

The Long-Term Effects of the Printing Press in Sub-Saharan Africa

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Abstract

Can early capital transfers durably affect the course of development? In sub-Saharan Africa, Protestant missionaries were the first to both import the printing press technology and allow the natives to use it. We build a novel geocoded dataset locating protestant missions in 1903. This dataset includes, for each mission station, the amount and nature of the investments conducted prior to 1903 as well as geographic characteristics. We find that proximity to an historical missionary settlement endowed with a printing press significantly increases newspaper readership today *within* regions located close to historical mission settlements. This result is robust to a variety of identification strategies striving against potential endogenous selection of missions into printing. Newspaper readership has important consequences for political participation nowadays. Using distance to the location of the printing press as an instrument for the impact of newspaper readership on political participation, we find that newspaper readership significantly increases political participation at the community level and has no effect on participation at a larger (national) level.

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“There can be no doubt that [the missionary newspapers] introduced the first generation of educated Africans to what had become an intrinsic part of enlightened society in Europe and other lands. Their example gave inspiration to African people who inherited the idea of the newspaper and came to employ it as the chief weapon by which they were to exercise their power of participation in the government of their land.” (Omu, 1978)

1 Introduction

Can early capital transfers durably affect the course of development? Because of early access to the printing press, local newspapers developed first in certain African regions. In this paper we study the persistence of these geographical differences in access to information and its consequences on contemporaneous political participation.

Throughout the XIXth and XXth centuries, a wave of Protestant and Catholic missions settled along the sub-Saharan coastline, probably motivated by the competition among the two religions and recent improvements in the understanding of tropical diseases. Numerous missionaries travelled alone or with their families, settled down or explored this unknown continent, bringing what they considered to be “civilization” into this region of the world.

Protestant missionary activity played a central role in the development of a written tradition in sub-Saharan Africa. According to the principle of the *Sola Scriptura*, central to the Protestant doctrine, every protestant should be able to read the Bible. The long-term consequences of such a religious incentive to increase human capital have been recently studied as an alternative to Max Weber’s theory of the *Protestant Ethic* to explain the economic success of regions early converted to Protestantism (Becker and Woessman, 2009; Woodberry, 2012). Because they needed to print Bibles and educational material, Protestant missionaries were among the first to bring the printing press to Africa. As shown in Figure 1, 27 stations all around sub-Saharan Africa were equipped with printing presses in 1903 (Dennis, Beach, and Fahs, 1903).

Our paper analyses the long-term consequences on newspaper readership of the early introduction of the printing press in sub-Saharan Africa in Protestant mission stations. Using contemporary individual-level data, we find that proximity to the closest historical location of a printing press has a positive and statistically significant impact on the probability of reading the news nowadays. Controlling for individual and town-level characteristics, a one-standard deviation increase in the distance to the printing press reduces the probability of reading the news on a monthly basis from 7% to 17% of a standard deviation depending on the specifications.

Depending on denomination and personal missionaries’ preferences, protestant stations invested in different activities such as printing, health or technical schools. To isolate the

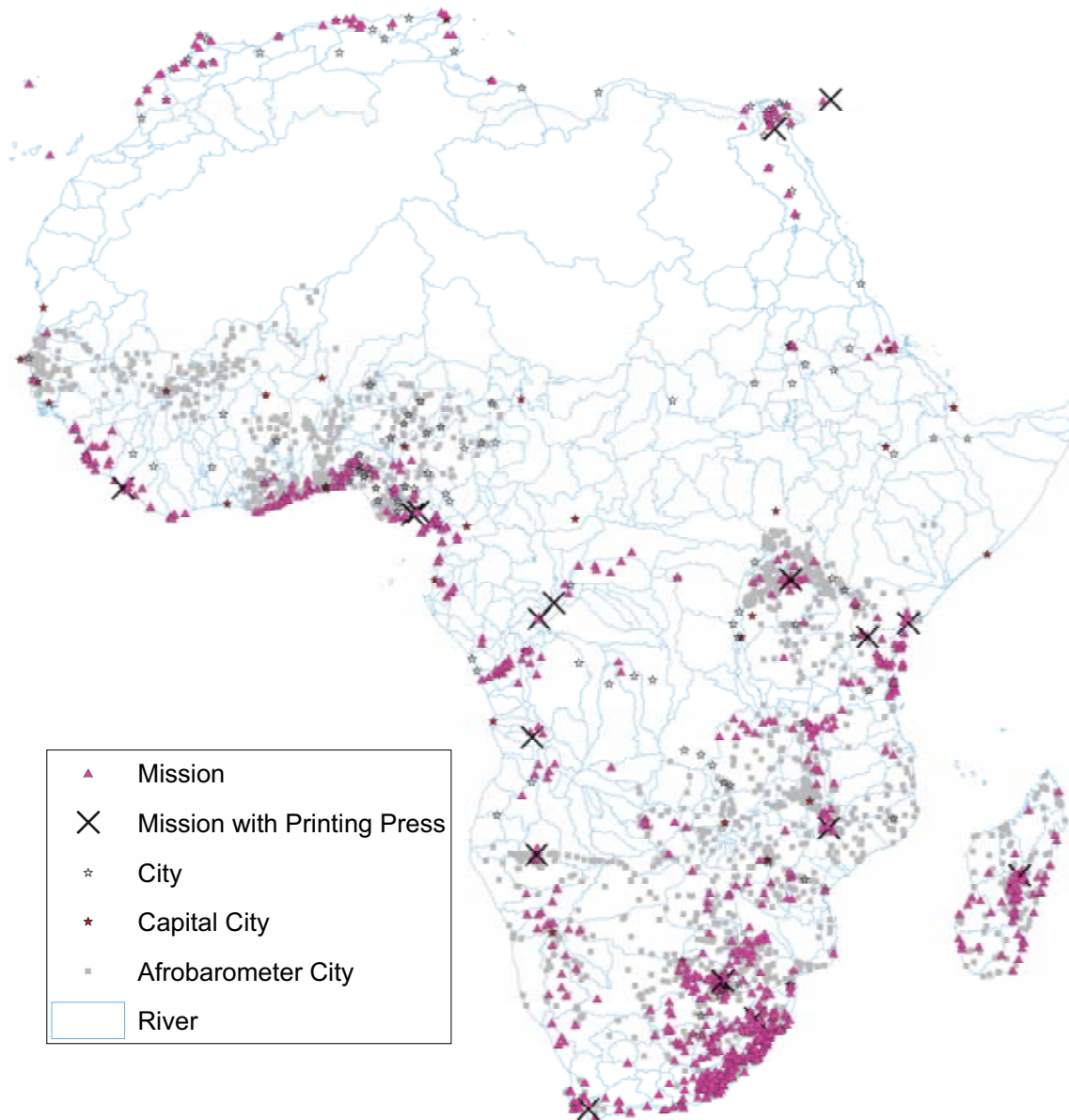


Figure 1: Mission Stations With and Without a Printing Press in 1903

Notes: This map is a digitized and geocoded version of plates 14 to 18 of Dennis, Beach, and Fahs (1903). The geocoding was conducted by the authors.

specific effect of the printing technology from any other possible long-term consequences of protestant activities, we exploit the variation in investments *within* Protestant missions. We estimate the impact of the proximity to the printing press on newspaper readership restricting our sample to individuals living close to a Protestant mission. Living close is defined as living in a village for which there is a Protestant mission within alternatively a 200-kilometer (124 miles), a 150-kilometer (93 miles) and a 50-kilometer (62 miles) radius. This strategy isolates the specific effect of the “treatment” by historical proximity to the printing press for all the individuals “treated” by historical proximity to a Protestant mission station. Our estimates of the impact of the printing press are robust to this specification and, if anything, the point estimates increase when we reduce the size of the radius.

A crucial empirical issue is the possibility of endogenous selection of missions into printing. This issue is addressed using five complementary approaches.

First, we control extensively for the other investments conducted at the mission level, in particular their investments in education and health. Similarly, we control for an extensive set of covariates that may have determined the location of the printing press and proximity to it. These covariates are population density, historical exposure to slave trade, water constraints, cash constraints, distance from the coast and distance from trade roads. Moreover, we introduce controls for the geographic characteristics of the regions where missions with and without printing presses locate. All our estimates are robust to introducing these controls.

Despite our attempts to control for these observable factors, our estimates might still be driven by unobserved factors correlated with both long-term development and proximity to historical location of a mission with a printing press. We thus develop an instrumental variable approach (IV). We approximate the probability that each mission has a printing press using the share of missions from the mission’s society equipped with a printing press in all the regions of the world *outside* sub-Saharan Africa. The hypothesis behind this IV strategy is that decisions on the type of investments conducted at each mission center were guided by differences in doctrines embodied in different societies. We construct an instrument for the distance of each town to the closest mission with a printing press using the approximated probabilities for the missions in the city surroundings. All our results are robust to this instrumental variable approach.

Third, we use a matching strategy. We match each mission with a printing press to the “closest” missions without printing press using all the observable characteristics we have on missions. We then compare individuals treated by a mission with a printing press with individuals treated by a “similar” mission but without a printing press. Our results are robust to this strategy and to the use of alternative radius.

Fourth, for each location in our sample, we compute the closest distances to mission stations with different type of investments in schooling and health. Our results are robust

to the inclusion of all these distances in the estimation. In particular, they are robust to controlling for distance to the closest educational facilities in mission stations. Similarly, proximity to historical mission settlements with the printing press does not seem to explain contemporaneous education.

Finally, following Nunn and Wantchekon (2011), we use the recent insights from Altonji, Elder, and Taber (2005) to calculate how much greater the influence of unobserved factors would need to be relative to observable factors to completely explain away the negative relationship between the distance to the printing press and newspaper readership. We find that the influence of unobserved factors would have to be greater than observable factors. Therefore, it is unlikely that our estimates can be fully attributed to unobserved heterogeneity and endogenous selection into printing press.

The evidence from all these different strategies finally suggests that the impact of the printing press on newspaper readership is causal. How to explain such a persistent effect of the location of the printing press in 1903 on newspaper readership nowadays? The printing technology was an investment with a large fixed cost. It could not be easily exported to other regions due to transport costs of the machine itself and the specific knowledge investments it required. Protestant missionaries made the printing presses, directly imported from Europe, accessible to the natives by both teaching them the printing technology and granting them access to it. The printing press was made available for the local population in an environment in which the written culture was thought as something that had to be accessible for all as opposed to reserved to an elite (Woodberry, 2012). The early availability of the printing technology, in accessible environments, enabled the local development of a culture of writing and diffusing texts and pamphlets. Written information transmission mechanisms, especially newspapers, quickly developed around the printing press, resulting into a persistent geographic concentration of publishing activities and thus into a persistent concentration of newspaper readership.

Ideally, information on newspaper supply would have been necessary to test for persistence in the concentration of newspapers around the historical printing areas. However, there is no reliable information of newspaper supply at the local level in sub-Saharan Africa. The few datasets available, in particular the ICON project¹, mostly provide information on the main national-level newspapers. However in the Appendix, using the only available data on newspaper supply we could collect, we provide cross-country suggestive evidence of the persistence of the supply of newspapers.

In the last part of the paper, we use proximity to the printing press on newspaper readership as an instrument to study the impact of newspaper readership on political participation using different proxies for participation. We find that newspaper readership robustly and

¹International Coalition on Newspapers, <http://icon.crl.edu>

significantly increases political participation at the community level. We also show that it increases the subjective appreciation of the political discussion environment. On the contrary, we do not find any effect of newspaper readership on measures of satisfaction with democracy not on the respondent preference for democratic systems above all the other possible systems. We discuss some alternative explanations rationalizing these findings.

Related Literature This paper contributes to four strands of the literature. First, we contribute to the vast literature on the long-term consequences of historical events. Acemoglu, Johnson, and Robinson (2001) show that European colonizers developed better institutions in places where they settled than in places they just wanted to exploit. La Porta, Lopez-de Silanes, and Shleifer (2008) argue that it is rather the nationality of the colonizer that matters because they imported their legal systems which were not optimally adapted for the New World, especially the French Civil Law (Glaeser and Shleifer, 2002). New approaches of this question include micro-oriented studies isolating specific channels through which a development dynamic was durably established (see for instance Nunn (2008) on slave trade, Huillery (2009) on colonial investments, Dell (2010) on forced mining-labor, Alesina, Easterly, and Matuszeski (2011) on improper colonial border design, Michalopoulos and Papaioannou (2012) on pre-colonial ethnic institutions and Klasnja, Novta, and Wantchekon (2012) on the first colonial schools in Benin).² Our paper emphasizes the role of capital investments even among regions sharing the same institutional framework. In that sense our approach is in line with Huillery (2009, 2011) and Feyrer and Sacerdote (2009).

The extent to which the printing press was a revolutionary innovation is a vivid debate among economic historians but, to the notable exception of Dittmar (2011), there has been no research on the long-term consequences of the printing press. Dittmar (2011) shows that between 1500 and 1600, European cities where printing presses were established in the 1400s grew 60% faster than otherwise similar cities. We focus on a longer-term approach since we identify the effect of the early arrival of the printing press on contemporaneous outcomes. Moreover, our work analyses the role of the printing press in Africa when it had already been diffused to most other places in the world. Finally, our approach focuses on newspaper readership and political participation whereas Dittmar analyses urbanization as a proxy for economic development.

Third, our work contributes to the literature on the effects of Protestantism on economic outcomes. Weber (1930) argues that the *Protestant Ethic* is a pillar of economic success in capitalistic societies. Recent papers (Becker and Woessman, 2009; Cantoni, 2011) emphasize the role of education and literacy as alternative explanations for protestant regions growing and developing faster. Results from McCleary (2012) on protestantism and human capital

²For a review of this growing body of literature, see Nunn (2009).

in Guatemala and Bai and Kung (2011) on China tend to confirm this hypothesis. Our paper shows how protestant conversion also came with an important technological and capital transfer in several sub-Saharan African regions that affected regional long-term development.

Moreover, our paper is a novel contribution to the literature as it studies the “intensive margin” of early missionary presence. As opposed to the existing literature on the role of missionary activity (Woodberry, 2004; Gallego and Woodberry, 2010; Nunn, 2010; McCleary, 2012; Woodberry, 2012) our treatment is not binary. On the one hand, we can identify the type of investments realized at each mission station. On the other hand, for each type of investment, we have information on the “intensity” of the treatment – for example we do not only know whether a mission has a school but how many schools it does have and the number of students. From this standpoint, our paper is closely related to Huillery (2009) who measures how different colonial investments (education, health, infrastructure) affected different outcomes. But while Huillery (2009) only controls for selection into investment, we are able to deal with selection into the different *kinds* of investments.

Finally, our work contributes to the political economy on how information can affect political outcomes. A first trend of this literature shows how media content affects political preferences. Della Vigna and Kaplan (2007) find that the increasing coverage of *Fox News* in the U.S. increased the likelihood of voting Republican in 2000. Enikolopov, Petrova, and Zhuravskaya (2011) corroborate these findings measuring how access to the independent national TV channel in Russia increased the probability of voting for opposition parties. More closely related to our paper, there is a growing literature on how media access affects political participation. Stromberg (2004) shows that the introduction of the radio in the 1920s led to more people voting in gubernatorial races. Results from Oberholzer-Gee and Waldfogel (2006) confirm the positive effect of access to media on political participation using information about Hispanic citizens with access to Spanish-language local television channels in the United States. Gentzkow, Shapiro, and Sinkinson (2012), using a panel of local US daily newspapers, show that the entry of the first newspaper in the market increases significantly turnout at national election. Cagé (2013) shows that while turnout increases with media access, it may decrease with media competition if there is a race to the bottom in terms of media quality.³

The present work contributes to this literature by exploring historical determinants of newspapers’ development. We provide a new – and to the extent of our knowledge, the first – instrument for media access in sub-Saharan Africa. There has been very little quantitative work on mass media focusing on Africa although Africa is an exemplary place to study newspaper activity.⁴ Despite the growing questioning on the future of newspapers in the internet

³See also Gentzkow (2006), Schulhofer-Wohl and Garrido (2009) and Snyder and Stromberg (2010).

⁴A notable exception is the work by Reinikka and Svensson (2005) who studies the impact of a newspaper campaign in Uganda aimed at reducing capture of public funds by providing schools with information to

era, Africa is one of the very few places in the world where the newspaper market is still growing. This market expands while literacy steadily increases as opposed other media like television or internet that require capital too costly for most Africans.

Our article measures the impact of newspaper readership on political participation in sub-Saharan Africa. It is therefore closely related to a very rich political science literature on the determinants of political participation in Africa. However, this literature has mainly focused on the role of ethnicity (Gibson and Long, 2012; Ichino and Nathan, 2013) and clientelism (Ichino and Nathan, 2012). We argue that media access might be another important determinant of political participation behavior in sub-Saharan Africa.

