** (0.275)	-0.937*** (0.286)	-0.987*** (0.313)
Industry share	0.860*** (0.248)	0.861*** (0.250)	0.866*** (0.250)	0.853*** (0.253)	0.870*** (0.260)	0.864*** (0.283)
Obs.	15,362	15,142	15,204	14,786	13,784	11,198

Coverage of small villages was a by-product of terrain. Estimates hold down to towns of 10,000.

Did TV towns also get more *Cassa del Mezzogiorno* money?

- Signal does **not** predict *Cassa* spending per capita
 - Public works, 1950s: -0.003 (0.008)
 - Public works, 1960s: -0.001 (0.009)
 - Industrial subsidies, 1960s: 0.002 (0.019)
- Controlling for it (build-up, col. 6)
 - LFP 0.99^{***} , women's LFP 1.34^{***} , agriculture -0.96^{***}
 - Literacy rate 0.10^* (0.05)

5. Demographics: fewer births, deaths and marriages

Signal $\times$ Post, change in rates per 1,000, 1961–71 relative to 1951–61

	Signal $\times$ Post	Mean Δ 1961–71
Births per 1,000	−0.57*** (0.16)	−3.4
Deaths per 1,000	−0.55*** (0.13)	+0.7
Marriages per 1,000	−0.30*** (0.10)	−0.3

Fertility falls fastest (1 SD $\approx$ 0.6 fewer births per 1,000, $\approx$ 17% of the average drop), in line with more educated women working outside the home.

Spillovers

Does literacy pay off beyond the town that received the signal?

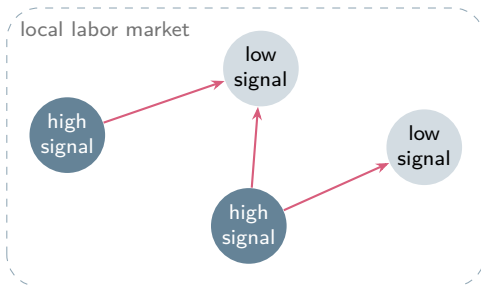
Does literacy pay off beyond the learner?

- Nearby towns share one labor market — workers commute, firms hire across town lines

Private return: a town's jobs respond only to its **own** signal

Social return: a town's jobs also respond to its **neighbors'** signal

more literate workers nearby raise productivity for everyone (Moretti 2004; Acemoglu & Angrist 2000)



Jobs follow the neighbors' signal

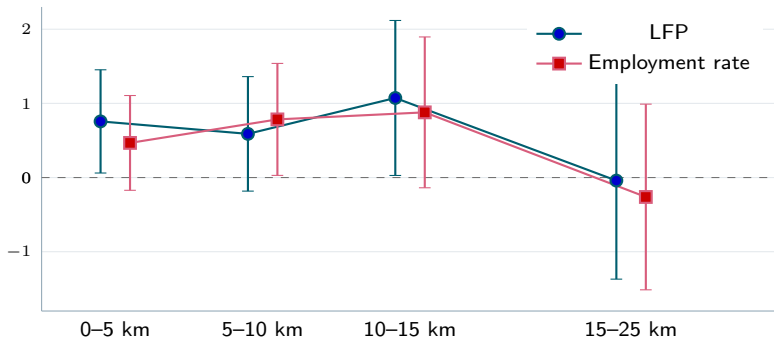
Neighbors = mean signal of all other towns within 15 km

- Participation and employment respond to the **neighbors'** signal: **+2.2 pp** LFP, **+3.2 pp** for women
- Between two adjacent towns, participation barely differs — the gain is **shared across the area**
- Only the *sector* of work still follows a town's own signal

Literacy is learned locally; its labor-market payoff accrues to the whole local labor market. [▶ Table](#)

The effect fades at commuting distance

Jobs' response to *neighbors'* signal, by distance ring. Δ pp per 1 SD, 95% CI



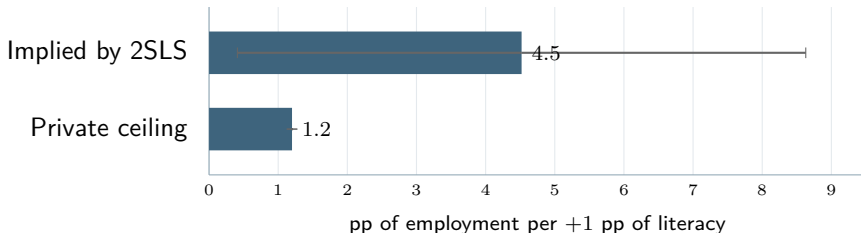
Positive within **15 km**, zero beyond: the reach of a local labor market, not a regional trend.

• Tables

How much of the return is social?

2SLS: effect of Δ literacy rate on Δ employment, instrumented by signal

- **Private ceiling:** a newly literate adult can take at most one job $\Rightarrow$ +1 pp literacy raises employment by at most ≈ 1.2 pp
- **Implied total return:** ≈ 4.5 pp — about $4\times$ the private ceiling



Most of the return is **social**. Caveats: weak first stage ($F=6.8$); wide CI; TV may also act through other channels. [► Table](#)

Who gains?

