The Long-Term Effects of the Printing Press in sub-Saharan Africa[†]

By Julia Cagé and Valeria Rueda*

This article investigates the long-term consequences of the printing press in the nineteenth century sub-Saharan Africa on social capital nowadays. Protestant missionaries were the first to import the printing press and to allow the indigenous population to use it. We build a new geocoded dataset locating Protestant missions in 1903. This dataset includes, for each mission station, the geographic location and its characteristics, as well as the printing-, educational-, and health-related investments undertaken by the mission. We show that, within regions close to missions, proximity to a printing press is associated with higher newspaper readership, trust, education, and political participation. (*JEL* L82, N37, N77, N97, O17, O43, Z13)

This article studies the long-term effects of early Protestant missionary activity in sub-Saharan Africa on civic and social capital nowadays. In particular, we investigate the long-term consequences of the early introduction of the printing press in the nineteenth century. Civic and social capital can have a profound effect on democracy and development.

In the nineteenth century sub-Saharan Africa, missions invested in numerous activities such as education, health, and printing. We built and geocoded an entirely new dataset of Protestant mission settlements. For each settlement, we document the exact geographic location, the educational, health-related, and printing investments, as well as geographic and historical characteristics.[1] Producing these data is our first contribution.

Our second contribution is to identify the long-term effects of these investments. We investigate the effect of proximity to a range of mission characteristics on a range of contemporary outcomes. Using an original empirical strategy relying on our reading of history, we focus on the introduction of the printing press and its effects on contemporary newspaper readership, education, local civic engagement, and social capital.

A wide literature suggests that higher social capital, and in particular trust, leads to higher economic activity (Guiso, Sapienza, and Zingales 2008; Tabellini 2010) as well as to higher well-being (see Algan and Cahuc 2014 for a survey of this literature). Similarly, newspaper readership is a relevant proxy for social capital (Putnam 2000; Guiso, Sapienza, and Zingales 2004), and it is consistently associated with political participation (Gentzkow, Shapiro, and Sinkinson 2011; Cagé 2014) and voter knowledge (Snyder and Strömberg 2010; Casey 2013).

Using contemporary individual-level data from the Afrobarometer, we find that proximity to the closest location of a mission with a printing press has a positive and statistically significant impact on the probability of reading the news, our first proxy for social capital. A one-standard deviation increase in the proximity to a mission with a printing press increases the probability of reading the news on a monthly basis by around 5.3 percent of a standard deviation, trust by 8.1 percent, and education by 6.3 percent. Finally, we show that in democracies, proximity to a mission with a printing press increases political participation at the local level nowadays. In contrast, proximity to a mission without a printing press—whether Protestant or Catholic—has no significant impact on newspaper readership.

We then investigate the extent to which different types of missionary investments affect different contemporary outcomes. We find a positive correlation between proximity to a mission with a school and education nowadays. However, we find no persistent effect of proximity to a mission with a hospital on contemporary health-related outcomes.

Our econometric analysis attempts to move beyond two forms of selection. First, historical and geographical characteristics might have determined mission station location, preventing the comparison between regions close and far from these settlements. Protestant missionaries did choose to locate in geographically favored areas (Johnson 1967, Nunn 2010). Second, Protestant stations invested in different activities such as printing, health, and education. There may be endogenous selection of missions into these activities.

To address selection from missions' location, we restrict our sample to regions *near* historical mission settlements. Because regions near Protestant missions shared similar geographic, institutional, and cultural environments, this restriction isolates the specific effect of the investments from other possible long-term determinants of civic and social capital embedded in specific mission locations.