The rest of the paper is organized as follows. Section 2 presents historical background on how Protestant missions influenced the development of African newspapers. Section 3 describes the novel geocoded dataset of missions and printing presses constructed for this study. Section 4 presents empirical evidence of the impact of Protestant missionary activity on newspaper readership, discusses endogenous selection of missions into printing and assesses that this impact is causal. Section 5 studies the causal impact of newspaper readership on various political outcomes using the proximity to a printing press as an instrument for readership. Section 6 concludes.

2 Missionaries Influence and the Development of African Newspapers: Historical Background and Persistence

Protestant missionaries pioneered in the development of a written tradition for sub-Saharan African languages. Wherever they went, protestants quickly formalized native languages by learning them, understanding their grammars and codifying their written forms. Reverend S. W. Kelle from the Church Missionary Society collected and categorized, in his *Polyglotta Africana*, more than 100 distinct African languages and dialects (Church Missionary Society, 1862). His work is still considered one of the most important contribution for African linguistics. Similarly, Samuel Ajayi Crowther, who was ordained first African Bishop of the Anglican church in 1864, published a version of the Bible in Yoruba language in 1843 before establishing the first grammar and dictionary for this language. Finally, around the 1850's, David Livingstone wrote an analysis of the Tswana language (Livingstone, 1858). The Tswana language is one of the four main South African languages, the other three being the Zulu, the Xhosa and the Sotho. Mission societies in South Africa translated the New Testament in Xhosa in 1846, followed by the Old Testament in 1857. In the 1860s, the Presbyterian mission revised the Xhosa Bible and completed it in 1887 (Switzer, 1984).

Converting through the text naturally gave rise to an increase in literacy and religiosity, an

monitor local officials' handling of a large education grant program.

effect that has recently received attention as a potential determinant of long-term development (Nunn, 2010; Woodberry, 2004). Protestant missions also facilitated the access to the printing press, acting as the intermediaries for its diffusion. For example in South Africa, printing presses were acquired by several mission societies in Cape Colony between the 1820s and the 1870s, depending on the mission denomination. The Methodists acquired a printing press in Grahamstown in the 1830s. The Anglicans acquired presses for several stations in the eastern Cape in the 1860s and 1870s. In the later 19th and early 20th centuries, missionary societies outside Cape Colony – the Congregationalists, the Lutherans and the Roman Catholics –, were also active in publishing, especially in Natal (Switzer, 1984).

Investing in printing technology was probably a better strategy than importing printed material. As shown by Dittmar (2011), printed media was costly to import because they were heavy and fragile commodity sensitive to damp (Dittmar, 2011). Section 4.3.6 shows historical evidence describing how printing presses were costly investments to import in the XIXth and early XXth century. Moreover, an important number of the books to be published were translations of various existing texts in native African languages; these texts had mostly been written in African stations.

Missionaries created their own publications and especially their own newspapers (Tudesq, 1995; Woodberry, 2004), in addition to educational and religious publications. Among the first indigenous newspapers, most of them were sponsored by mission centers and printed at their printing stations. The first newspaper intended for black readers, the *Umshumayeli Wendaba* ('Publishers of the News'), written in Xhosa, was published as an irregular quarterly in 1837 and printed at the Wesleyan Missionary Society (Methodist) in Cape Colony.⁵ The *Iwe Irohin* ("The Newspaper") started in 1859 as a publication directed by Reverend Henry Townsend from the Anglican Church missionary society in Nigeria. *Isigidimi samaXhosa* ("The Xhosa Messenger"), the first African newspaper edited by Africans was first released in January 1876 and printed at the Lovedale Mission Press. Eight years later, in November 1884, was published the English/Xhosa weekly *Imvo Zabantsundu* ("The African Opinion"), the first black-owned and controlled newspaper in South Africa. The *Imvo Zabantsundu* was edited by John Tengo Jabavu, former editor of the *Isigidimi*, and perhaps "*the most widely known mission-educated African in Southern Africa*" at the time (Switzer and Switzer, 1979).

On the contrary, in regions where Protestant missions were less active, the first newspapers appeared only at the beginning of the XXth century and no indigenous newspapers were created before World War I. Before that time, the printing presses were mostly owned by the colonial power. The first paper in Abidjan (Ivory Coast) to be owned and edited by an

⁵The London Missionary Society and Methodist missions also produced the earliest journals aimed at the Tswana Christian community from their stations at Kuruman and Thaba'Nchu. *Mokaeri Oa Becuana, Le Muleri Oa Mahuku* ('The Teacher of the Bechuana, the Announcer of the News'), which started in 1857, is regarded as the oldest newspaper in the Tswana language (Switzer, 1984).

African, the *Eclairneur de la Cote d'Ivoire*, appeared only in 1935 (Mytton, 1983).

3 Data Description and Summary Statistics

3.1 Missions and Printing Presses

We geocoded all the maps of sub-Saharan Africa from the *Geography and Atlas of Christian Missions* (Dennis, Beach, and Fahs, 1903). This Atlas provides maps locating each mission station in the world (an example of these maps is provided in the Data Appendix Figure 4). Moreover, in the Atlas, each mission station is uniquely identified in a statistical index providing detailed information on the type of investments conducted in the station. Among others, it identifies the mission's size (number of students and native workers), its investment in school, health facilities and printing presses. The Atlas also identifies the society to which each station is affiliated. The exhaustive list of variables and a reproduction of one page of the statistical index are provided in the Appendix (Figure 3). We digitize all these variables.

Our sample includes a total of 723 missions, out of which 27 were equipped with a printing press in 1903. The Atlas mostly provides location for Protestant and Anglican missions (99% of the data). Hence, in the remainder of the paper, we simply use the terminology “missions” when talking about “Protestant missions”.

Data from the *Ethnographic Atlas* (Murdock, 1959; Nunn, 2008) provides precolonial characteristics at the ethnic group-level, such as initial population density or historical data on slave trade. Ethnic group-level characteristics are used each time individual-level information for the characteristic is not available and we were not able to construct it.⁶

3.2 Readership Data

To compute information on newspaper readership, we use the 2005 Afrobarometer surveys. There are 17 sub-Saharan countries in these surveys: 10 former English colonies (Ghana, Kenya, Lesotho, Malawi, Nigeria, South Africa, Tanzania, Uganda, Zambia and Zimbabwe), 4 former French colonies (Benin, Madagascar, Mali and Senegal), 2 former German colonies (Botswana and Namibia) and the former Portuguese colony Mozambique. Surveys are based on interviews conducted in the local languages of random sample of either 1,200 or 2,400 individuals of voting age in each country. Overall it covers approximately 21,000 individuals, sampled to constitute representative groups at the country level.

The Afrobarometer gives individual subjective data on a series of social capital and political outcomes, as well as the frequency of newspaper reading, listening to the news on radio or watching news on television. Media variables are binary: there is no information on the

⁶See Nunn (2008) for more details on this dataset.

amount of time individuals allocate to each media. The Afrobarometer also provides information on a set of individual controls: education, age, sex and ethnicity among others. This data is geocoded at the district level.⁷

3.3 Geographic Characteristics

To control for geographic characteristics, we use the *Global Agro-Ecological Zones* (GAEZ) data. This data is geocoded and provides information on the annual precipitation levels, the average suitability for rainfed crops, the number of agriculture growing days per year and the accumulated temperature in the year. It allows us to control for the quality of land which is a possible determinant of long-term development.

3.4 Summary Statistics

In Table 1 (respectively Table 3) we present summary statistics at the individual- and village-level for our main controls (outcomes) of interest. On average only 34% of the individuals surveyed in the Afrobarometer read a newspaper at least once a month. This percentage increases to nearly 37% for individuals living in locations that are less than 150km from a mission and to 41% for individuals living in locations that are less than 150km from a mission with a printing press (Table 3). Variables from the control group are of similar magnitudes in the three sub-samples, although education is slightly higher in regions closer to any mission. The average education level lies between 3 and 4 meaning that individuals have on average at least completed primary schooling (education=3). All the variables are described in details in the Appendix Table 25.

Table 4 presents summary statistics for variables defined at the ethnic group-level. These variables are from Nunn (2008). Finally Table 3, presents descriptive statistics for geographic characteristics and investments in mission stations. This table is commented with greater details in the next section.

4 Newspaper Readership and the Printing Press: an Empirical Analysis

In this section, we analyze the link between the printing press brought by missions and newspaper readership nowadays within areas close to protestant missions. We discuss selection of missions into printing as well as the persistence of the effect of the printing press.

⁷The choice of using the readership data from the Afrobarometer rather than data on newspaper circulation is driven by the availability of the readership data at the district level. We need district-level information for our identification strategy which uses precise geographic variation. There is no data on African newspaper circulation available at the district level. Moreover, having the readership data available at the individual level allows us to control for important individual characteristics (like education or sex).

	(1)	(2)	(3)
	Full	Mission	Printing Press
	mean/sd	mean/sd	mean/sd
Education	3.06 (2.01)	3.23 (1.93)	3.39 (1.87)
Urban	0.37 (0.48)	0.37 (0.48)	0.35 (0.48)
Protestant Today	0.31 (0.46)	0.36 (0.48)	0.40 (0.49)
Catholic Now	0.25 (0.43)	0.27 (0.45)	0.30 (0.46)
Water Constraints	1.17 (1.39)	1.11 (1.36)	0.96 (1.30)
Cash Constraints	2.09 (1.35)	2.05 (1.35)	2.00 (1.35)
Age	36.43 (14.68)	36.48 (14.75)	34.45 (13.71)
Age Squared	1542.88 (1309.75)	1548.14 (1315.12)	1374.55 (1170.36)
Female	0.50 (0.50)	0.50 (0.50)	0.51 (0.50)
Min Distance to Mission, 100km	1.34 (1.73)	0.52 (0.39)	0.36 (0.28)
Min Distance to Printing Press, 100km	4.46 (3.01)	3.66 (2.70)	0.77 (0.44)
Distance Mission	4.16 (1.33)	3.55 (1.04)	3.21 (0.96)
Distance Printing Press	5.76 (1.01)	5.52 (1.06)	4.05 (0.97)
Observations	21330	15314	3597

Table 1: Summary Statistics at the Individual- and Village-Level, Controls

Notes: Numbers in parentheses are standard deviations and the others are averages. Column 1 gives statistics for the entire sample. Column 2 gives statistics for locations closer than 150km away from any mission in 1903. Column 3 gives statistics for locations closer than 150km away from any mission in 1903 and closer than 150km to any mission with a printing press in 1903. Variables are described with more details in Appendix Table 25.

	(1)	(2)	(3)
	Full	Mission	Printing Press
	mean/sd	mean/sd	mean/sd
Read News	0.34 (0.47)	0.37 (0.48)	0.41 (0.49)
Listen News	0.86 (0.35)	0.86 (0.35)	0.90 (0.30)
Watch News	0.46 (0.50)	0.45 (0.50)	0.43 (0.50)
Observations	21330	15314	3597

Table 2: Summary Statistics at the Individual- and Village-Level, Media

Notes: Numbers in parentheses are standard deviations and the others are averages. Column 1 gives statistics for the entire sample. Column 2 gives statistics for locations closer than 150km away from any mission in 1903. Column 3 gives statistics for locations closer than 150km away from any mission in 1903 and closer than 150km to any mission with a printing press in 1903. Variables are described in Appendix Table 25.

	(1)	(2)	(3)
	Full	Mission	Printing Press
	mean/sd	mean/sd	mean/sd
Register	0.80 (0.40)	0.81 (0.39)	0.80 (0.40)
Turnout	0.75 (0.43)	0.75 (0.43)	0.75 (0.43)
Action as Citizen	0.57 (0.49)	0.58 (0.49)	0.60 (0.49)
Trust	0.17 (0.37)	0.16 (0.37)	0.14 (0.35)
Others Listen	0.45 (0.50)	0.45 (0.50)	0.50 (0.50)
Satisfaction	0.46 (0.50)	0.45 (0.50)	0.44 (0.50)
Observations	21330	15314	3597

Table 3: Summary Statistics at the Individual- and Village-Level, Outcomes

Notes: Numbers in parentheses are standard deviations and the others are averages. Column 1 gives statistics for the entire sample. Column 2 gives statistics for locations closer than 150km away from any mission in 1903. Column 3 gives statistics for locations closer than 150km away from any mission in 1903 and closer than 150km to any mission with a printing press in 1903. Variables are described in Appendix Table 25.

	(1)	(2)	(3)
	Full	Mission	Printing Press
	mean/sd	mean/sd	mean/sd
Min Distance to Printing Press, 100km	4.73 (2.86)	3.40 (2.26)	1.00 (0.38)
Min Distance to Mission, 100km	1.90 (2.05)	0.71 (0.35)	0.33 (0.18)
Fraction of Land Within 10km of Water	0.16 (0.18)	0.16 (0.17)	0.14 (0.15)
Initial Population, millions	1.39 (2.46)	1.40 (2.45)	1.06 (1.24)
Initial Population Density	18.41 (34.53)	20.09 (25.18)	20.47 (26.36)
Distance to Coast, 100km	5.18 (3.52)	4.30 (3.52)	3.51 (3.65)
Observations	186	116	20

Table 4: Summary Statistics at the Ethnicity-Level

Notes: Numbers in parentheses are standard deviations and the others are averages. Column 1 gives statistics for the entire sample. Columns 2 and 3 give statistics respectively for locations at less than 150km to any mission in 1903 and less than 150km to a mission with a printing press in 1903. Variables are described in Appendix Table 25. Ethnicities are defined according to Murdock’s clasification (Nunn, 2008).

4.1 Specification and Identification Strategy

We match our data on the location of missions and printing presses in 1903 with the Afrobarometer data on newspaper readership in 2005. We track the long-term impact of the distance to a mission on newspaper readership nowadays. Let i index individuals, j index the geographic unit in which individuals live, e index the ethnicity and c index the country. Location j is defined using the latitude and longitude provided in the Afrobarometer data. In the Afrobarometer data, individuals are assembled by the smallest unit among villages, cities or districts. We call “village” this unit in the remainder of the paper. Standard errors are clustered at the village-level.

Equation 1 describes the identification equation.

$$\begin{aligned} \text{News}_{ijec} = & \alpha + \beta_1 \text{Distance Mission}_j + \beta_2 \text{Distance Printing Press}_j \\ & + \gamma X_i + \theta Y_j + \epsilon Z_e + \delta_c + u_{ijec} \end{aligned} \quad (1)$$

X_i is a vector of individual-level observable characteristics, Y_j is a vector of village-level observable characteristic, Z_e is a vector of ethnicity-level controls, γ , θ and ϵ are vectors of parameters, δ_c are country fixed-effects and u_{ijec} is an individual-village-ethnicity-country shock. “News $_{ijec}$ ” is a binary variable equal to 1 if individual i in village j of ethnicity e and country c reads a newspaper at least once a month and 0 otherwise.

“Distance Mission $_j$ ” is the logarithm of the distance from village j to the closest mission. “Distance Printing Press $_j$ ” is the logarithm of the distance from village j to the closest mission with a printing press. These distances are computed using the geocoded information described in Figure 1 and section 3.1.

Unless otherwise noted, the vector of individual controls X_i includes the age of the surveyed individuals, their age squared, their sex, their level of education, their religion (two binary variables indicating whether the individual is protestant and whether the individual is catholic), a binary variable indicating whether the individual lives in an urban location, and two indices ranging from 0 to 4 indicating the intensity of cash and water constraints. These two indices are proxies for living standards.

The vector of village-level controls Y_j is crucial because of the potentially endogenous location of the printing press among mission stations. We control for a large number of factors that may have played a role in determining both mission center locations and long-term economic development. At the village level, we control for the distance to the capital city, historical distance to the coast, the fraction of land within 10km of water and the historical exposure to the trans-Atlantic and Indian slave trades.

At the ethnicity-level (vector of ethnicity-level controls Z_e), we control for the precolonial population density, the population density in 2005, the malaria ecology of the land and the current distance from the coast.

4.2 OLS Estimation

4.2.1 Baseline Results

In Table 5 we present OLS estimates of the impact of the proximity to a mission with a printing press on newspaper readership. Column 1 shows that a 1% increase in the proximity to the closest mission with a printing press increases the probability of reading a newspaper by nearly 6 percentage points. Introducing country fixed-effects, individual-, village- and ethnic- level covariates and controlling for the proximity to the closest mission reduces the point estimate to 1.6 percentage points (column 6). This negative coefficient is statistically significant and economically meaningful. A one-standard deviation increase in the logarithm of the proximity to the printing press increases the probability of reading newspapers by 7.3% of a standard deviation (column 6).