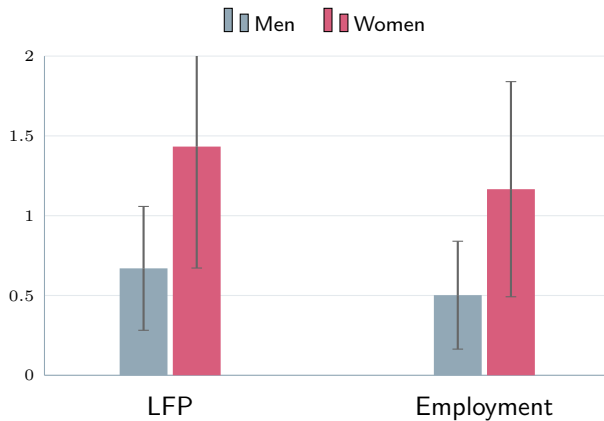
Women, places that started behind, places with a listening spot

Winners I: why women?

- In 1951 women were most of Italy's illiterate adults
- Furthest from formal schooling, most tied to the home
- Television comes *into the home*
- Labor-market effects are **twice the men's**
 - LFP +1.43 vs. +0.67 pp
 - Employment +1.17 vs. +0.50 pp

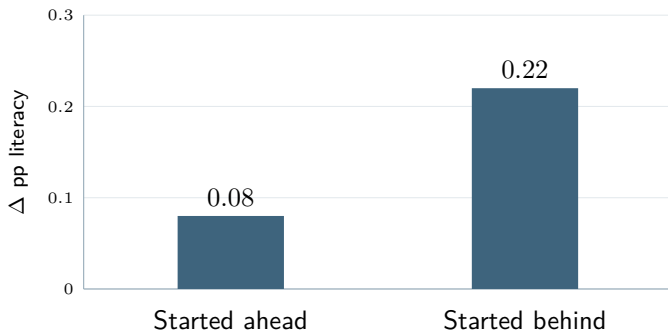
Winners I: women

Δ pp per 1 SD of signal, 95% CI



Winners II: places that started behind

Effect on the literacy rate per 1 SD of signal, by 1951 literacy above vs. below the median

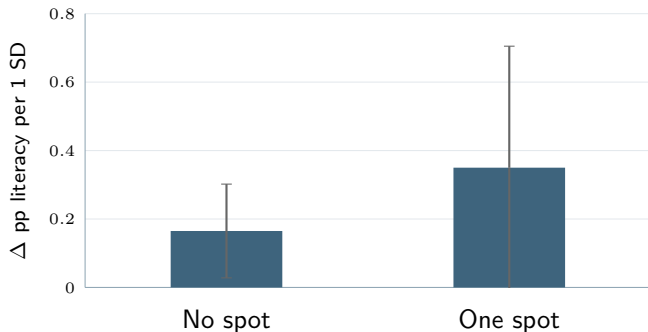


“Behind”/“ahead” = below/above the median 1951 literacy rate. Difference $p = 0.26$.

Literacy gains tilt toward the places that **started behind**: +0.22 vs. +0.08 pp — television compressed the gap.

Winners III: does a listening spot amplify the signal?

Effect of 1 SD of signal on the literacy rate (Δ pp), by presence of a listening spot. 95% CI



6,819 towns without a spot, 814 with one.

The point estimate is larger where a spot operated (0.35 vs. 0.17), but the difference is **not statistically significant** ($p = 0.33$): no evidence that a spot adds to the broadcast.

Was it worth it? The first full year

- 1961: broadcast hours 687 $\rightarrow$ 1,066
- 57,000 adults enrolled at 3,500+ listening points
- 35,000 passed the elementary exam
- Cost: 279 million lire

$\rightarrow \approx$ **8,000 lire per certified adult**

Costs over the program's life

Year	Total cost (million lire)
1961	279.0
1962	269.4
1963	249.6
1964	281.5
1965	262.8
1966	293.5

RAI Annual Reports and Financial Statements

Flat cost path of ≈ 270 million lire a year. Next: lire per additional literate adult and per additional worker, using the social return.

Conclusions

1. **Adults learn from television.** Better reception raised literacy, robustly across specifications, small towns and neighbor pairs
2. **Learning reached the labor market, firms and families:** higher participation, strongest for women; a shift out of agriculture; lower fertility
3. **The gains spilled over** to towns within commuting distance

Thank you

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Appendix

Italian television, 1952–1976

- RAI, state-owned, granted the TV monopoly in 1952. One channel until 1961
- Coverage <80% of population in 1957, 98% in 1961
- Licence-fee financed. Mission: “inform, entertain, educate” (BBC model, government-controlled)
- 1954–61: cultural programming rises from 21% to 49% of airtime
- 1975 reform: pluralism and parliamentary oversight. 1976: private local TV enters

RAI transmitters, 1957



Distance gradient: discs instead of rings

Neighbors' mean signal within each radius (separate regressions, with own signal). Δ pp