To address selection of missions into different investments, we first control for observable covariates. The set of observable covariates include geographic and historical characteristics as well as distance to historical mission stations that invested in health, educational facilities, and printing presses. We then develop a matching strategy that aims at isolating the effect of proximity to a mission with a specific investment (printing press, school, or hospital) from the effect of proximity

to a mission with similar characteristics, but without this specific investment. The results are robust to this approach and of similar order of magnitude. Finally, we use insights from Altonji, Elder, and Taber (2005) and Oster (2013) to assess the bias due to unobservables using the sensitivity of the treatment to added controls. From this approach, it seems unlikely that the entire estimated effect of the distance to the printing press is driven by unobserved variables.

Despite our attempts to control for observable factors, our estimates might be driven by unobserved determinants of long-term development and proximity to a historical mission settlement endowed with a printing press. The long-term effects of printing missions on civic and social capital seem specific to missions with presses and is not related to other observed mission characteristics. Moreover, information on the number of publications printed at the mission press until 1923 suggest that the impact of the distance to a printing press on newspaper readership may be explained by the development of publishing activities. Although we cannot ultimately separate the effect of printing per se from other mission characteristics, a causal interpretation of the results seems plausible.

Related Literature.—The long-term consequences of religious incentives for economic success have been widely studied in the social sciences, the most well-known theory being Max Weber's "Protestant Ethic" (Weber 1930). According to the principle of the *Sola Scriptura*, central to the Protestant doctrine, every Protestant should be able to read the Bible. Recent work has emphasized this incentive to increase literacy as an alternative explanation for the economic success of regions that first converted to Protestantism (Becker and Woessmann 2009, Bai and Kung 2011, McCleary and Pesina 2012, Woodberry 2012, Cantoni 2013). These studies consider Protestant conversion as a whole. Instead of using such a binary approach, we exploit different types of missionary treatment.

Woodberry (2004, 2012) and Woodberry and Shah (2004) first document the role of Protestant missionaries on the consolidation of liberal democracy and emphasize the introduction of the printing press and newspapers as a potential mechanism. They identify the relationship between Protestantism and democracy using a cross-country identification strategy. On the contrary, we estimate the long-term effects of the printing press in sub-Saharan Africa using a variety of within-mission empirical strategies. Our econometric analysis moves beyond selection from missions's location. Our empirical work relies on the building of a new geocoded dataset and on the use of several previously unexploited historical archives.

Our results also complement a growing literature documenting the persistence of development paths (Acemoglu, Johnson, and Robinson 2001; Glaeser and Shleifer 2002; La Porta, Lopez-de-Silanes, and Shleifer 2008). Focusing on literacy and religious affiliation, Cogneau and Moradi (2014) find that colonial border effects still persist today. At a more refined level, Michalopoulos and Papaioannou (2014) shed light on the long-term growth consequences of subnational institutions. Protestant missionaries are potential agents of change at the subnational level. While this literature mainly compares regions with different institutional or colonial history, we highlight access to the printing press as a specific long-term determinant of civic and social capital, within regions sharing the same institutional or ethnic background.

As noticed by Feyrer and Sacerdote (2009), Huillery (2009), and Huillery (2011), historical events can explain heterogeneous development dynamics. Recent micro-oriented studies therefore isolate specific channels through which a development dynamic was durably established (Nunn 2008; Huillery 2009; Dell 2010; Alesina, Easterly, and Matuszeski 2011; Michalopoulos and Papaioannou 2011, 2013; Voigtländer and Voth 2012). Of particular importance for sub-Saharan Africa are early investments. Wantchekon, Klašnja, and Novta (2012) highlight for example the durable impact of the first schools in Benin. There has been little research on the long-term consequences of the printing press. Rubin (2014) documents the link between the spread of the Protestant Reformation and the spread of the printing press in Europe at the time. Dittmar (2011) shows that European cities where printing presses were established between 1450 and 1500 grow faster between 1500 and 1600 than similar cities which were not early adopters. While Dittmar focuses on urbanization and economic change in the sixteenth and seventeenth century Europe, we identify the effect of the early arrival of the printing press on contemporary local civic engagement and social capital in sub-Saharan Africa. Consistently with the hypothesis from historians of sub-Saharan Africa (Omu 1978, Tudesq 1995), we are the first to show empirically that proximity to the missionary press is associated with higher newspaper readership today, as well as with other proxies for social capital. Moreover, we find that contemporary education is higher in regions close to the missionary press. Finally, we are the first to investigate the extent to which different types of missionary investments affect different contemporary outcomes.