An alternative way to assess the magnitude of the proximity to the printing press coefficient is to compare its explanatory power against other variables in the regression. A variance decomposition of the results from column 6 shows that the proximity to the printing press and the other covariates together explain 20% of the total variation in newspaper readership. Of this 20%, 0.5-5.6% is explained by the proximity to a printing press.

Interestingly, there is no effect of the proximity to a mission *without* a printing press once we control for country fixed-effects and our set of covariates (column 6). This supports our hypothesis that the proximity to a printing press matters per se as a long-term determinant of newspaper readership nowadays.

4.2.2 Reducing the Sample to Individuals Close to a Protestant Mission

Depending on denomination and personal missionaries' preferences, protestant stations invested in different activities such as printing, health or technical schools. Moreover, as most missionaries' objective was to maximize conversion *through the text*, most of them thought literacy to the natives.⁸ To isolate the "treatment" by a printing press from other possible long-term consequences of protestant activities, we exploit the variation in investments *within* Protestant missions to solely capture the persistent effect of the early arrival of the printing press.

Table 6 shows the results of the estimation of equation 1 when the sample is restricted to individuals "close enough" to a Protestant mission. "Close enough" is defined as being in a village with at least a Protestant mission in a 200-kilometer radius around the village (columns 1 and 2), a 150-kilometer radius (columns 3 and 4) and a 50-kilometer radius (columns 5 and 6). These restrictions represent, respectively, 17%, 15% and 8.5% of the sample. This sample restriction isolates the effect of the printing press from the "treatment" of proximity to a historical mission location. All the individuals in the reduced sample are indeed "treated" by proximity to a historical mission location. Therefore, this approach corrects for any potential endogenous selection of missionary location. If, once we control for individual, local and ethnic characteristics, selection of missions into printing is exogenous then Table 6 captures the causal effect of distance to the printing press on contemporaneous newspaper readership.

For all the different specifications, we find a negative and statistically significant impact of an increase of the proximity to a printing press. The point estimates vary between 2.7 and 5.8 percentage points. Considering individuals living in a village with at least one mission in a 50-kilometer radius around the village (column 6), we find that a one-standard deviation increase in the proximity to the closest printing press increases newspaper readership by 15.6% of a standard deviation. A variance decomposition of the results from column 6 shows that the proximity to the printing press and the other covariates together explain 19% of the total variation in newspaper readership. Of these 19%, 2.5-10% is explained by the distance to the printing press. The explanatory power of the printing press thus increases when we only consider individuals close to a mission. As before, we find no effect of the proximity to a mission *without* a printing press.

⁸ The systematic emphasis on literacy is verified for missions in sub-Saharan Africa in the early XXth (Woodberry, 2004). However, as emphasized by McCleary (2012), the role of missionary activity on literacy may

	(1)	(2)	(3)	(4)	(5)	(6)
	Read News	Read News	Read News	Read News	Read News	Read News
	b/se	b/se	b/se	b/se	b/se	b/se
Distance Printing Press	-0.057*** (0.007)	-0.057*** (0.007)	-0.022*** (0.006)	-0.034*** (0.008)	-0.034*** (0.008)	-0.024*** (0.006)
Distance Mission				-0.037*** (0.007)	-0.037*** (0.007)	0.004 (0.005)
Observations	21330	21330	17537	21330	21330	17537
Country FE	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Clusters	2270	2270	2109	2270	2270	2109
R2	0.0145	0.0145	0.293	0.0227	0.0227	0.293
F-Statistic	58.82	58.82	414.6	41.85	41.85	393.0

Table 5: Impact of the Distance to a Printing Press on Newspaper Readership, Baseline Estimation

Notes: * p<0.10, ** p<0.05, *** p<0.01. The Table reports OLS estimates. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-, village-, and ethnicity-level controls described in the text.

	(1)	(2)	(3)	(4)	(5)	(6)
	200km	200km	150km	150km	50km	50km
	b/se	b/se	b/se	b/se	b/se	b/se
Distance Printing Press	-0.018*** (0.006)	-0.024*** (0.006)	-0.025*** (0.006)	-0.027*** (0.006)	-0.032*** (0.007)	-0.032*** (0.007)
Distance Mission		0.013** (0.006)		0.005 (0.007)		-0.002 (0.010)
Observations	14189	14189	12529	12529	7034	7034
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	1681	1681	1520	1520	876	876
R2	0.283	0.284	0.281	0.281	0.284	0.284
F-Statistic	338.4	321.4	304.1	288.3	195.6	184.8

Table 6: Impact of the Proximity to a Printing Press, Within Regions Close to Missions

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table reports OLS estimates. The sample is sequentially restricted to individuals living 200 km, 150 km and 50 km away from an historical mission settlement. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-, village- and ethnicity-level controls described in the text.

4.3 Endogenous Selection of Missions into Printing

A crucial empirical challenge is the possibility of endogenous selection of missions into printing. This section develops various empirical strategies dealing with such potential endogenous selection. First, regression 1 is augmented with an extensive set of covariates. Second, we identify each mission's originating society to develop an instrument for investment in the printing press at the mission level. Third, we use a propensity score matching strategy. Fourth, for each town in the Afrobarometer, we compute the closest distances to mission stations with different type of investments in schooling and health. Our results are robust to the inclusion of all these distances in the regression. Finally, we use the recent insights from Altonji, Elder, and Taber (2005) to calculate how much greater the influence of unobserved factors would need to be relative to observable factors to completely explain away the negative relationship between the proximity to the printing press and newspaper readership.

4.3.1 Controlling for Additional Controls, Mission Characteristics and Investments

Additional Controls An extensive set of additional controls is added to the analysis as a control for possible endogenous location of the printing press among mission stations.

First we use variables from Nunn (2008). We control for proximity to railway lines using information from the Century Company (1911). The first control a binary variable equal to one if the railway line has been significantly reduced later in the century (around the 1940's), when imaging technology developed.

	(1)	(2)	(3)	(4)
	All Sample	200Km	150Km	50Km
	b/se	b/se	b/se	b/se
Distance Printing Press	-0.020*** (0.007)	-0.021*** (0.008)	-0.026*** (0.008)	-0.040*** (0.010)
Distance Mission	0.004 (0.005)	0.002 (0.006)	-0.004 (0.007)	-0.007 (0.009)
Observations	17537	14189	12529	7034
Controls	Yes	Yes	Yes	Yes
Extra Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Clusters	2109	1681	1520	876
R2	0.316	0.307	0.304	0.308
F-Statistic	186.8	164.9	145.9	89.64

Table 7: Impact of the Proximity to a Printing Press on Newspaper Readership, Additional Controls

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table reports OLS estimates. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The sample in Column 1 is the entire sample. In columns 2, 3 and 4 it is sequentially restricted to individuals living 200 km, 150 km and 50 km away from an historical location of a mission station. The controls are the individual-, village- and ethnicity-level controls described in more details in the text. “Extra controls” include an indicator variable equal to one if there was a city located on the land inhabited by each ethnic group, an indicator variable equal to one if any part of the railway network was built on land historically inhabited by the ethnic group and an indicator variable equal to one if an European explorer traveled through land historically occupied by the ethnic group.

to one if any part of the railway network was built on land historically inhabited by the ethnic group and zero otherwise. The second control is a binary variable equals one if an European explorer traveled through land historically occupied by the ethnic group. The final control uses data from Chandler (1987) on the location of African cities with more than 20,000 inhabitants in year 1400. This binary variable equals one if there was a city located on the land inhabited by each ethnic group.

These covariates should capture any potential determinants of both mission (and printing press) location and long-term economic development. Estimates of β from equation (1) controlling for the additional controls are reported in Table 7. Column 1 reports the results for the entire sample. In columns 2 to 4 the sample is restricted in the same way as it is in Table 6. For all the specifications, the impact of the proximity to a printing press remains positive and highly significant. Moreover, the magnitude of the results is similar to what is found in Tables 5 and 6.

Mission Characteristics and Investments Missions that invested into printing, compared to missions that did not, might have conducted other type of investments or located in regions with specific geographic characteristics geographic which may be, in both cases, correlated with determinants of newspaper readership. In other words, there might be an

endogenous selection among missions into printing. If it were to be the case, then our estimates of the impact of the proximity to the printing press on newspaper readership could be capturing omitted variables explaining both the location of the printing presses and the development of newspaper readership.

Table 9 presents mission-level descriptive statistics for geographic characteristics (the annual precipitation level, the suitability for rainfed crops, the number of agriculture growing days and the temperature), other mission characteristics (date of arrival, whether the mission is a Bible society and the number of native workers) and investments performed (number of teachers, of schools, of students, of health facilities and of physicians). Column 1 presents the statistics for all the missions that did not invest in printing whereas column 2 presents statistics for missions that did have a printing press. Column (3) gives the results of a t-test on the equality of previous samples means.

First, in terms of geographic conditions, there is no statistically significant difference between missionary settlements. Second, missions with or without a printing press arrived in Africa around the same date and there is no statistically significant difference in the number of native workers working in both kinds of missions. Missions with a printing press have a much higher probability to be a Bible Society but this was expected: printing presses were first imported to print Bibles.

Some mission characteristics are significantly different among the two groups. There are on average 1.5 more schools and 1.3 more health facilities in settlements where the printing press was early imported. However, this difference is almost entirely driven by differences in the mission size: we find no statistically significant difference in the average numbers of teacher per student, physicians per capita and health facilities per capita.⁹ The only difference that remains unexplained by the size of the missions is the greater number of schools per student. A plausible explanation for this difference is that school buildings were probably not constructed *at all* before attaining a certain minimal threshold in the number of students. In any case, we control in our regressions for all these missions' characteristics and investments.

Table 8 shows the results when the regressions from Table 7 are augmented with mission level controls. For each town j , we add mission-level controls for the closest mission to j both with and without a printing press. These controls include the number of health and schooling facilities, the number of native workers, students, teachers per student, schools per student, physicians, health facilities, health facilities per capita, physicians per capita, the arrival date of the mission, a binary variable indicating whether the mission was a bible society, as well as geographic characteristics (the annual precipitation level, the suitability for rain-fed crops, the number of agricultural growing days and the accumulated temperature). Results are robust

⁹Per capita variables are computed using the total size of the mission as given by the sum of the number of students, teachers, native workers, missionaries and their family members.

	(1)	(2)	(3)	(4)
	All Sample	200km	150km	50km
	b/se	b/se	b/se	b/se
Distance Printing Press	-0.020*** (0.007)	-0.021*** (0.008)	-0.026*** (0.008)	-0.040*** (0.010)
Distance Mission	0.004 (0.005)	0.002 (0.006)	-0.004 (0.007)	-0.007 (0.009)
Observations	17537	14189	12529	7034
Country FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Extra Controls	Yes	Yes	Yes	Yes
Mission Controls	Yes	Yes	Yes	Yes
Clusters	2109	1681	1520	876
R2	0.316	0.307	0.304	0.308
F-Statistic	186.8	164.9	145.9	89.64

Table 8: Impact of the Proximity to a Printing Press on Newspaper Readership, Controlling for Mission Characteristics and Investments

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table reports OLS estimates. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-, village-, ethnicity- and mission-level controls described in the text, as well as an indicator variable equal to one if there was a city located on the land inhabited by each ethnic group, an indicator variable equal to one if any part of the railway network was built on land historically inhabited by the ethnic group and an indicator variable equal to one if an European explorer traveled through land historically occupied by the ethnic group.

to introducing all these controls.

Identity of the Colonizer Another possible concern in the specification is the possibility that the proximity to the printing press might be capturing the identity of the colonizer despite the fact that we are controlling for country fixed effects. Protestant missions were indeed more likely to settle in former British territories than in former French ones. It follows that cities within the former British empire are more likely to be close to a printing press because they are just more likely to be close to a protestant mission. If it were to be the case, this effect would not be totally captured by country fixed effects. Although the sample restriction to regions close to an historical mission settlement should correct for this potential endogeneity, it would not capture an interaction between the identity of the colonizer and proximity to the printing press. Table 26 in the Appendix shows that our results hold when restricting the analysis to regions close to historical mission settlements *among former British colonies*. Moreover, the magnitude of the coefficients we obtain doing so is the same as the one found using the entire sample. Therefore, it is unlikely that our effects are entirely driven by colonizers' identity.

	(1) No Printing	(2) Printing	(3) t-test/
Geography			
Annual Precipitation level	1232	1404	-172 (435)
Suitability for Rainfed Crops	4.97	4.74	0.23 (0.36)
Number of agriculture growing days	382	224	159 (477)
Accumulated Temperature	12910	13480	-570 (3097)
Mission Characteristics			
Arrival Date	1878	1872	6 (4)
Bible Society	0.05	0.33	-0.28*** (0.05)
Number of Native Workers	3.21	1.85	1.36 (3.16)
Investment in Education			
Schools (any kind) in mission	0.26	1.74	-1.48*** (0.17)
Number of Students	313	413	-99 (119)
Schools per Student (%)	0.32	1.37	-1.05** (0.37)
Teachers per Student (%)	10.31	16.57	-6.26 (4.44)
Other Investments			
Health Facilities	0.19	1.56	-1.37*** (0.14)
Physicians per Capita (%)	0.41	1.07	-0.66 (0.61)
Health Facilities per Capita (%)	1.63	2.47	-0.85 (1.32)
Observations	723		

Table 9: Geographic Characteristics, Mission Characteristics and Investments Done by Missions With and Without a Printing Press (t-test)

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table compares geographic characteristics, mission characteristics and investments done by missions with and without a printing press. Column 1 presents the results for the missions without a printing press. Column 2 presents the results for the missions with a printing press. In Column 3 we perform a t-test on the equality of means (standard errors in parenthesis).

4.3.2 Controlling for the Distance to Missions with other Investments

The question of how endogenous selection of missions into printing may affect our results is two-dimensional. A first concern is the possibility that *other* type of investments, conducted *also* by the missions with a printing press, could drive our results in favor of a positive long-term impact of proximity to the printing press on newspaper readership. The second concern is a matter of interpretation: human capital accumulation could be the only dynamic captured in our previous regressions. If it were to be the case, then it would mean that what that we are capturing in fact is a positive effect of the proximity to a printing press on education, and more especially on literacy, and not on the demand for or supply of newspapers. This second concern is not an identification problem per se but it could modify the interpretation of our results. In Tables 10 and 11 we present results dealing with these two concerns.

Table 10 gives the OLS estimates of regression (1) when proximities from town j to the closest mission settlements with different kinds of investments are added to the regression as controls. All the estimations presented here are performed within regions closer than 150km away from mission settlements but are robust to the use of other geographic restrictions.¹⁰ Our results are robust to the inclusion of all these distances as controls. More importantly, the proximity to the closest mission with a printing press is the only variable with a positive and statistically significant effect on newspaper readership. From these results, it seems that access to the printing press is indeed the central long-term determinant of newspaper readership.

Table 11 gives the OLS estimates of regression (1) controlling for proximities from town j to the closest mission settlements with different kinds of investments but with the current level of education rather than newspaper readership as a dependent variable. We find no impact of the proximity to the printing press on the current level of education. Therefore it seems unlikely that our results are due to a positive effect of the printing press on human capital accumulation. On the contrary, they can be explained by an increase in the demand for newspapers. This result is confirmed in Table 27 in the Appendix. In this table the dependent variable is a binary variable indicating whether the individual has at least completed primary education. This binary variable is a proxy for literacy. We find no impact of the proximity to the printing press on literacy nowadays.

The absence of any correlation between the proximity to an historical location of a printing press and contemporaneous education levels or literacy can be interpreted in several ways. On the one hand, one could think that the direct effect of the access to a printing press on newspaper development did not have any collateral effect on human capital accumulation and therefore no persistent effect of the proximity to the printing press on education were expected to be found. Nevertheless, this assumption seems unlikely, especially if newspaper development did enhanced political participation and social capital. On the other hand, education

¹⁰These results are available from the authors upon demand.

has been one of the most common policy targets for economic development and protestant missions themselves put a lot of effort on improving literacy in sub-Saharan countries: we find a positive and statistically significant effect of the proximity to the closest high school or boarding school and to the closest industrial school (Table 11) on education.¹¹ Therefore an alternative explanation would be that although the proximity to the printing press may have induced some human capital accumulation, this effect has been compensated both by a broader effort of protestant missions at the time and contemporaneous efforts to improve access to education.¹²

Our results are thus robust both to controlling extensively for the other investments conducted at the mission level and mission characteristics and for the distances to the closest mission settlements with different kinds of investments. However, despite our attempts to control for these observable factors, our estimates might still be driven by unobserved factors correlated both with long-term development and proximity to historical location of a mission with a printing press. In the next section we develop an instrumental variable approach to deal with this issue.

4.3.3 IV Estimation

This section presents an instrumental variable strategy in order to assess the causality of the effect of the proximity to an historical location of the printing press on contemporaneous newspaper readership.