	Neighbors' mean signal within			
	5 km	10 km	15 km	25 km
LFP	1.361*** (0.364)	1.769*** (0.383)	2.173*** (0.455)	2.205*** (0.514)
LFP, women	1.992*** (0.545)	2.614*** (0.586)	3.187*** (0.714)	3.345*** (0.822)
Employment rate	1.015*** (0.313)	1.471*** (0.326)	1.767*** (0.392)	1.710*** (0.447)
Firm employees p.c.	1.240*** (0.402)	1.617*** (0.461)	1.943*** (0.541)	2.228*** (0.668)
Δ ln population	0.019*** (0.006)	0.030*** (0.007)	0.038*** (0.008)	0.044*** (0.009)
Literacy rate	0.143 (0.099)	0.066 (0.131)	0.181 (0.143)	0.349** (0.167)

Balance test: full table

Coefficient on Signal (1 SD). Univariate: free-space signal only. FE and controls: + geography, LLM FE

	Mean	Univariate		FE and controls	
1951		coef.	s.e.	coef.	s.e.
Literacy rate (%)	87.64	0.440	(0.478)	0.063	(0.073)
LFP (%)	55.55	1.004***	(0.261)	0.021	(0.161)
LFP, men (%)	83.33	0.203*	(0.106)	-0.129*	(0.071)
LFP, women (%)	28.29	1.758***	(0.486)	0.259	(0.286)
Employment rate (%)	53.11	0.703***	(0.244)	-0.016	(0.161)
Agriculture share (%)	57.39	-1.798	(1.160)	-0.447	(0.343)
Industry share (%)	27.61	1.997*	(1.132)	0.142	(0.287)
Services share (%)	7.21	-0.231*	(0.122)	0.157	(0.111)
ln population	7.95	0.215***	(0.029)	0.050***	(0.015)
Men per 100 women	98.70	0.000	(0.208)	-0.312**	(0.154)
Household size	4.11	-0.009	(0.026)	-0.007	(0.008)
Cassa: public works p.c. (log)	1.35	-0.169**	(0.073)	-0.003	(0.008)

Spillovers: own vs. neighbors' signal

Δ pp (population: Δ ln). Neighbors = mean signal of all other towns within 15 km

	Own and neighbors' signal		Neighbor pairs
	Own	Neighbors (≤ 15 km)	≤ 10 km, $ \Delta SSFS < 0.25$
Literacy rate	0.096 (0.060)	0.183 (0.143)	0.101** (0.042)
LFP	0.127 (0.196)	2.168*** (0.456)	-0.191 (0.168)
LFP, women	0.129 (0.348)	3.178*** (0.715)	-0.253 (0.278)
Employment rate	0.082 (0.193)	1.764*** (0.393)	-0.307* (0.171)
Agriculture share	-0.612*** (0.222)	-0.611 (0.504)	-0.704*** (0.198)
Industry share	0.442** (0.221)	0.846 (0.518)	0.577*** (0.218)
Δ ln population	0.005* (0.003)	0.037*** (0.008)	0.000 (0.003)

Distance gradient: full estimates

Signal $\times$ Post by ring, entered jointly. Δ pp (population: Δ ln)

Participation and employment

	Own	Neighbors' signal, by distance ring			
	signal	0–5 km	5–10 km	10–15 km	15–25 km
LFP	0.092 (0.186)	0.757** (0.355)	0.589 (0.394)	1.073** (0.533)	–0.041 (0.678)
LFP, women	0.036 (0.330)	1.098* (0.567)	0.827 (0.669)	1.435 (0.905)	0.188 (1.139)
Employment rate	0.088 (0.186)	0.467 (0.326)	0.784** (0.385)	0.879* (0.519)	–0.262 (0.639)

Firms and population

	Own	Neighbors' signal, by distance ring			
	signal	0–5 km	5–10 km	10–15 km	15–25 km
Firm employees p.c.	–0.168 (0.305)	0.617 (0.381)	0.509 (0.450)	0.427 (0.609)	0.930 (0.865)
Δ ln population	0.004 (0.003)	0.007 (0.006)	0.006 (0.006)	0.010 (0.007)	0.017 (0.011)

Each ring: mean signal (and free-space signal) of towns at that distance, each interacted with Post; indicators for empty rings.

Implied return to literacy: 2SLS

Δ outcome on Δ literacy rate, instrumented by $\text{Signal} \times \text{Post}$

Outcome (Δ pp)	2SLS: per +1 pp literacy	s.e.
Employment rate	4.52**	(2.10)
LFP	5.77**	(2.54)
LFP, men	3.79**	(1.84)
LFP, women	8.11**	(3.65)
Industry share	4.87**	(2.11)
Firm employees per 100	4.33**	(1.98)
First-stage F (Kleibergen–Paap)	6.8	

Private bound ≈ 1.2 pp: literacy measured over the 6+ population, employment over 15+, so +1 pp literacy can raise employment by at most ≈ 1.2 pp through the learners themselves.