The rest of the paper is organized as follows. Section I presents a brief historical background on missionary activity in sub-Saharan Africa and the development of newspapers. Section II describes the data, in particular our new geocoded dataset of missions and discusses the determinants of missions' location and investments. In Section III, we provide empirical evidence on the long-term impact of proximity to a printing press on civic and social capital nowadays. We also document the long-term relationship between mission investments in education and health and contemporary education-related and health-related outcomes. We discuss extensively endogenous selection of missions into these different investments. Section IV concludes.

I. Historical Background and Persistence

The Introduction of the Printing Press.—Protestant missionaries pioneered in the development of a written tradition for sub-Saharan African languages. Wherever they went, Protestants quickly formalized indigenous languages and printed Bibles and educational material in these languages. Following the principle of the *Sola Scriptura*, every Protestant should be capable of reading and interpreting the Bible (Eisenstein 1980, Woodberry and Shah 2004, Woodberry 2012).[2] On the contrary, for the Catholic religious practice, reading the Bible is not necessary.

---

[2]"Christian missionaries continued to set up printing presses in remote parts of the world to turn out Gospels and Psalters as had been done in Mainz four hundred years earlier" (Eisenstein 1980, 158).

Protestant missionaries were thus among the first to bring the printing press to sub-Saharan Africa; on the contrary, Catholic missionaries had no role in bringing the printing press. Moreover, Protestant missions facilitated the access to the printing press, acting as the intermediaries of its diffusion. For example, in South Africa, several mission societies acquired the printing press in Cape Colony between the 1820s and the 1870s. 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 nineteenth and early twentieth centuries, missionary societies outside the Cape Colony were also active in publishing, especially in Natal (Switzer 1984).

Investing in printing technology was a better strategy than importing books, as transportation was long and native languages were mostly unknown in Europe. Due to technological constraints, printing presses could hardly be built in sub-Saharan Africa and had to be imported from Europe. Missionaries mainly imported hand press machines; nevertheless, importation was far from easy.[3] Wooden printing presses were, for instance, highly inflammable materials. In 1819, Thomas Stingfellow and Robert Godlonton, both English settlers and qualified printers, set sail for South Africa with a large crate containing a second-hand wooden press. Their "inflammable" machine was however impounded in Table Bay by the Acting Governor, calling a halt to 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 1820s. 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 Xhosa language were missing from the typing range. The printing press therefore could not be used for almost three years, the time it took for the missing material to arrive to Grahamstown.

This anecdotal evidence illustrates the complexity of starting any printing activity in sub-Saharan Africa. Printing presses were costly: a printing press cost on average 25 years of a worker's wage.[4] They were also sizable (Moran 1973) and missionaries had to import them from Europe. Printers had to train apprentices and do much of the mechanical work themselves: "the editor, printer, publisher and proprietor were all combined in one person" (Gordon-Brown 1979). Printing presses were often operated by settlers who had experience on a printing office in

---

[3] At the time of Protestant missions' settlement in sub-Saharan Africa, there existed three kinds of printing presses: the wooden press directly inherited from the old Gutenberg's printing press (Clair 1976); the iron press, the most famous one being the Stanhope press which appeared around 1800; and the more technological steam press that uses a rolling cylinder in printing to overcome excessive manual strain.