Mission stations were affiliated to different denominations and among denominations, to different societies. These groups were not equally inclined to the same activities. For example, the Baptist doctrine emphasizes the importance of the conversion decision *after* reading the gospel while the Seventh Day Adventist Church is known to invest large amounts of resources on health. Therefore Baptist missions certainly put a greater emphasis on importing the printing press and printing texts than the Adventists. Decisions on the type of investments conducted at each mission center were therefore guided by differences in doctrines embodied in different denominations and societies. We exploit this variation to construct an instrument for the proximity to an historical location of a mission with a printing press.

Let “Society PP_m ” be the share of missions from mission m ’s society equipped with (at least) one printing press in all the regions of the world *outside sub-Saharan Africa*. This information – similarly to the information on the missions in sub-Saharan Africa – comes from the *Geography Atlas of Christian Missions* (Dennis, Beach, and Fahs, 1903) that we digitize.

¹¹This is consistent with the findings of Woodberry (2004).

¹²See Voigtlander and Voth (2012) for a fascinating discussion on how policy can fail or succeed at modifying long-term established social dynamics.

	(1)	(2)	(3)	(4)	(5)	(6)
	Read News	Read News	Read News	Read News	Read News	Read News
	b/se	b/se	b/se	b/se	b/se	b/se
Distance Printing Press	-0.070*** (0.011)	-0.034** (0.014)	-0.021** (0.010)	-0.021** (0.010)	-0.020* (0.012)	-0.020* (0.012)
Distance High/Boarding School	0.018 (0.013)	0.020* (0.012)	0.002 (0.010)	0.003 (0.010)	-0.000 (0.010)	-0.000 (0.011)
Distance Day School	-0.041*** (0.013)	-0.010 (0.025)	0.004 (0.022)	0.003 (0.022)	0.014 (0.027)	0.014 (0.027)
Distance Sunday School	-0.020** (0.009)	-0.021* (0.011)	0.005 (0.008)	0.007 (0.009)	0.005 (0.009)	0.005 (0.010)
Distance Theological School	-0.001 (0.012)	-0.016 (0.013)	-0.007 (0.010)	-0.007 (0.010)	-0.004 (0.011)	-0.004 (0.011)
Distance Industrial School	0.046*** (0.014)	0.005 (0.010)	-0.014 (0.009)	-0.014 (0.009)	-0.014 (0.010)	-0.014 (0.010)
Distance Medical School	-0.007 (0.013)	0.013 (0.019)	0.046*** (0.014)	0.045*** (0.014)	0.027 (0.018)	0.027 (0.018)
Observations	15314	15314	12563	12563	12563	12563
Country FE	No	Yes	Yes	Yes	Yes	Yes
Controls	No	No	Yes	Yes	Yes	Yes
Extra Controls	No	No	No	No	No	No
Mission Controls	No	No	No	No	Yes	Yes
Clusters	1648	1648	1520	1520	1520	1520
R2	0.0245	0.120	0.243	0.243	0.247	0.247
F-Statistic	12.43	29.99	102.3	99.67	67.14	66.02

Table 10: Impact of the Proximity to a Printing Press on Newspaper Readership, Controlling for Distance to Schools, Within Regions Close to Missions

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table reports OLS estimates. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-, village-, ethnicity- and mission-level controls described in the text. The dependent variable is the newspaper readership nowadays. All the estimations are performed within regions closer than 150km away from mission settlements.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Sample	All Sample	150 km	150 km	100 km	100 km	50 km	50 km
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
Distance Printing Press	0.012 (0.033)	0.010 (0.033)	0.002 (0.034)	-0.005 (0.034)	-0.003 (0.035)	-0.007 (0.036)	-0.011 (0.042)	-0.011 (0.042)
Distance High/Boarding School	-0.128*** (0.037)	-0.133*** (0.037)	-0.131*** (0.037)	-0.142*** (0.038)	-0.136*** (0.039)	-0.143*** (0.039)	-0.158*** (0.042)	-0.160*** (0.042)
Distance Day School	0.342*** (0.093)	0.345*** (0.093)	0.222** (0.098)	0.231** (0.098)	0.208** (0.102)	0.215** (0.102)	0.160 (0.114)	0.161 (0.114)
Distance Sunday School	0.082*** (0.030)	0.074** (0.034)	0.062* (0.033)	0.041 (0.035)	0.072** (0.035)	0.057 (0.037)	0.086** (0.041)	0.081* (0.044)
Distance Theological School	-0.086** (0.035)	-0.087** (0.035)	-0.043 (0.036)	-0.047 (0.036)	-0.059 (0.038)	-0.061 (0.038)	-0.078* (0.043)	-0.077* (0.043)
Distance Industrial School	-0.077** (0.038)	-0.077** (0.038)	-0.029 (0.038)	-0.030 (0.037)	-0.040 (0.039)	-0.040 (0.039)	-0.023 (0.042)	-0.023 (0.042)
Distance Medical School	0.110* (0.064)	0.111* (0.064)	-0.029 (0.065)	-0.025 (0.066)	-0.022 (0.069)	-0.019 (0.070)	-0.114 (0.074)	-0.115 (0.074)
Distance Mission		0.016 (0.029)		0.046 (0.031)		0.033 (0.033)		0.012 (0.041)
Observations	17537	17537	12529	12529	10756	10756	7034	7034
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mission Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	2109	2109	1520	1520	1315	1315	876	876
R2	0.367	0.367	0.345	0.345	0.337	0.337	0.327	0.327
F-Statistic	129.7	127.5	89.08	87.83	74.54	73.39	.	.

Table 11: Impact of the Proximity to a Printing Press and to Different Kind of Schools on Education

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table reports OLS estimates. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual, village-, ethnicity- and mission-level controls described in the text. The dependent variable is the level of education nowadays. Columns 1 and 2 present the results for the entire sample. In columns 3 to 8 the sample is sequentially restricted to individuals living 150 km (columns 3 and 4), 100km (columns 5 and 6) and 50 km (columns 7 and 8) away from an historical mission settlement.

There are a total of 5,535 missions in the entire world outside sub-Saharan Africa (6,258 including sub-Saharan Africa) reported in the Atlas in 1903. Only 2.3% of these missions had a printing press.¹³ These missions were affiliated to 369 different societies.¹⁴ Among these societies, 16.8% had a printing press in at least one of their missions. Our instrumenting assumption is that the larger this share, the more likely it was for a mission from this denomination to invest in a printing press in sub-Saharan Africa. Columns (2) and (3) from table 12 confirm that “Society PP_{*m*}” is positively correlated with the binary variable indicating whether the sub-Saharan mission had a printing press in 1903 (“Mission PP”). We have information on the originating society for 679 out of our 723 missions. The others 44 missions were either affiliated to a denomination existing only in sub-Saharan Africa, or not affiliated to a denomination.

Let “Village Printing_{*j*}(*k*)” be the sum of Society PP_{*m*} for all the missions historically located less than *k* km away from village *j*. For each village *j*, we call *m_j(x)* any mission station historically located *x* km away from *j*. The variable “Village Printing_{*j*}(*k*)” is defined in equation 2:

$$\text{Village Printing}_j(k) = \sum_{x \leq k} \text{Society PP}_{m(x)} \quad (2)$$

Figure 2 draws a diagram of the instrumental variable’s construction. We took the example of two different villages – villages *j*₁ and *j*₂ – and of two different distances given by the radius *k*₀ and *k*₁. If we consider the smaller radius – *k*₀ – then village *j*₁ has a higher probability – as estimated by Village Printing_{*j*₁}(*k*₀) – to be closer to a mission with a printing press than villages *j*₂ whose surrounding missions are from denominations without printing presses outside of sub-Saharan Africa. The larger the radius we consider, the higher the potential value of Village Printing_{*j*}(*k*) since increasing the radius is equivalent to increasing the potential number of missions from denominations with printing presses outside sub-Saharan Africa.¹⁵

“Village Printing_{*j*}(*k*)” is used as an instrument for the proximity to the closest historical location of a mission with a printing press (“Distance Printing Press”). The exclusion restriction is that the share of missions from a society having invested in a printing press (“Society PP_{*m*}”) outside sub-Saharan Africa is not correlated with long-term determinants of newspaper readership in sub-Saharan Africa. For instance, societies that invested the most in printing presses should not be the richest or located in places with the best geographic characteristics or located in places with other characteristics positively correlated with a higher taste for newspapers.

¹³This is slightly lower than in sub-Saharan Africa where the percentage of the missions with a printing press was 3.7%.

¹⁴There were 262 denominations in sub-Saharan Africa.

¹⁵In the illustration, Village Printing_{*j*₂}(*k*₀) = 0 < Village Printing_{*j*₂}(*k*₁) = 0.02.

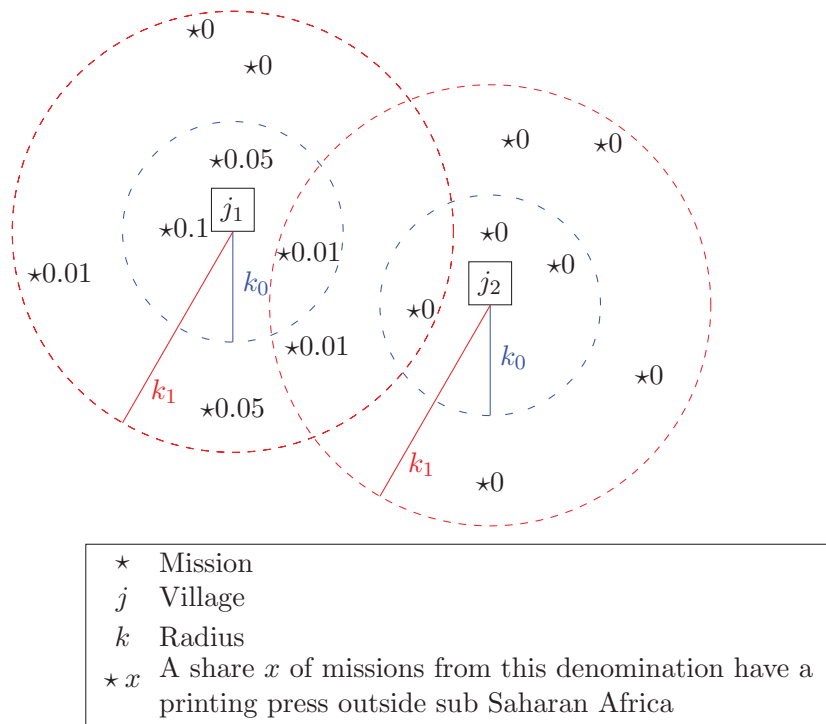


Figure 2: Instrumenting the Distance to the Printing Press Using Missions' Denomination: A Graphical Illustration

Notes: Figure 2 provides an illustrative example of how we construct the “Village Printing $_j(k)$ ” variable. In the Figure, we consider the case of two different villages – j_1 and j_2 – and of two different distances given by the radius k_0 and k_1 .
Village Printing $_{j_1}(k_0) = 0.16 = 0.1 + 0.05 + 0.01$.
Village Printing $_{j_1}(k_1) = 0.07 = 0.1 + 0.05 + 0.01 + 0.01 + 0.01 + 0.05$.
Village Printing $_{j_2}(k_0) = 0$.
Village Printing $_{j_2}(k_1) = 0.02 = 0.01 + 0.01$.

Table 12, column (1), provides evidence supporting the validity of the exclusion restriction. It reports estimates of the mission-level regression of “Society PP” on missions’ investments and geographic characteristics. None of the coefficients are statistically significant supporting our exclusion restriction. The societies outside sub-Saharan Africa investing the most into printing did not systematically conduct other type of investments in sub-Saharan Africa, nor did they settle in particularly geographically favored regions.

Tables 13 and 14 give the results of the estimation of equation (1) when “Distance Printing Press” is instrumented by the log of “Village Printing $_j(20)$ ”. We present here the results for a radius of 20 km but results are robust to the use of other radius.¹⁶

Table 13 gives the results of the first-stage of the estimation. All the coefficients we obtain are positive and statistically significant. Moreover they are robust to restricting the sample to locations close to historical locations of mission stations. A one-standard deviation increase

¹⁶These results are available from the authors upon demand.

	(1)	(2)	(3)
	Denomination PP	Mission PP	MissionPP - Logit
	b/se	b/se	b/se
main			
Geography:			
Annual Precipitation level	-0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
Suitability for Rainfed Crops	-0.004 (0.006)	-0.009 (0.008)	-0.147 (0.158)
Number of agriculture growing days	0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)
Accumulated Temperature	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Investment in Mission:			
Arrival Date	0.001 (0.001)	-0.000 (0.001)	0.011 (0.019)
Bible Society	-0.061 (0.064)	-0.054 (0.049)	-1.030 (0.984)
Number of Native Workers	0.000 (0.001)	-0.010*** (0.004)	-0.298 (0.195)
Schools (any kind) in mission	0.035 (0.034)	0.033 (0.023)	0.667** (0.316)
Number of Students	0.000 (0.001)	-0.010** (0.004)	-0.226** (0.103)
Schools per Student (%)	0.013 (0.013)	-0.010** (0.004)	-0.968* (0.501)
Teachers per Student (%)	-0.000 (0.000)	0.001 (0.001)	0.022** (0.011)
Health Facilities	0.007 (0.013)	0.046 (0.035)	0.180 (0.354)
Physicians per Capita (%)	0.001 (0.001)	0.005 (0.004)	0.103 (0.067)
Health Facilities per Capita (%)	-0.001 (0.001)	-0.002 (0.001)	-0.020 (0.037)
Society PP		0.066** (0.031)	1.405* (0.761)
Observations	463	463	367
Country FE	Yes	Yes	Yes
Clusters	58	58	55
R2	0.133	0.288	
Pseudo-R2			0.455

Table 12: Correlation between Missions' Investment and Location and their Denomination

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The table reports OLS estimates of the regression of the average number of printing presses of the mission denomination all over the world except sub-Saharan Africa (dependent variable) on the mission's investments and geographic characteristics. The unit of observation is a mission.

in the log of “City Printing_{*j*}(20)” increases the log-distance to the closest printing press by 8.3% of a standard deviation in the entire sample (Column 1), 10.2% of a standard deviation for regions located at less than 200 km from an historical mission settlement (Column 2) and 11.6% of a standard deviation for regions located at less than 150 km from an historical mission settlement (Column 3).

Table 14 presents the results of the second stage of the estimation. The positive impact of the proximity to a printing press on newspaper readership is robust to the instrumentation strategy. If anything, the results tend to be larger than those obtained in the previous sections. A one-standard deviation increase in the log-distance to the closest printing press decreases individual newspaper readership nowadays by 22.3% of a standard deviation when we consider the entire sample (Column 1), 22.6% of a standard deviation for regions located 200 km away from an historical location of a mission station (Column 2) and 21.7% of a standard deviation for regions located 150 km away from an historical location of a mission station (Column 3). Therefore, the IV approach supports the causal interpretation for the correlation between the proximity to the printing press and newspaper readership nowadays.

It is worth emphasizing that the point estimates of the IV estimations we obtain in Table 14 are larger than the point estimates of the OLS estimations. How to explain this increase in the point estimates? A first possible explanation comes from the fact that the OLS estimates might be suffering from the attenuation bias due to measurement error. Our measure of newspaper readership is a binary variable capturing whether an individual reads a newspaper on a monthly basis, which is only an imperfect signal of the amount of time allocated to newspaper readership. The instrumentation would be correcting for the attenuation bias, hence increasing the point estimates.

In the next section we present an alternative empirical strategy supporting the causal interpretation for the correlation between the proximity to the printing press and newspaper readership nowadays. This strategy is in the spirit of “propensity score matching” estimations.

4.3.4 Matching Missions

This section uses a matching approach to test the robustness of the relationship between the proximity to an historical location of a printing press and newspaper readership nowadays. We estimate the probability that missions are endowed with a printing press using a logit approach with the mission-level. Results are given in Table 12 column 3. We then select the 10% missions most likely to have a printing press in 1903 according to these results *but that did not have a printing press* (30 missions are selected).¹⁷ These missions are extremely similar to missions with a printing press but had not imported it in 1903. We call the sample of missions similar to those with the printing press but without the printing technology \overline{PP} .

¹⁷Our results are robust to the use of other thresholds and are available from the authors upon demand.

	(1)	(2)	(3)
	All Sample	200Km	150Km
	b/se	b/se	b/se
Village Printing (20)	0.073** (0.032)	0.081** (0.036)	0.099*** (0.038)
Observations	12243	10316	8937
All Controls	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Clusters	1333	1086	958
R2	0.714	0.702	0.703
F-Statistic	55.91	51.00	58.20

Table 13: IV: Impact of the Proximity to a Printing Press, IV Estimation, First Stage

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The Table reports the first stage of the IV estimation of the impact of the distance to a printing press on newspaper readership. The distance to a printing press (dependent variable in the Table) is instrumented by Village Printing $_j(20)$ which is the sum of Denomination PP $_m$ for all the missions historically located less than 20km away from village j . The construction of the variables ‘Village Printing $_j(20)$ Denomination PP $_m$ and is described in more details in the text. The controls are the individual-, village- and mission-level controls described in the text.

The sample of missions with the printing technology is called PP .

Each city from the Afrobarometer is then associated to the closest mission in the sample $\{\overline{PP} \cup PP\}$. We then define a binary variable called ‘‘Printing Treatment Area’’. If a city is associated to a mission that indeed imported the printing press then the binary variable ‘‘Printing Treatment Area’’ is equal to one. Otherwise it is set to zero. In other words, the map of Africa is decomposed as a Voronoi diagram using the missions in $\{\overline{PP} \cup PP\}$ as generators.¹⁸ We present the resulting diagram in the Appendix Figure 10. For each Voronoi region, the binary variable ‘‘Printing Treatment Area’’ indicates whether the generator point (mission) was indeed endowed with a printing press. Similarly, we compute the logarithm of the distance from each Afrobarometer city to the closest generator mission – equivalently to the closest mission from the sample $\{\overline{PP} \cup PP\}$. This variable is named ‘‘Distance Voronoi’’.

Equation 3 describes the identification equation.

$$\begin{aligned}
\text{News}_{ijec} = & \alpha + \beta_1 \text{Distance Mission}_j + \beta_2 \text{Printing Treatment Area}_j \\
& + \beta_3 \text{Distance Voronoi}_j + \beta_4 \text{Printing Treatment Area}_j \times \text{Distance Voronoi}_j \quad (3) \\
& + \gamma X_i + \theta Y_j + \epsilon Z_e + \delta_c + v_{ijec}
\end{aligned}$$

Table 15 gives the results of regression 3. The control matrices X_i , Y_j and Z_e are the same

¹⁸A Voronoi Diagram is a way of dividing space into a number of regions. A set of points (called seeds, sites, or generators) is specified beforehand and for each seed there is a corresponding region consisting of all the points closer to that seed than to any other. The regions are called Voronoi cells.

	(1)	(2)	(3)
	All Sample	200Km	150Km
	b/se	b/se	b/se
Distance Printing Press	-0.085*	-0.090*	-0.079*
	(0.050)	(0.050)	(0.047)
Distance Mission	0.015	0.015	0.004
	(0.013)	(0.013)	(0.011)
Observations	12243	10316	8937
All Controls	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Clusters	1624	1367	1238

Table 14: IV: Impact of the Proximity to a Printing Press, IV Estimation, Second Stage

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The Table reports the second stage of the IV estimation of the impact of the distance to a printing press on newspaper readership. The distance to a printing press is instrumented by $Village\ Printing_j(20)$ which is the sum of Denomination PP_m for all the missions historically located less than 20km away from village j . The construction of the variables ‘ $Village\ Printing_j(20)$ Denomination PP_m ’ and is described in more details in the text. The controls are the individual-, village- and mission-level controls described in the text.

as defined in the baseline specification 1.

Should all the results be driven by endogenous selection into printing, distance to the closest generator mission will have the same impact no matter the value of the binary variable “Printing Treatment Area”. The OLS estimates of β_2 and β_4 would then be close to zero whereas those of β_3 should be negative and statistically significant. Results in Table 15 show evidence against such endogenous selection into printing and supporting on the contrary the causal relationship between historical distance to mission settlements with a printing press and newspaper readership. Distance to the closest mission with the printing press or similar to a mission with a printing press has no robust significant effect on newspaper readership today. On the contrary we find a positive and statistically significant β_2 coefficient and a negative and statistically significant β_4 coefficient (columns 4 and 6). In other words, the proximity to an historical mission settlement *similar to those that imported the printing press* only matters for contemporaneous newspaper readership if the mission did indeed import the printing press.

Therefore it seems unlikely that among regions close to historical mission settlements the persistent effect of the proximity to a printing press on contemporaneous newspaper readership is due to any other type of capital investment (physical or human) than the printing press. It is also worth noting that this section’s estimates of β_4 are consistent with the magnitude of the effects found in previous sections.

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample	All Sample	200 km	200 km	150 km	150 km
	b/se	b/se	b/se	b/se	b/se	b/se
Distance Mission	-0.003*** (0.001)	0.002 (0.003)	-0.003*** (0.000)	0.003 (0.004)	-0.007*** (0.002)	-0.002 (0.001)
Printing Treatment Area	-0.007 (0.018)	0.082 (0.050)	-0.013 (0.021)	0.087** (0.038)	-0.017 (0.013)	0.081** (0.032)
Distance Voronoi		-0.002*** (0.000)		0.001 (0.001)		-0.000 (0.003)
Treatment X Distance Voronoi		-0.018*** (0.007)		-0.021*** (0.004)		-0.021*** (0.004)
Observations	17537	17537	14189	14189	12529	12529
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mission Controls	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.324	0.325	0.317	0.318	0.313	0.314
F-Statistic	165.6	159.5	145.6	140.1	127.3	121.5

Table 15: Impact of the Proximity to a Printing Press on Newspaper Readership: Matching Missions Approach

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The unit of observation is an individual. Standard errors in parentheses are clustered two ways at the village level. The table reports the OLS estimates and the dependent variable is a binary variable indicating whether individual reads the news on a monthly basis. Columns (1) and (2) give the results for all sample; columns (3) and (4) give the results when the sample is restricted to individuals living at maximum 200 km of an historical mission settlement. In columns (5) and (6) the same restriction applies using 150 km. The controls are the individual-, village and mission-level controls described in the text.

Controls in the Restricted Set	Controls in the Full Set	(1) Read News
None	Individual-level controls from eq (1)	1.26
None	Individual- and village-level controls from eq (1), additional controls	1.12
Age, age squared, sex	Individual-level controls from eq (1)	1.33
Age, age squared, sex	Individual- and village-level controls, from eq (1), additional controls	1.12

Table 16: Using Selection on Observables to Assess the Bias from Unobservables

Notes: Each cell of the Table reports ratios based on the coefficient for the distance to the printing press from two individual-level regressions. In one, the covariates include the “restricted set” of control variables. In the other, the covariates include the “full set” of controls. In both regressions, the sample sizes are the same and country fixed-effects and distance to the closest mission are included.

4.3.5 Using Selection on Observables to Assess the Bias from Unobservables

Despite our attempts to circumvent any endogenous determination of our results, results from previous tables may still be biased by unobserved missing variables.

This section follows Nunn and Wantchekon (2011) to assess the likelihood that the estimates are biased by unobservables and exploit the insight from Altonji, Elder, and Taber (2005) that selection on observables can be used to assess the potential bias from unobserved variables. This strategy is described in details in Nunn and Wantchekon (2011).

We construct a measure to gauge the strength of the likely bias arising from unobserved variables using four different set of control variables: (i) two sets of restricted covariates: one with no control and one with a sparse set of individual-level controls that includes only age, age squared and sex; (ii) two sets of full covariates: one including all the individual-level controls from equation (1), and one adding to this the village-level controls from equation (1) and the additional controls presented just above. Using these four sets of variables we calculate the effect that needs to be explained away by selection on unobserved variables and report these effects in the cells of Table 16.

Of the 4 ratios reported in Table 16, none is less than one. The ratios range from 1.12 to 1.33. Therefore, to attribute the entire OLS estimate to selection effects, selection on unobserved variables would have to be greater than selection on observables. In our view, these results make it unlikely that the estimated effect of the distance to the printing press is fully driven by unobserved variables. The evidence rather suggests that the correlation between the distance to the printing press and newspaper readership is causal.

Taken together, all the results from section 4 are consistent with the idea that the proximity to a printing press in 1903 has a causal effect on newspaper readership nowadays but no other effect on determinants of political participation we are not controlling for. How to explain

such a persistent effect of the location of the printing press in 1903 on newspaper readership nowadays?

4.3.6 Discussion: Persistence

Our working hypothesis suggests that the newspaper distribution profile shaped during the early colonization period is still persistent today. Persistence in publishing activities can be justified because printing presses are an expensive capital investment with very large transportation costs.

The Printing Press: A Costly and Sizeable Investment At the time of Protestant missions' settlement in sub-Saharan Africa, there existed three kinds of printing presses: the wooden press (Figure 5 in the Online Appendix) directly inherited from the old Gutenberg's printing press;¹⁹ the iron press, the most famous one being the Stanhope press which appeared around 1800 (Figure 6 in the Online Appendix); and the more technological steam press. The basic idea of the steam press, also called 'cylinder machine', was to use a rolling cylinder in printing to overcome excessive manual strain. A patent for the first cylinder machine was issued in October 1911 by Friedrich Koenig and a version of it was ready to work a year later (Clair, 1976) (Figure 7 in the Online Appendix).

Due to technological constraints, printing presses could not be built in sub-Saharan Africa and had to be imported from Europe. Missionaries only imported hand-presses machines; nevertheless, importation was far from easy. Wooden printing presses, for instance, were highly inflammable materials. In 1819, Thomas Stingfellow and Robert Godlonton both English settlers and qualified printers, sailed for South Africa with a large crate containing a second-hand wooden press. However, their "inflammable" machine was impounded in Table Bay by the Acting Governor, calling a halt on their printing project before it even started (Gordon-Brown, 1979). Similarly, the Wesleyan missionaries in Grahamstown (South Africa) decided to import an iron printing press at the end of the 1920. But their project was almost as complicated. When Reverend Stephen Kay arrived with the machine in 1830, the missionaries realized that certain characters required for the Hosa language were missing from the typing range. The printing press could not be used during almost three years, the time it took for the missing material to arrive to Grahamstone.

This anecdotal evidence illustrates the complexity of starting the printing activity in sub-Saharan Africa. Moreover, the printing press was a costly object to transport because of its size and weight. Figure 8 in the Online Appendix shows the so-called Moffat or Kuruman press, considered to be the oldest iron hand press in South Africa. This press had been sent

¹⁹ "The wooden press remained unchange in its essentials for some 350 years, with only minor alterations which were not always of universal application" (Clair, 1976).

to South Africa by the London Missionary Society in 1825. It was given by Dr. John Philip to the missionary Robert Moffat who transported it from Port Elizabeth to Kuruman in 1831 (Moran, 1973). As it appears on the picture, printing presses were bulky at the time. It is difficult to have exact information of the size of each given press, but some useful information is given in Moran (1973) who reports size found in catalogs. The platen of one of the smallest wooden presses found in the 1820's (the *Brooke*) was 30cm×3.8cm×45cm (1ft×1½in×1ft5in), while it was 91cm×30cm (3ft×11½in) for the largest one. Iron presses were of the biggest size. For example the size of the Columbian press, introduced between 1812 and 1814 and which, according to Moran (1973), “looks much like others of the period”, ranges from 53cm×40cm (21in×16in) to 106cm×68cm (42in×27in).

On top of being sizeable, printing presses were costly. Information provided in Moran (1973) is once again instructive. At the beginning of the XIXth century, the wooden presses costed between £ 60 and £ 70. When Stanhope introduced his first iron press around 1800, its price was £ 90. The price began to drop when competitors entered the market but in 1808, it still ranged from £ 21 for the cheapest to £ 73 for the most expensive. A few years later, at the end of the 1810's, the price of the Columbian press, another iron model, ranged from £ 100 and £ 125. In 1820, the price was still above £ 75. Finally, in the 1840's, the Albion press – following the Columbian Press – varied in size from ‘Amateur’ (15cm×12cm or 7×5½in) to Double Royal (100cm×58cm or 40in×23in). The price of the Double Royal was £ 75.²⁰

To have an idea of what these prices represented at the time, we look at the national income per capita and the wages in 1830 England – the year in which the Wesleyan missionaries imported their first printing press to Grahamstone. Piketty and Zuckman (2013) report that in 1830, the national income per year and adult was £30, while the average wage was £20 a year (the lowest worker wages were £10 a year). The average worker (blue-collar) wage was £15 a year. In other words, a printing press costed on average five years of a worker wage.

Printing presses were thus costly, sizeable and missionaries had to import them from Europe. Furthermore, particular knowledge was required to use them. When bringing a printing press in sub-Saharan Africa, the owner had to train apprentices and do much of the mechanical work himself: “*the editor, printer, publisher and proprietor were all combined in one person*” (Gordon-Brown, 1979). Printing presses were often operated by settlers who had an experience of a printing office in England. Moreover, specific education investments had to be made. Printing schools were indeed established by Protestant missionaries for natives to acquire the specific knowledge required. In 1896, four printing schools were already active in South Africa (Cape Colony), Zanzibar and Malawi (Lake Nyasa) with close to 300 students

²⁰Not to refer to the prices of the cylinder machine. The simplest Koenig machine, the single cylinder, costed £900. A double machine costed £1,400 and the most advanced one £2,000.

(Dennis, Beach, and Fahs, 1896). As a consequence, printing presses were accessible available to the native population outside Protestant missions with a printing press.

The nature of the printing machine and the specific knowledge it required made it a rare commodity in Africa outside mission stations; thus explaining the geographic concentration of printing and publishing activities around the missionary printing press. This concentration was probably exacerbated for newspapers because information institutions take time to consolidate into solid and independent structures. In most sub-Saharan African countries, the newly established government tried to take control over the press after the Independence. These nationalizations however did not succeed in countries where newspapers were well established, stable and independent before colonization. In Nigeria for instance, despite the *coup d'État*, the following military regime and the development of a State-owned press, independent newspapers managed to survive. Similarly, even during the Apartheid in South Africa, the black press and anti-Apartheid white-owned press spared to exist. *The Daily Dispatch*, the *SASO Newsletter* or *The World* regularly diffused their anti-Apartheid position. This has not been the case in former French colonies.

Finally, reading habits exhibit strong persistence over time. A survey on newspapers made by the Lumina Foundation across Lagos, Enugu, Oyo, Edo, Kogi, Kaduna and the River States, confirms the persistence of reading habits in southern and middle-belt Nigeria at least. 59% of the respondents replied that they read newspapers as a cultural and family inherited culture (Fraser, 2008).

Persistence of the Supply of Newspapers In the Appendix, using the only available data on newspaper supply we could collect, we provide cross-country suggestive evidence of the persistence of the supply of newspapers. Figures 9(a) and 9(b) give cross-country plots of, respectively, the number of newspapers recorded up to date and the date of publication of the first newspaper against the average distance of cities surveyed in the Afrobarometer to the closest historical mission settlement with a printing press. Figure 9(a) shows a negative correlation between distance to the printing press and the total number of newspapers recorded in the country's history. Figure 9(b) shows a positive correlation between distance to the printing press and the first date recorded of a newspaper in the country. Although the evidence is just suggestive, it supports the early emergence of newspapers around mission stations and the persistence of the concentration pattern. In the remainder of the paper, the independent variable is newspaper readership. Newspaper readership is indeed available at the individual level, and geocoded at the city-level in the Afrobarometer.

5 Newspaper Readership and Political Participation

How can access to information affect development? Recent work in political economy has studied the correlation between access to the media – especially to newspapers – and political participation. Assessing causality from this correlation is challenging because of endogeneity concerns. First, reverse causality might bias OLS estimates as political participation might increase demand for information. Second, omitted variables can also bias OLS estimates as unobserved variables like personal taste for political matters or corruption at the regional level might affect both political participation and newspaper readership.

In this article we propose to instrument newspaper readership by the proximity to an historical location of the printing press to deal with these endogeneity concerns. As shown in the previous section, once we control for individual-, town- and mission-level characteristics, the proximity to an historical mission settlement endowed with a printing press significantly increases newspaper readership and this relationship is causal. The proximity to an historical location of the printing press is thus a valid instrument for current newspaper readership.

Access to information can affect different attitudes towards political participation. The different variables used and mentioned below are described in a subsequent footnote for each variable. The description gives the question used in the Afrobarometer to construct the variable. The variables are also summarized in Table 25 in the Appendix.

First, because it provides information on the different political events like elections, access to information might just mechanically increase the pool of people informed of the events they can participate to, increasing the likelihood of participation. In that sense, access to information can increase political participation to all kinds of political events, “big-scale” events such as national elections but also “small-scale” events like demonstrations or protest marches. We estimate the impact of newspaper readership on the three different measures of political participation: registration to elections²¹; voting for past elections²²; and a proxy for political participation at the local level (“Actions as Citizen”²³).