[4] Moran (1973) gives some information about the prices of printing activities in England at the turn of the century. At the beginning of the nineteenth century, wooden presses cost around £65. When Stanhope introduced his first iron press around 1800, its price was £90. The price began to drop with competition; in 1808, however, it still ranged from £21 to £73. A few years later, at the end of the 1810s, the price of the Columbian press, another iron model, ranged from £100 to £125. In 1820 the price was still above £75. In the 1840s, the Albion press—following the Columbian Press—varied in size from Amateur (15 cm × 12 cm or 7 × 5 $\frac{1}{2}$ in) to Double Royal (100 cm × 58 cm or 40 in × 23 in). The price of the Double Royal was £75. In 1830, the average annual income in the United Kingdom per adult was £30, while the average annual wage was £20. The average worker (blue-collar) annual wage was £15 (see, e.g., Piketty and Zucman 2014). According to Maddison's historical per capita gross domestic product (GDP) series, average incomes in Africa around 1820 were about five times smaller than in the United Kingdom.

England. Specific educational investments also had to be made. Printing schools were established by Protestant missionaries for the indigenous population 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 (Church Missionary Society 1896). As a consequence, printing presses were not available to the native population outside Protestant mission stations with a printing press.[5]

The Introduction of the First Newspapers.—Publishing material for Africa was central to the missionary ambitions since the commencement of their work (Fahs and Davis 1935); mission presses not only published Christian texts but were also the first to produce all sorts of written material and newspapers in indigenous languages (Maake 2000).

Because Protestant missionaries made printing presses available to the indigenous population, most of the first indigenous newspapers were printed and sponsored by mission centers. Woodberry (2012) qualifies conversionary Protestants as being "a crucial catalyst initiating the development and spread (…) of newspapers."

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 in Cape Colony.[6] The *Iwe Irohin* ("The Newspaper") was founded 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 in South Africa. Eight years later, in November 1884, the English/Xhosa weekly *Imvo Zabantsundu* ("The African Opinion") was published. It was the first black-owned 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).

In regions where Protestant missions were less active, the first newspapers appeared only at the beginning of the twentieth century and no indigenous newspapers were created before World War I. Before the war, the printing presses were mostly owned by the colonial powers. The first paper in Abidjan (Ivory Coast) to be owned and edited by an African, the *Eclaireur de la Cote d'Ivoire*, was first published in 1935 (Mytton 1983).

---

[5]It is important to highlight that, while mission printing presses were not the only printing presses in the nineteenth century sub-Saharan Africa, they were the only presses to which the native population was given access to. Moreover, there were very few other presses. These other presses were the government presses. They were mainly used to print and copy administrative documents, and the indigenous population was not given access to these presses. As noted by Harmsen (1982), the spread of printing in sub-Saharan Africa was "initially overwhelmingly religious."

[6]The 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).

Persistence.—The lag of more than one century in the timing of creation of the first indigenous newspapers might explain the persistent effect of the proximity to a printing press on newspaper readership today. This persistence may have worked through demand and/or supply.

On the one hand, places with printing missions—which were more likely to have newspapers—may have built up both physical (beginning with printing presses) and human capital (e.g., printing schools or journalism schools) that make it cheaper to run newspapers there nowadays. We discuss in Section IIIE the role played by the regional development of the publishing industry: the printing press may have changed the supply side of the printing industry. Unfortunately, we do not have information on newspaper supply at the local level nowadays in sub-Saharan Africa.[7] The few datasets available only provide information on the main national newspapers. In the online Appendix, we provide suggestive cross-country evidence of the persistence of newspaper supply.[8] This evidence supports the notion of the early emergence of newspapers around mission stations and the persistence of the concentration pattern.

On the other hand, the early availability of the printing technology enabled the local development of a culture of writing and information diffusion. This is consistent with Dittmar (2011) who, building on Habermas (1989), argues that proximity to the printing press has enabled the development of a culture of information exchange and of an urban, bourgeois public sphere. Newspapers take time to consolidate. In most sub-Saharan African countries, the newly-established government tried to take control of the press after independence. These nationalizations did not succeed in countries where newspapers were well established, stable, and independent before colonization. In Nigeria, for instance, despite the 1966 coup d'état, the ensuing 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 presses continued to exist. *The Daily Dispatch*, the *SASO Newsletter*, or *The World* regularly diffused their anti-Apartheid stances. This was not the case in former French colonies.