Second, access to information can increase accountability of political representation thus increasing incentives for citizens to participate in the democratic process. If this was to be the case, access to information should increase satisfaction with the democratic system. However,

²¹Understanding that some [Ghanaians/Kenyans/etc.] were not able to register as voters for the [20xx] elections, which statement is true for you? You were registered to vote, You did not want to register, You could not find a place to register, You were prevented from registering, You were too young to register, Did not register for some other reason, Dont Know/Can't remember

²²With regard to the most recent, [20xx] national elections, which statement is true for you? You voted in the elections, You decided not to vote, You could not find the polling station, You were prevented from voting, You did not have time to vote, Did not vote for some other reason, You were not registered, Dont Know/Can't remember

²³Here is a list of actions that people sometimes take as citizens. For each of these, please tell me whether you, personally, have done any of these things during the past year. If not, would you do this if you had the chance: attend a community meeting; go together with others to raise an issue; attend a demonstration or protest march.

as underlined in the recent literature (Djankov and et al, 2003; Cagé, 2013) access to information can be associated with monitoring only if the media’s quality is compatible with the costs and difficulties of the monitoring function. In regions where media are either captured or of very poor quality, they are less likely to efficiently monitor politicians. Therefore, newspaper readership is less likely to affect political participation through monitoring in sub-Saharan Africa. From the Afrobarometer, we can infer satisfaction with democracy using two different variables: “Satisfaction”²⁴ and “trust”²⁵. These two outcomes are likely to increase if there is efficient monitoring in politics.

Finally, information institutions provide a space for citizens to discuss political matters. A developed information system might therefore deal with a large set of public matters likely to interest a great number of citizens. In that sense, access to information might improve the political discussion environment.²⁶ Thanks to the richness of the Afrobarometer data, we can evaluate the impact of newspaper readership on a proxy for the quality of political discussion at the local level: “Others Listen”²⁷.

For all these different outcomes of interest, we first estimate the reduced-form impact of the proximity to the printing press on political participation. Newspaper readership is indeed one but perhaps not the only channel through which the printing press may have affected long-term political participation. We then estimate the impact of newspaper readership nowadays on political participation. We finally run an IV estimation using the proximity to the printing press as an instrument for newspaper readership nowadays. To avoid omitted variables bias, we present each time estimations with the entire sample and with the sample restricted to individuals “treated” by historical proximity to a mission station (to regions closer than 150 km away from an historical location of a mission station). To assess the robustness of our results, we use both OLS and Probit estimations.

5.1 Reduced-Form Estimation

Table 17 presents the results of the OLS estimation of the impact of the proximity to a mission with a printing press on our different measures of political participation. As expected, we find that an increase in the proximity to the printing press increases political participation as measured “Actions as a citizen” (column 3). It also increases the interest in politics as proxied by whether an individual thinks that other listen to her as far as politics is concerned (column

²⁴Binary variable indicating that individual both thinks its country is a democracy and is “fairly” or “very satisfied” with “the way democracy works”.

²⁵Generally speaking, would you say that most people can be trusted or that you must be very careful in dealing with people?

²⁶Habermas (1989) suggested the important role of the development of the public sphere of discussion for the emergence of democracy.

²⁷Binary variable indicating whether respondent disagreed with the statement: “As far as politics is concerned, friends and neighbors do not listen to you?”

5). Both estimations are strongly statistically significant. We also find that an increase to the distance to the printing press increases the “supply of democracy” (column 6). We find no statistically significant effect on the “demand for democracy” and on trust.

More surprisingly, we find that an increase to the proximity to a printing press *decreases* political participation as measured by voter registration (column 1) and voter turnout (column 2). However, this effect is small and not very statistically significant. Moreover it is not robust to either using a Probit estimation (Table 19) or to reducing the sample to regions close to historical mission settlements.

Table 18 presents the estimation of the impact of the proximity to a printing press on individuals living in regions closer than 150 km away from an historical location of a mission station. We find no statistically significant effect on registration (column 1), turnout (column 2), trust (column 4), supply (column 6) or demand of democracy (column 7). On the contrary, we still find a negative and statistically significant impact of the distance to a printing press on whether an individual takes actions as a citizen (Column 3) and on whether an individual thinks that other listen to her as far as politics is concerned (Column 5). These results are robust to using Probit estimation rather than OLS (Table 19). The magnitude of the estimates is consistent across methods. For example, the impact of the proximity to a printing press on “Others Listen” is 1.23 times larger than for “Actions as citizens” in the OLS approach (columns 3 and 5 in Table 18) and it is 1.3 larger in the Probit approach (Table 19).

5.2 OLS Estimation

As discussed in the previous section, an increase in the proximity to the printing press increases newspaper readership nowadays. Moreover the body of evidence from Section 4 tends to support causality. In this section, we first estimate the impact of newspaper readership on political participation using OLS. We then use the proximity to the printing press as an instrument for newspaper readership in an IV estimation.

Table 20 gives the results from the OLS estimation of the impact of newspaper readership on political participation controlling for the same set of covariates as before. We find that reading the news has a positive and statistically significant impact on whether an individual takes actions as a citizen (column 3) and on whether an individual thinks that other listen to her as far as politics is concerned (column 5). Moreover, we find a positive and statistically significant impact of newspaper readership on the demand for democracy (column 7). The impact of newspaper readership on voter registration (column 1), turnout (column 2) and supply of democracy (column 6) is not statistically significant.

We find a negative and statistically significant impact of newspaper readership on trust (column 4). Although not robust to instrumentation, this result is to take into consideration given the recent increase of research on the role of trust on economic development (Aghion,

	(1)	(2)	(3)	(4)	(5)	(6)
	Register	Turnout	Action as Citizen	Trust	Others Listen	Satisfaction
	b/se	b/se	b/se	b/se	b/se	b/se
Distance Printing Press	0.008* (0.005)	0.010** (0.005)	-0.021*** (0.007)	-0.003 (0.006)	-0.036*** (0.009)	-0.018** (0.008)
Distance Mission	-0.004 (0.004)	-0.003 (0.004)	0.017*** (0.005)	-0.002 (0.005)	0.000 (0.006)	-0.002 (0.006)
Observations	17484	17537	17537	17210	12478	14523
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Media Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	2109	2109	2109	2107	2020	2075

Table 17: Reduced-Form Estimation (OLS): Proximity to the Printing Press and Political Participation

	(1)	(2)	(3)	(4)	(5)	(6)
	Register	Turnout	Action as Citizen	Trust	Others Listen	Satisfaction
	b/se	b/se	b/se	b/se	b/se	b/se
Distance Printing Press	0.006 (0.005)	0.007 (0.005)	-0.023*** (0.008)	-0.005 (0.006)	-0.030*** (0.009)	-0.015* (0.008)
Distance Mission	-0.006 (0.004)	-0.004 (0.004)	0.018*** (0.007)	-0.001 (0.006)	-0.011 (0.007)	-0.005 (0.007)
Observations	12485	12529	12529	12311	8972	10309
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Media Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	1520	1520	1520	1519	1449	1493

Table 18: Reduced-Form Estimation (OLS): Proximity to the Printing Press and Political Participation, Within Regions Close to Missions

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The table reports OLS estimates. The sample is restricted to individuals living 150km from an historical location of a mission station. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-level and village-level controls described in more details in the text.

	(1)	(2)	(3)	(4)	(5)	(6)
	Register	Turnout	Action as Citizen	Trust	Others Listen	Satisfaction
	b/se	b/se	b/se	b/se	b/se	b/se
main						
Distance Printing Press	0.023 (0.022)	0.023 (0.018)	-0.065*** (0.022)	-0.024 (0.027)	-0.080*** (0.025)	-0.047* (0.026)
Distance Mission	-0.019 (0.019)	-0.014 (0.017)	0.049*** (0.019)	0.003 (0.023)	-0.030 (0.019)	-0.016 (0.021)
Observations	12485	12529	12529	12149	8972	10309
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Media Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	1520	1520	1520	1493	1449	1493

Table 19: Reduced-Form Estimation (Probit): Proximity to the Printing Press and Political Participation, Within Regions Close to Missions

Notes: * p<0.10, ** p<0.05, *** p<0.01. The table reports Probit estimates. The sample is restricted to individuals living 150km from an historical location of a mission station. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-level and village-level controls described in more details in the text.

Algan, Cahuc, and Shleifer, 2010; Algan and Cahuc, 2010). This result could be specific to African countries which suffer from important social and political conflict. In this region of the world, information could indeed come at the detriment of trust as it would reveal the true state of unstable regions. This interpretation is of course purely speculative as is not possible to verify it here. However the role of information on trust is an important question that would deserve further research.

As we underline before, OLS estimations can be biased if there is reverse causation: some people read newspapers because, since they participate in political life, they need to be informed; or if there is an omitted variable bias: unobserved variables can correlate both with newspaper readership and political participation. For instance, individual taste for society issues might be positively correlated with both variables. Similarly corruption can also affect them in undetermined directions: it might increase media access if there is capture or decrease it if there is censure; it might increase political participation in the case of charismatic or populist regimes and decrease it if there it affects confidence in the regime. We instrument newspaper readership using the proximity to a mission with a printing press to deal with these endogeneity issues.

5.3 IV Estimation

This section gives the results of the instrumental variable approach using both linear regression and Probit methods. In all the specifications, our instrument refutes the weak identification null hypothesis: the Cragg-Donaldson F-statistic is always greater than the Stock-Yogo critical values for the null hypothesis of a bias not larger than 15% of the OLS bias. Table 28 in the appendix gives the Cragg-Donaldson F-Statistic and the critical values for all the models estimated in this section.

Table 22 shows the results of the IV estimation. We find that newspaper readership, instrumented by the proximity to the printing press, has a positive and statistically significant impact on whether an individual takes actions as a citizen (column 3) and on whether an individual thinks that other listen to her as far as politics is concerned (column 5). It has no significant impact on the other political outcomes. The instrumental-variable Probit approach used to produce table 23 are consistent with the linear estimation approach. The only remarkable difference is that newspaper readership statistically significantly increases satisfaction with democracy.

Newspaper readership has therefore a stable positive impact on political participation at the community level as opposed to no effect at all on institutional (probably national-level) political participation. Two interpretations are possible. First, political participation at the local level can be increased because individuals are just more informed about their participation opportunities and this effect would only work for less well-known forms of such

	(1)	(2)	(3)	(4)	(5)	(6)
	Register	Turnout	Action as Citizen	Trust	Others Listen	Satisfaction
	b/se	b/se	b/se	b/se	b/se	b/se
Read News	-0.003 (0.009)	-0.001 (0.009)	0.047*** (0.011)	-0.024** (0.009)	0.061*** (0.014)	-0.002 (0.011)
Observations	12485	12529	12529	12311	8972	10309
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Media Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	1520	1520	1520	1519	1449	1493

Table 20: OLS Estimation: Newspaper Readership and Political Participation

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The table reports OLS estimates. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-level and village-level controls described in more details in the text.

	(1)	(2)	(3)	(4)	(5)	(6)
	Register	Turnout	Action as Citizen	Trust	Others Listen	Satisfaction
	b/se	b/se	b/se	b/se	b/se	b/se
main						
Read News	-0.018 (0.039)	-0.006 (0.035)	0.134*** (0.031)	-0.110*** (0.042)	0.158*** (0.037)	-0.007 (0.034)
Observations	12485	12529	12529	12149	8972	10309
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Media Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	1520	1520	1520	1493	1449	1493

Table 21: Probit Estimation: Newspaper readership and Political Participation, Within Regions Close to Missions

Notes: * p<0.10, ** p<0.05, *** p<0.01. The table reports Probit estimates. The sample is restricted to individuals living 150km from an historical location of a mission station. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-level and village-level controls described in more details in the text.

opportunities. Second, newspaper readership might increase individual concern about local and community matters, thus motivating individuals to take actions as citizens. Further research could aim at disentangling more precisely these two effects but it is far beyond the scope of this paper. Furthermore, newspaper readership has a stable positive impact on the quality of public discussion: it increases the probability that individuals feel listened whenever discussing political matters. This effect supports the idea that information institutions are a form of social capital required for the consolidation of democracy.

The point estimates of the IV estimations are larger than the point estimates of the OLS estimations. Given the reverse causation issue and the undetermined direction of the omitted variable bias of the previous section’s approach, the increase in the point estimates is not inconsistent with the first results. Moreover, the OLS estimates might also be suffering from the attenuation bias due to measurement error. Our measure of newspaper readership is a binary variable capturing whether an individual reads a newspaper on a monthly basis, which is only an imperfect signal of the amount of time allocated to newspaper readership. This amount of time might nevertheless be the “real” determinant of political participation. The instrumentation would be correcting for the attenuation bias, hence increasing the point estimates.

5.3.1 Falsification Test: the Impact on Radio and Television

For the proximity to the printing press to be a valid instrument for contemporaneous individual newspaper readership, it has to satisfy the exclusion restriction. The exclusion restriction states that the proximity to the printing press only affects political participation through newspaper readership. Although largely discussed in section 4, this section performs a last check.

Table 24 performs a falsification test supporting the exclusion restriction. The dependent variable $News_{ijc}$ is now a dummy variable equal to 1 if individual i in village j and country c , listens to the news on the radio (columns 1 and 2) or watches the news on television (columns 3 and 4) at least once a month. The coefficient β is only weakly significant in column 1 and is not robust to the sample restriction. In all the other cases, the coefficients are close to 0 and are not statistically significant. These results confirm our the validity of our exclusion restriction.

6 Conclusion

This research explores historical determinants of newspapers’ development in sub-Saharan Africa to identify the causal effect of newspaper readership on political participation. We show that there is a negative correlation between the distance to the printing press in 1903

	(1)	(2)	(3)	(4)	(5)	(6)
	Register	Turnout	Action as Citizen	Trust	Others Listen	Satisfaction
	b/se	b/se	b/se	b/se	b/se	b/se
Read News	-0.196 (0.276)	-0.315 (0.289)	1.165** (0.575)	0.289 (0.415)	0.995* (0.550)	0.717 (0.549)
Observations	12485	12529	12529	12311	8972	10309
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Media Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	1520	1520	1520	1519	1449	1493

Table 22: IV Estimation: Newspaper Readership and Political Participation

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table reports IV estimates. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-level and village-level controls described in more details in the text.

	(1)	(2)	(3)	(4)	(5)	(6)
	Register b/se	Turnout b/se	Action as Citizen b/se	Trust b/se	Others Listen b/se	Satisfaction b/se
main						
Read News	-1.242 (1.046)	-1.248 (0.889)	2.242*** (0.345)	1.318 (1.240)	2.340*** (0.233)	1.990*** (0.537)
Observations	12485	12529	12529	12149	8972	10309
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Media Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	1520	1520	1520	1493	1449	1493

Table 23: Probit-IV Estimation: Newspaper Readership and Political Participation, Within Regions Close to Missions

Notes: * p<0.10, ** p<0.05, *** p<0.01. The table reports Probit estimates. The sample is restricted to individuals living 150km from an historical location of a mission station. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-level and village-level controls described in more details in the text.

	Radio News		TV News	
	(1)	(2)	(3)	(4)
	All Sample	150km	All Sample	150km
	b/se	b/se	b/se	b/se
Distance Printing Press	-0.006 (0.005)	-0.007 (0.008)	-0.010* (0.005)	-0.003 (0.008)
Distance Mission	-0.008* (0.005)	-0.012** (0.006)	-0.010* (0.006)	-0.018*** (0.007)
Observations	17594	17594	12563	12563
All Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Clusters	2109	2109	1520	1520
R2	0.0820	0.368	0.0948	0.389

Table 24: Falsification Test

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table reports OLS estimates. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-level and village-level controls described in more details in the text. In Columns 1 and 3 the dependent variable is listening to the news on the radio at least once a month. In Columns 2 and 4 the dependent variable is watching the news on TV at least once a month. In Columns 3 and 4 the sample of surveyed individuals is restricted to individuals in a village with at least a Protestant mission in a 150-kilometer radius around the village.

and newspaper readership nowadays. Evidence from a variety of identification strategies suggest that the relationship is causal.

We estimate the impact of newspaper readership using the proximity to an historical location of a mission's printing press as an instrument for political participation. According to our results, newspaper readership enhances political participation at the local level because it delivers information about the important democratic events and gives a space for public discussion. Similarly, it improves the quality of the political discussion environment.

These findings are important for various reasons. First, analyzing the case of the printing press in sub-Saharan Africa, we show that early capital transfers can have a persistent effect on development. Second, we provide a new instrument for newspaper readership on different outcomes in contemporary Africa. This is of particular interest in the sub-Saharan African context where, on the one hand, the newspaper market is still growing and, on the other hand, much is still to do to fight against corruption and improve democratic institutions. Finally, we find that the persistent effect of Protestantism on economic development goes beyond literacy and education.

Our analysis reveals the crucial role of access to information on development, a role that had not been considered in the literature before. Our results on political participation raise numerous question that could be the object of further research. Further research could attempt at disentangling the different channels through which media access can affect citizen participation at the local level: is it a purely informational effect or is it due to an increase

in sensibility to social and political issues? Forthcoming research will also aim at evaluating the role of information institutions on other dimensions of development such as health or business creation. Information institutions can be vectors of social and economic policies, and their role on economic and political development has not been studied deeply enough in the economic literature.

References

- ACEMOGLU, D., S. JOHNSON, AND J. A. ROBINSON (2001): “The Colonial Origins of Comparative Development: an Empirical Investigation,” *American Economic Review*.
- AGHION, P., Y. ALGAN, P. CAHUC, AND A. SHLEIFER (2010): “REGULATION AND DISTRUST,” *The Quarterly Journal of Economics*, 125(3), pp. 1015–1049.
- ALESINA, A., W. EASTERLY, AND J. MATUSZESKI (2011): “Artificial States,” *Journal of the European Economic Association*, 9(2), 246–277.
- ALGAN, Y., AND P. CAHUC (2010): “Inherited Trust and Growth,” *The American Economic Review*, 100(5), pp. 2060–2092.
- ALTONJI, J. G., T. E. ELDER, AND C. R. TABER (2005): “Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools,” *Journal of Political Economy*, 113(1), 151–184.
- BAI, Y., AND J. K.-S. KUNG (2011): “Diffusing Useful Knowledge While Spreading God’s Message: Protestantism and Economic Prosperity in China, 1841-1920,” *Mimeo, The Hong-Kong University of Science and Technology*.
- BECKER, S. O., AND L. WOESSMAN (2009): “Was Weber Wrong? A Human Capital Theory of Protestant Economic History,” *Quarterly Journal of Economics*, 124(2), 531–596.
- CAGÉ, J. (2013): “Trash Media: How Competition Affects Information,” *Harvard Mimeo*.
- CANTONI, D. (2011): “Adopting a New Religion: The Case of Protestantism in 16th Century Germany,” *Economic Journal*, 122(560), 502–531.
- CENTURY COMPANY, . . (1911): *The Century Atlas: Africa [map]*. Buffalo, NY: Matthews-Northrup.
- CHANDLER, T. (1987): *Four Thousand Years of Urban Growth: An Historical Census*. St. David’s University Press.
- CHURCH MISSIONARY SOCIETY, . (1862): *The Church Missionary atlas: maps of the various missions of the Church Missionary Society, with illustrative letter-press*. Church Missionary House.
- CLAIR, C. (1976): *A history of European printing*. Academic Press.
- DELL, M. (2010): “The Persistent Effects of Peru’s Mining Mita,” *Econometrica*, 78(6), 1863–1903.

- DELLA VIGNA, S., AND E. KAPLAN (2007): “The Fox News Effect: Media Bias and Voting,” *The Quarterly Journal of Economics*, 122(3), 1187–1234.
- DENNIS, J. S., H. P. BEACH, AND C. H. FAHS (1896): *A Geography and Atlas of Protestant Missions*. Student Volunteer movement for foreign missions.
- (1903): *Geography and Atlas of Christian Missions*. Student Volunteer movement for foreign missions.
- DITTMAR, J. E. (2011): “Information Technology and Economic Change: The Impact of The Printing Press,” *The Quarterly Journal of Economics*, 126(3), 1133–1172.
- DJANKOV, S., AND ET AL (2003): “Who Owns the Media?,” *Journal of Law and Economics*, 46(2), 341–81.
- ENIKOLOPOV, R., M. PETROVA, AND E. ZHURAVSKAYA (2011): “Media and Political Persuasion: Evidence from Russia,” *American Economic Review*, 101(7), 3253–3285.
- FEYRER, J., AND B. SACERDOTE (2009): “Colonialism and Modern Income: Islands as Natural Experiments,” *The Review of Economics and Statistics*, 91(2), 245–262.
- FRASER, R. (2008): *Book History through Postcolonial Eyes: Rewriting the Script*. Routledge.
- GALLEGO, F. A., AND R. WOODBERRY (2010): “Christian Missionaries and Education in Former African Colonies: How Competition Mattered,” *Journal of African Economies*, 3(19), 294–329.
- GENTZKOW, M. (2006): “Television and Voter Turnout,” *The Quarterly Journal of Economics*, 121(3), 931–972.
- GENTZKOW, M., J. M. SHAPIRO, AND M. SINKINSON (2012): “Competition and Ideological Diversity: Historical Evidence from US Newspapers,” *NBER Working Paper 18234*.
- GIBSON, C., AND J. D. LONG (2012): “Ethnicity, Performance, and Elections in Africa: an Experimental Approach to Voting Behavior,” *Working Paper*.
- GLAESER, E. L., AND A. SHLEIFER (2002): “Legal Origins,” *The Quarterly Journal of Economics*, 117(4), 1193–1229.
- GORDON-BROWN, A. (1979): *The settlers’ press: seventy years of printing in Grahamstown covering the publication of books, pamphlets, directories, almanacs, newspapers, with historical notes and anecdotes and contemporary illustrations*. A. A. Balkema.
- HABERMAS, J. (1989): *The Structural Transformation of the Public Sphere: An Inquiry into a Bourgeois Society*. The MIT Press.

- HUILLERY, E. (2009): “History Matters: The Long-Term Impact of Colonial Public Investments in French West Africa,” *American Economic Journal: Applied Economics*, 1(2), 176–215.
- (2011): “The Impact of European Settlement within French West Africa: Did Pre-colonial Prosperous Areas Fall Behind?,” *Journal of African Economies*, 20(2), 263–311.
- ICHINO, N., AND N. L. NATHAN (2012): “Do Primaries Improve Electoral Performance? Clientelism and Intra-Party Conflict in Ghana,” *American Journal of Political Science*, pp. no–no.
- (2013): “Crossing the Line: Local Ethnic Geography and Voting in Ghana,” *Forthcoming, American Political Science Review*.
- KLASNJA, M., N. NOVTA, AND L. WANTCHEKON (2012): “Education and Human Capital Externalities: Evidence from Colonial Benin,” *Working Paper*.
- LA PORTA, R., F. LOPEZ-DE SILANES, AND A. SHLEIFER (2008): “The Economic Consequences of Legal Origins,” *Journal of Economic Literature*, 46(2), 285–332.
- LIVINGSTONE, D. (1858): *Missionary Travels and Researches in South Africa*. Harper and Bros.
- MCCLEARY, R. (2012): “Protestantism and Human Capital in Guatemala,” *Mimeo*.
- MICHALOPOULOS, S., AND E. PAPAIOANNOU (2012): “Pre-colonial Ethnic Institutions and Contemporary African Development,” Working Paper 18224, National Bureau of Economic Research.
- MORAN, J. (1973): *Printing Presses: History and development from the Fifteenth Century to Modern Times*. University of California Press.
- MURDOCK, G. P. (1959): *Africa: Its People and Their Culture History*. McGraw Hill.
- MYTTON, G. (1983): *Mass Communication in Africa*. Edward Arnold.
- NUNN, N. (2008): “The Long Term Effects of Africa’s Slave Trade,” *Quarterly Journal of Economics*, 123.
- (2009): “The Importance of History for Economic Development,” *Annual Review of Economics*, 1(1), 65–92.
- (2010): “Religious Conversion in Colonial Africa,” *American Economic Review*, 100(2), 147–52.

- NUNN, N., AND L. WANTCHEKON (2011): “The Slave Trade and the Origins of Mistrust in Africa,” *American Economic Review*, 101(7), 3221–52.
- OBERHOLZER-GEE, F., AND J. WALDFOGEL (2006): “Media Markets and Localism: Does Local News en Espanol Boost Hispanic Voter Turnout?,” *NBER Working Paper 12317*.
- OMU, F. I. A. (1978): *Press and Politics in Nigeria, 1880-1937*, Ibadan History Series. Longman.
- PIKETTY, T., AND G. ZUCKMAN (2013): “Capital is Back: Wealth-Income Ratios in Rich Countries, 1870-2010,” *Working Paper*.
- REINIKKA, R., AND J. SVENSSON (2005): “Fighting Corruption to Improve Schooling: Evidence from a Newspaper Campaign in Uganda,” *Journal of the European Economic Association*, 3(2-3), 259–267.
- SCHULHOFER-WOHL, S., AND M. GARRIDO (2009): “Do Newspapers Matter? Short-run and Long-run Evidence from the Closure of The Cincinnati Post,” (14817).
- SNYDER, J. M., AND D. STROMBERG (2010): “Press Coverage and Political Accountability,” *Journal of Political Economy*, 118(2), 355–408.
- STROMBERG, D. (2004): “Radio’s Impact on Public Spending,” *The Quarterly Journal of Economics*, 119(1), 189–221.
- SWITZER, L. (1984): “The African Christian Community and its Press in Victorian South Africa,” *Cahiers d’études africaines*, 24(96), 455–476.
- SWITZER, L., AND D. SWITZER (1979): *The Black press in South Africa and Lesotho: a descriptive bibliographic guide to African, Coloured, and Indian newspapers, newsletters, and magazines, 1836-1976*, Bibliographies and guides in African studies. Hall.
- TUDESQ, A.-J. (1995): *Feuilles d’Afrique: étude de la presse de l’Afrique sub-saharienne*. Talence: Editions de la Maison des Sciences de l’Homme d’Aquitaine.
- VOIGTLANDER, N., AND J. VOTH (2012): “(Re-) Shaping hatred: Anti-Semitic attitudes in Germany, 1890-2006,” (1344).
- WEBER, M. (1930): *The Protestant Ethic and the Spirit of Capitalism*. Unwin Hyman, London and Boston.
- WOODBERRY, R. D. (2004): “The Shadow of Empire: Christian Missions, Colonial Policy, and Democracy in Postcolonial Societies,” Ph.D. thesis, University of North Carolina at Chapel Hill.

——— (2012): “The Missionary Roots of Liberal Democracy,” *American Political Science Review*, 106(02), 244–274.

Appendices

A Data

A.1 Data on Mission Centers Location and Investments

The *Geography Atlas of Protestant missions*, published in 1903, was the result of an extensive work of localizing all the missionary stations around the world and reporting all the activities they were investing on. Of all the reports, conducted in 1896, 1903, 1911 and 1925, this one (1903) is the most precise and extensive version as investments, denomination, number of students, teachers (both native and foreign) and missionaries are reported for each mission localized on the maps.

The atlas contains maps of all the regions in the world and locates all the missions active in 1903. Figure 4 provides an example of these maps. All these missions are uniquely identified in a statistical index providing detailed information on the type the infrastructure available and the number of workers and students. Figure 3 shows a section of this statistical index. A list of the variables available at the mission level is provided below.

- Denomination.
- Whether the station is an anti-opium society (binary variable).
- Whether the station is an anti-foot-binding society (binary variable).
- Whether the station is a bible society, or tract and book-room.
- Whether the station has a blind school, or conducted special work for the blind (binary variable).
- The number of colleges, or universities in station.
- The number of churches or chapels in station.
- The number of dispensaries in station.
- Whether the station has a deaf-mute school, or works for deaf and dumb.
- Whether the station is a foundling asylum, or nursery mission
- The number of female helper training class in station.
- The number of hospitals in station.
- The number of high schools in station.

- The number of boarding schools in station.
- The number of industrial schools in station.
- Whether the station has an insane asylum (binary variable).
- Number of kindergartens in station.
- Whether the station has a leper asylum (binary variable).
- Number of literary workers in station.
- Whether the station has a medical, or nurse class, or school.
- Number of male foreign missionaries in station.
- Number of native male teachers, catechists, or pastors.
- Number of native female teachers, or religious helpers.
- Total number of native workers of both sexes.
- Number of orphanages in station.
- Number of Printing presses in station.
- Number of Physicians in station.
- Whether the station is a refuge for opium victims (binary variable).
- Whether the mission is a society of young people.
- Number of Sunday-schools in station.
- Number of theological classes, or schools in station.
- Whether the station is a temperance society (binary variable).
- Number of village or day schools.
- Number of missionaries' wives.
- Whether the station is a white Cross Society (binary variable).
- Number of students in mission.
- Whether the station is a YMCA (binary variable).
- Whether the station is a WMCA (binary variable).

A

Abaco, see Great Abaco Island
 Abadiyah, 12-Palestine Inset. — **FFMA** (1899) m w 3-N
 2-n 3-x=c s 2-v D
 Abasa, ? Gold Coast, Plate 14. — **WMS** m 64-Nn 64-0
 684-x=10-c 7-s 6-v
 Abbotabad, 11-D1. — **GEZMS** (1894) 3-W n=160 senana
 pupils
CMS (1899) 2-m w (p) 1) N 9-x=D
Abetifi, 14-D7. — **B** (1876) 2-m 2-w 20-N n 17-0 731-x=s
 15-v K (Abetifi)
 Abeih, very near Baakleen, 12-Palestine Inset. — See Mt.
 Lebanon, work of **FM**
 Abeokuta, 14-E7. — **CMS** (1846) 2-m w 2-W 24-N 5-n
 1122-x=c 17-v T D L
SBC (1856) m w 2-N n 2-0 26-x=c s v
WMS 2-m 30-Nn 22-0 264-x=7-c 7-s 3-v
 Aberdeen, 13-C1. — **BFSS** (1874) 2-m
 Abetifi, see Abetifi
 Abo, see Aboa
 Aboa, 14-F8 Inset. — **MGB** (1900) m=c v (Abo)
 Abokobi, see Agbogba
 Abors, corner of Tibet, China and Assam, north of Dibru-
 garh, 10-H1. — **MFA** (1900) 2-m (1)=D
 Aburah, 14-D7. — **WMS** m 49-Nn 75-0 545-x=10-c 10-s 5-v
 Aburi, 14-D7. — **B** (1847) 3-m 2-w W 14-N 4-n 9-0
 716-x=10-v K
WMS 3-m W 93-Nn 18-0 644-x=15-c 13-s 14-v h
 Acoas, see Acre
 Aocra, or Akra, 14-D7. — **MBC** (1900) m 50-x=c s
WMS 3-m 34-Nn 30-0 582-x=4-c 7-s 2-v
 Achampatti, 12-E6. — **CMS** N
 Achana, ? Ind. Ter., 3 and Inset. — **FMH** (1887) N
 26-x=c s
 Acre, Akka, or Acoho, 12-Palestine Inset, 13-L7. — **CMS**
 (1890) 2-m 2-w 4-W (p)=D H (Acca)
 Acton Homes, 18-E5. — **WMA** 29-N 12-0 297-x=2-c 3-s
 2-v

Aleppo, 12-K9, 13-M6. — **PCEJ** (1895) 2-m (p) 3-N n=
 s B v D
 Alert Bay, 2-16. — **CMS** (1878) 2-m 2-w 2-W N n 22-x
 h I
 Alexandria, 13-EF4. — **MEN** N 0 61-x=s
 Alexandria, 12-110, 13-Ks, 15-G1. — **AJM** No statistic
BFSS 2-m 3-N=B
CSJ 4-m 3-w 3-W=4-v
DAK (1857) 13-W=H
EMB (1898) 7-m
IU (1898) m w=home of rest
LSFCJ No statistics
NAM (1892) 2-m 2-w 2-W N n=c v
UP (1857) 2-m w 2-W=B
WMS m 2-N 45-x=s
 Algeciras, 13-B6, 7. — **SSM** (1890) m w N n=c v
 Algiers, 13-D6, 14-E1. — **BFBS** (1882) m w 6-Nn=B
FSEJ m
NAM (1892) 2-m 2-w 2-W (1)=2-s
PB m w W
PCFI No statistics
SMF (1887) m w=c s
TM (1888) 5-W
 Aligarh, 11-FG5. — **CMS** (1863) m w 3-W 21-N 10-n 3
 82-x=c 10-v
MEN 4-m 2-w W 14-N 16-n 720-x=2-c 32-s S 15-v I
 Allwal North, 17-G7, 18-B7. — **PMMS** (1870) 2-m 2-w 5
 9-0 1188-x=c s 2-v 2-T I t
 Allahabad, 10-A2. — **BFBS** m=B
CMS (1859) 9-m 6-w 12-N n 300-x=c 5-v T
MEN 2-m w 9-N 9-n 67-x=c 27-s S 13-v f o
PN (1836) 4-m 2-w 5-W (p) 18-N 8-n 2-0 150-x=3-c ;
 6-v 3-h D H
WU (1868) 2-W N 31-n=6-s B 14-v Rescue work, a
 special services for beggars
YMCA (1900) m=Y
ZBM 6-W N 19-n=5-v h o 260 senana pupils
 Allepie, see Alleppy
 Alleppy, 19-E2

Figure 3: Part of the Statistical index from the *Geography Atlas of Protestant missions*, 1903



Figure 4: Plate Representing all the Missionary Stations in 1903, West Africa

A.2 Afrobarometer Data

We use data from the 2005 Afrobarometer survey, which is a comparative series of national surveys on attitudes towards democracy, markets, and civil society in Africa. Surveys contain representative information at the individual level of individual attitudes towards political and social outcomes as well as individual evaluations of living standards. Table 25 gives a brief description of all the variables from the Afrobarometer used in our analysis.