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, highlights the persistence of reading habits in southern and middle-belt Nigeria. Fifty-nine percent of the respondents replied that they read newspapers as a family-inherited culture (Fraser 2008). In other words, the historical printing press may have shifted preferences for reading. Finally, a dynamic affecting both the supply and demand channels appears to be the most probable scenario to explain the persistence of the effects.

---

[7]There is no information on the number of existing newspapers at the local level, nor information on newspaper circulation at the local level.

[8]We also present the few data sources on sub-Saharan African newspapers that are available and that we digitize and merge together.

II. Data and Missionary Locations

A. *Data*

Historical Data.—We use different sources to construct the dataset of missions and historical controls.

Missionary Activity: We construct the mission-level data from the *Geography and Atlas of Christian Missions* (Beach 1903). We geocode the maps of sub-Saharan African regions from this atlas. The maps locate all the Protestant mission stations in 1903 (an example of these maps is provided in the online Appendix Figure A2).

As opposed to other available geographic datasets of Protestant missions (Nunn 2009), ours contains detailed information for each mission settlement. In the *Geography and Atlas of Christian Missions*, each mission station is uniquely identified in a statistical Appendix providing information on the mission's size (number of students, of missionaries, etc.) and a detailed record of its activities and investments. For example, we know whether each mission had a printing press, a school, or a health facility. The exhaustive list of variables and a reproduction of one page of the statistical index are provided in the online Appendix Figure A1. We digitize and geocode this information. Our sample of sub-Saharan African missions includes a total of 723 Protestant missions out of which 27 were equipped with a printing press in 1903. Figure 1 shows the location of mission stations and their printing presses in 1903. This dataset is, to the extent of our knowledge, the most exhaustive record of missionary investments in the world, and it is geocoded for Africa. We hope this dataset will be of use for future research.

Since very few Catholic missions are recorded in the *Geography and Atlas of Christian Missions*, we use data from Béthune (1889) to locate them. This source does not provide information on the investments conducted. However, as we discussed in Section I, Catholic missionaries had no role in bringing the printing press to sub-Saharan Africa.

Publication Records: We gather information on the number of publications printed at the mission press until 1923, 20 years after the publication of the *Geography and Atlas of Christian Missions*. The *Bibliography of Christian Literature* (Rowling and Wilson 1923) inventories all the books and reviews, religious or not, published by the missionaries. From this source, we identify 18 presses from our original sample that had a publication record in 1923. We use this additional data in Section IIIE.