A precise description of the survey, variables and sampling methods is available at the Afrobarometer website, <http://www.afrobarometer.org>. Similarly, all the questionnaires used for the construction of the dataset are available in the website.

	Type	Description
Outcomes		
Register	BV	Respondent registered for previous elections
Turnout	BV	Respondent voted at previous elections
Actions as Citizen	BV	Respondent takes actions as citizens (attend to local meetings, join others to raise an issue or has attended to a march)
Trust	BV	Respondent thinks that, in general, most people can be trusted
Others Listen	BV	Respondent feels people listen to him for political discussions
Supply of Democracy	BV	Respondent is satisfied with the country's democratic environment
Demand for Democracy	BV	Respondent thinks democracy is the best system and rejects one-party rule, military rule and one-man rule
Read News	BV	Respondent reads news on a monthly basis
Listen News	BV	Respondent listens to the news on the radio at least once a month
Watch News	BV	Respondent watches the news on TV at least once a month
Controls		
Education	DI	Level of education from none (0) to graduate studies (9)
Cash Constraints	DI	How often respondent has gone without cash income in the year from never (0) to always (4).
Water Constraints	DI	How often respondent has gone without enough clean water for home use in the year from never (0) to always (4).
Protestant Today	BV	Individual is Protestant
Urban	BV	Individual lives in an urban area

Table 25: Variables from Afrobarometer, Description

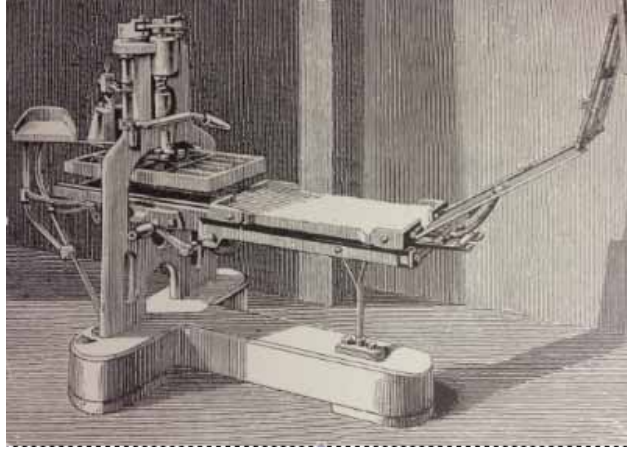
Notes: DI refers to *Discrete Index*, BV to *Binary Variable*

B Printing Presses



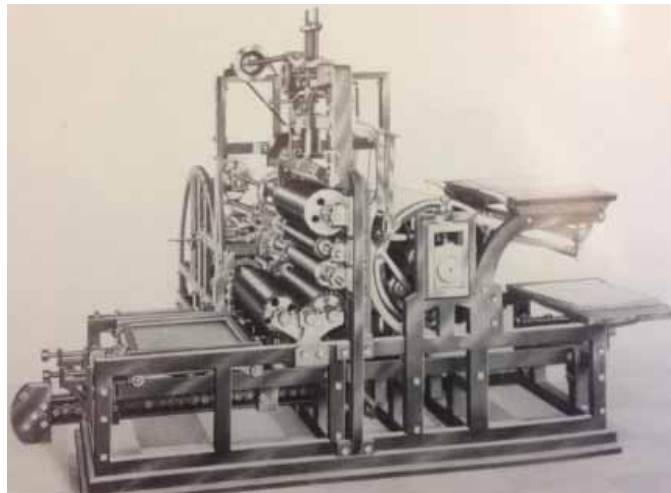
Source: Moran (1973).

Figure 5: Plate Representing a Eighteenth-century English Wooden Press



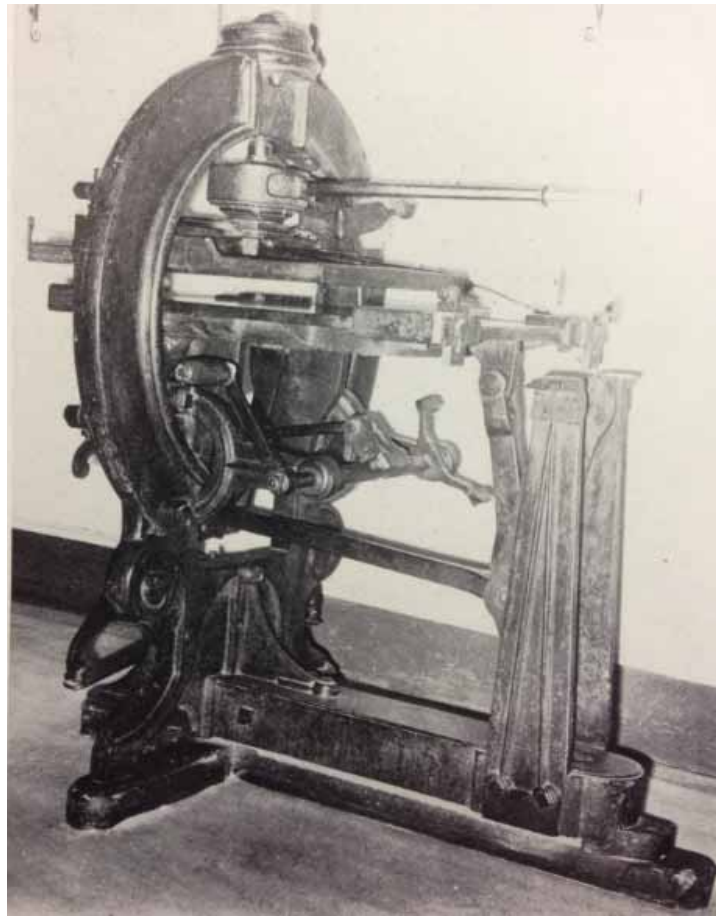
Source: Moran (1973).

Figure 6: Plate Representing a Stanhope Press of the First Construction



Source: Moran (1973).

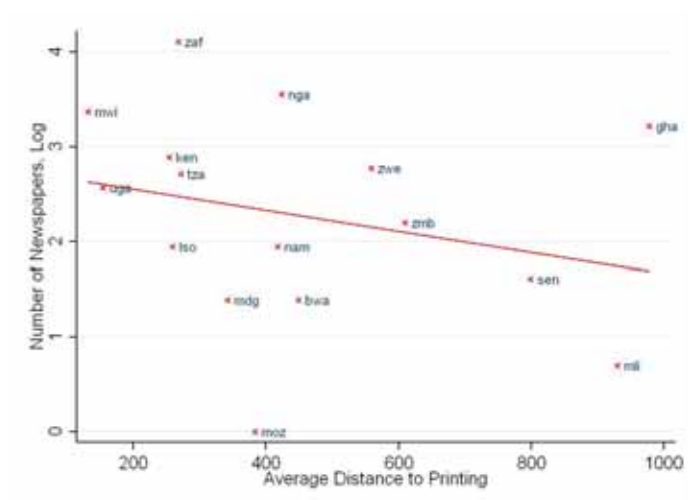
Figure 7: Plate Representing a Model of Koenig's First Cylinder Machine, 1812



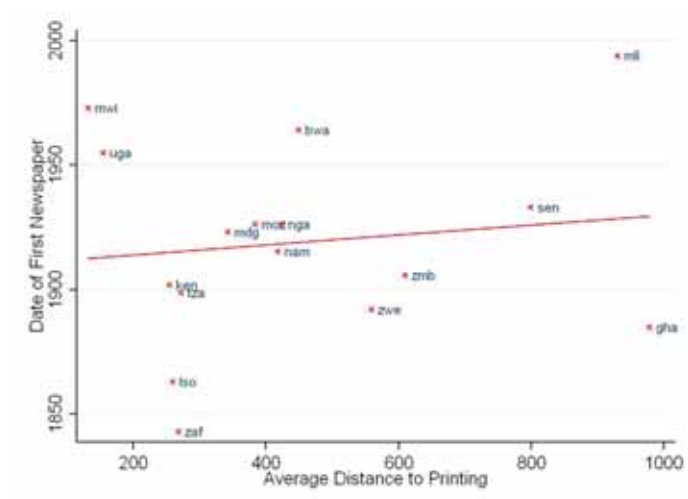
Source: Moran (1973).

Figure 8: Plate Representing the Moffat press

C Additional results



(a) Number of Newspapers



(b) Year of first Newspaper

Figure 9: Distance to the Printing Press and Newspaper Supply; Cross-Country Evidence

	(1)	(2)	(3)	(4)
	All Sample	200km	150km	50km
	b/se	b/se	b/se	b/se
Distance Printing Press	-0.024*** (0.006)	-0.017** (0.007)	-0.021*** (0.007)	-0.035*** (0.009)
Distance Mission	0.002 (0.006)	0.006 (0.007)		-0.003 (0.010)
Observations	11990	10212	9175	5365
Country FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Clusters	1421	1211	1103	681
R2	0.269	0.279	0.279	0.299
F-Statistic	271.1	126.2	113.5	78.90

Table 26: Impact of the Distance to a Printing Press, restricting to former British Colonies and within regions close to historical mission settlements

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Table reports OLS estimates. The sample is restricted to individuals 150 km away from an historical mission settlement. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-, village- and ethnicity-level controls described in the text.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All Sample	All Sample	All Sample	150 km	150 km	100 km	100 km	50 km	50 km
b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
Distance Printing Press	0.027*** (0.009)	0.029*** (0.009)	0.009 (0.009)	0.009 (0.009)	0.008 (0.009)	0.009 (0.009)	-0.003 (0.010)	0.002 (0.010)
Distance High/Boarding School	-0.018* (0.010)	-0.013 (0.010)	-0.019* (0.010)	-0.018* (0.010)	-0.024** (0.010)	-0.022** (0.010)	-0.028** (0.011)	-0.025** (0.011)
Distance Day School	-0.005 (0.025)	-0.009 (0.025)	0.015 (0.026)	0.014 (0.026)	0.010 (0.027)	0.008 (0.027)	0.010 (0.028)	0.007 (0.029)
Distance Sunday School	0.000 (0.008)	0.010 (0.008)	0.002 (0.008)	0.005 (0.008)	0.001 (0.009)	0.004 (0.009)	0.007 (0.010)	0.009 (0.011)
Distance Theological School	-0.001 (0.009)	-0.000 (0.009)	0.001 (0.009)	0.001 (0.009)	0.005 (0.009)	0.006 (0.010)	0.001 (0.011)	-0.004 (0.010)
Distance Industrial School	-0.024** (0.011)	-0.024** (0.011)	-0.019* (0.011)	-0.018* (0.011)	-0.020* (0.011)	-0.020* (0.011)	-0.019 (0.012)	-0.014 (0.012)
Distance Medical School	-0.020 (0.015)	-0.018 (0.015)	-0.026 (0.016)	-0.026 (0.016)	-0.036** (0.017)	-0.036** (0.017)	-0.048** (0.019)	-0.048** (0.019)
Distance Mission	-0.018** (0.007)	-0.018** (0.007)	-0.006 (0.008)	-0.006 (0.008)	-0.007 (0.009)	-0.007 (0.009)	-0.013 (0.010)	-0.013 (0.010)
Observations	17594	17594	12563	12563	10788	10788	7051	7051
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mission Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	2109	2109	1520	1520	1315	1315	876	876
R2	0.250	0.250	0.236	0.236	0.231	0.231	0.238	0.235
F-Statistic	142.9	141.8	86.28	84.63	73.59	72.27	50.81	48.68

Table 27: Impact of the Distance to Different Missionary Investments on Basic Education

Notes: * p<0.10, ** p<0.05, *** p<0.01. The Table reports OLS estimates. Basic education is a binary variable indicating whether respondent has at least some primary education. The sample is sequentially restricted to individuals living 200 km, 150 km and 50 km away from an historical mission settlement. The unit of observation is an individual. Standard errors in parentheses are clustered by village. The controls are the individual-, village- and ethnicity-level controls described in the text.

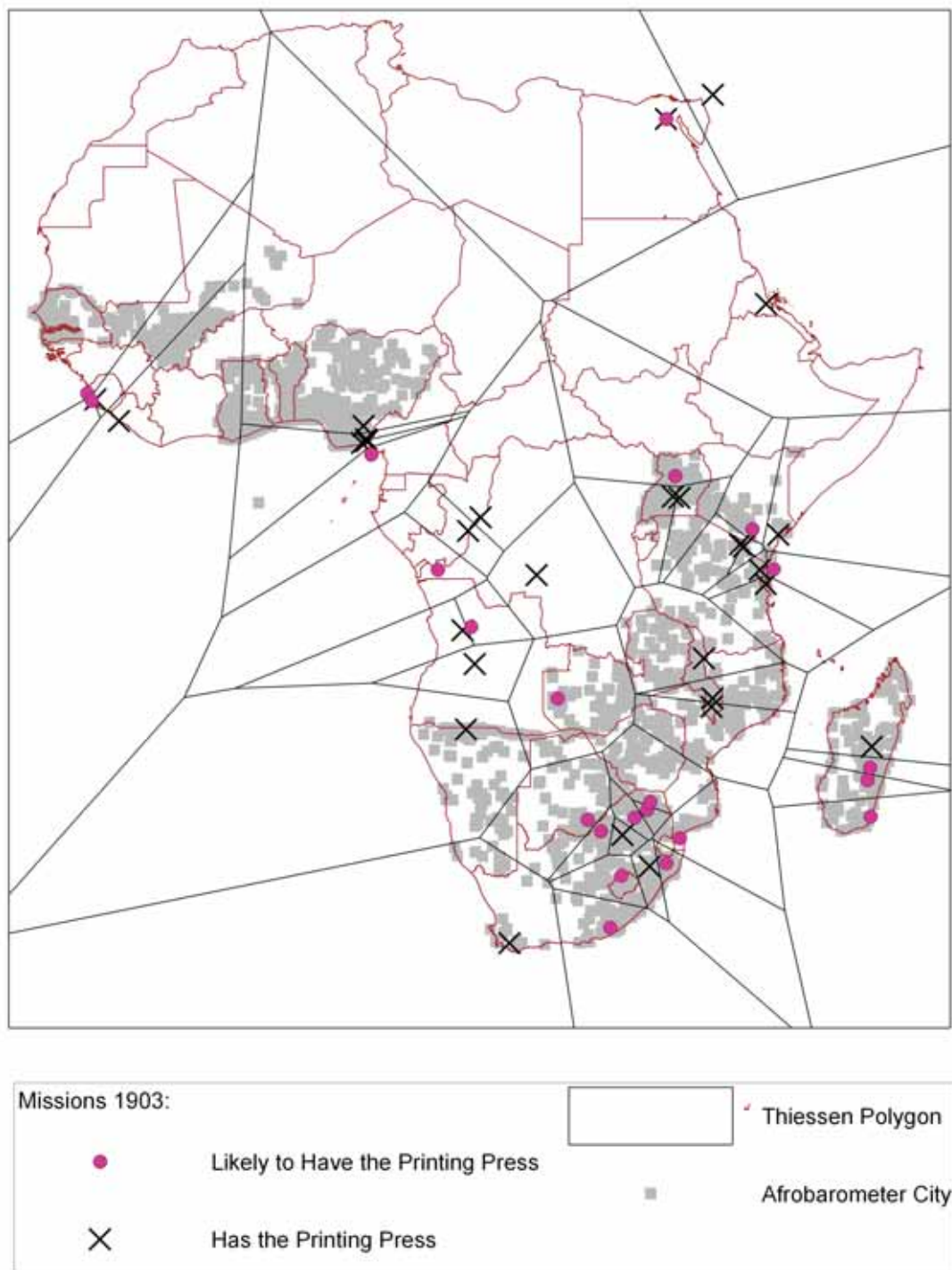


Figure 10: Voronoi Diagram of Africa using historical mission settlements with the printing press and similar to those with the printing press as generators

Dependent	CD F-Statistic	
	All Sample	150 km
Register	16.07	14.99
Turnout	15.76	14.75
Action as Citizen	15.76	14.75
Trust	12.94	11.75
Others Listen	10.78	10.04
Satisfaction	9.09	9.44
Critical Value 10%	16.38	
Critical Value 15%	8.96	
Critical Value 20%	6.66	

Table 28: Cragg-Donaldson F-Statistics for the Models Reported in Section 5.

Notes: The table reports the Cragg-Donaldson F-Statistics for the different models tested in section5. Stock-Yogo critical values for an IV bias of maximum 10%, 15% and 20% of OLS bias are reported in the bottom of the table.