Historical Controls: The *Ethnographic Atlas* (Murdock 1967) provides precolonial characteristics at the ethnic group-level such as initial population density. The slave trade data come from Nunn (2008). We geocode this data at the mission-level. Geocoded town-level data are from Nunn (2008).
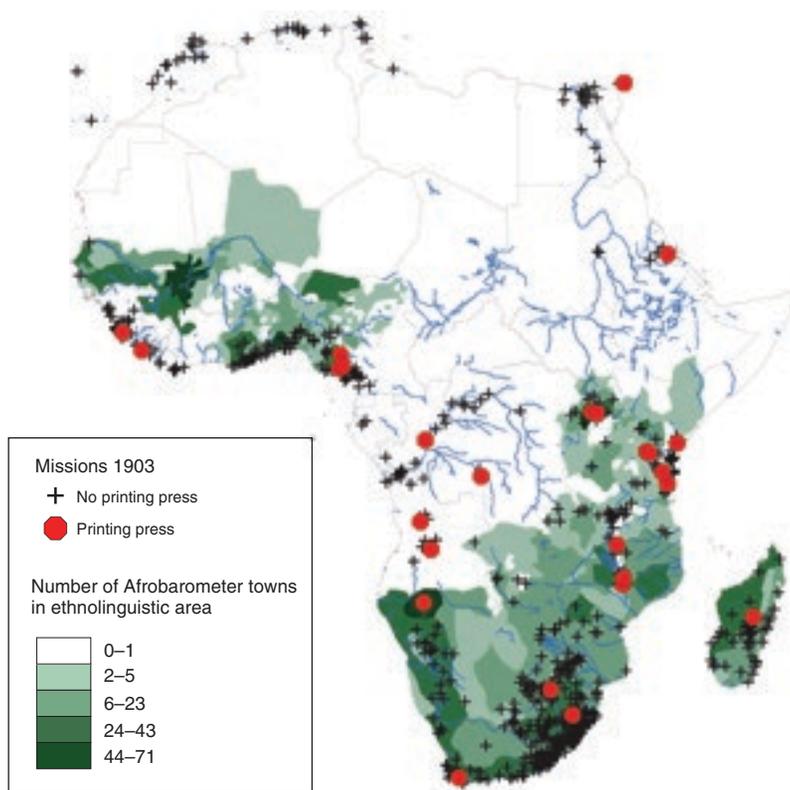
FIGURE 1. MISSION STATIONS WITH AND WITHOUT A PRINTING PRESS IN 1903

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.

Contemporary Data.—Contemporary data on civic and social capital are from the 2005 (Round 3) and 2008 (Round 4) Afrobarometer surveys.[9] There are 19 sub-Saharan African countries in these surveys: 10 former English colonies (Ghana, Kenya, Lesotho, Malawi, Nigeria, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe), 5 French (Benin, Burkina Faso, Madagascar, Mali, and Senegal), 2 German (Botswana and Namibia), 1 Portuguese (Mozambique), and Liberia.[10] Surveys are based on interviews conducted in the local languages from a random sample of either 1,200 or 2,400 individuals of voting age in each country. Overall, they cover approximately 47,000 individuals sampled to constitute representative groups at the national level. The data is geocoded at the district level.

The Afrobarometer provides individual-level subjective data on media consumption and civic attitudes. Our proxies for social capital are newspaper readership

---

[9] Each variable is described in details in the online Appendix Section A2. The description provides the questions used in the Afrobarometer to construct the different variables.

[10] To be more specific, there are 17 countries covered in both rounds, while for Burkina Faso and Liberia we only have data for the Round 4 of the Afrobarometer. Indeed the Afrobarometer data does not have a panel structure. Different individuals—sometimes from different locations—are surveyed in the different rounds, and the questions asked in the surveys may also vary from one round to the other.

(whether respondents read newspapers on a monthly basis) and trust (how much do you trust other country members). As for political participation, we use three different measures: registration for elections; voting in past elections; and a proxy for political participation at the local level ("Actions as citizen") which captures how likely individuals are to participate in a collective action or a march.[11]

Newspaper readership is of importance for a number of reasons. First, it can be considered as a proxy for civic and social capital (Putnam 2000; Guiso, Sapienza, and Zingales 2004). Second, there is vast evidence that it is a strong causal determinant of political participation (see, e.g., Gentzkow, Shapiro, and Sinkinson 2011; Cagé 2014) and voter knowledge (Snyder and Strömberg 2010). While there is a growing questioning of the future of newspapers in the Internet era, sub-Saharan Africa is one of the few places in the world where the newspaper market is still growing. This market expands as literacy steadily increases whereas other media like television or internet require capital that most sub-Saharan Africans do not have. Moreover, as suggested by Bratton, Mattes, and Gyimah-Boadi (2005), it is harder for governments to control newspapers while they can control radio or television by restricting supply and imposing a government monopoly (see, e.g., Cagé 2015).

We also investigate the long-term effects of early missionary investments on education-related and health-related contemporary outcomes. An outcome of interest would have been literacy; unfortunately, this information is not available in the Afrobarometer. We thus focus on education that we measure with a discrete variable ranging from 0 to 9, describing different levels of education from none (0) to post-graduate education (9). As for health, we use a binary variable equal to one if the respondent reports there is a clinic close to her town ("Clinic"). A better measure, capturing individual health conditions, would have been to use anthropometric indicators. However, such indicators are not available in the Afrobarometer.

Finally, the Afrobarometer provides information on a set of individual controls: age, sex, and ethnicity, among others.

Table A3 in the online Appendix provides summary statistics for these variables. On average, 33 percent of the individuals surveyed read a newspaper at least once a month; 38 percent in towns located 100 kilometers (km) away or closer to the closest mission. Forty-two percent of the individuals report to trust people in general ("Trust"); 38 percent in towns located close to a mission. As for political participation, the numbers reported for both registration (80 percent) and turnout at elections (72 percent) seem to be very high, but this is a well-known issue with the Afrobarometer. Twenty-four percent of the individuals report that they participated in a collective action or a march.

Geographic Characteristics.—Finally, to control for geographic characteristics at the town and mission level, we use the Global Agro-Ecological Zones (GAEZ) data. The data are geocoded and provide information on annual precipitation levels,

---

[11] Note that this last variable may also be interpreted as a proxy for social capital, as in Acemoglu, Reed, and Robinson (2014).

the average suitability for rainfed crops, the number of agriculture growing days per year, and the malaria ecology of the land.

B. *Determinants of Mission Location and Investments*

Before turning to the empirical analysis, we analyze the determinants of mission location. We also compare missions that invested in the printing technology and missions that did not. On average, towns in the Afrobarometer are located 140 km away from the closest mission settlement, and 439 km away from the closest mission settlement with a printing press (see Table A2 and Figure A5 in the online Appendix for more details). As a baseline, we use the 100 km threshold to define towns close to a mission, but we extensively discuss other specifications.

Mission Location.—A number of factors played a role in determining the location of mission settlements. Among them are access to a clean water supply, the ability to import supplies from Europe, the abundance of a fertile soil that could be used to grow crops, and a high altitude with a temperate climate (Johnson 1967). Moreover, mission locations exhibited a form of path-dependence. The routes of initial missionary explorers determined which parts of Africa were the best-known to Europeans, as well as the locations of the earliest mission stations from which larger networks of stations were developed. The colonial railway network is another factor that affected mission locations, as well as the slave trade (Johnson 1967, Nunn 2010).

These known trends are for the most part confirmed in our data. In Table 1 we perform a *t*-test on the equality of means for geographic and historical characteristics of towns located near (less than 100 km) and far (more than 100 km) from a historical mission settlement. As for the geographic characteristics, we find that missions locate in places with a lower prevalence of malaria and a more favorable climate. They also locate in places more suitable for agriculture (measured by the suitability for rainfed crops and the number of agricultural growing days). Moreover, they locate closer to the coast. As for the historical determinants of mission location, slave exports are higher in places near missions. We also find that missions have a higher probability to be located near historical railway networks.

An open question in the literature is the general effect of population density. Some missionaries intentionally built missions in more remote locations where the "word of God" otherwise would not have reached; whereas other missionaries recognized the benefits associated with dense populations and targeted these groups (De Gruchy 1999, Nunn 2010). According to Table 1, regions near historical mission settlements had on average a higher population density.

In our empirical analysis we only focus on regions near historical mission settlements. Moreover, our specifications always control for all the geographic and historical characteristics described in Table 1.

Location of Missions with a Printing Press.—Did missions with a printing press located in regions with specific geographical or historical characteristics correlate with determinants of civic and social capital? Table 2 compares the geographic and

TABLE 1—DETERMINANTS OF THE LOCATION OF MISSIONS
(*comparing towns close to missions to towns far from missions*)

	No mission (1)	Mission (2)	Difference (3)
Geographical characteristics			
Number of growing days (percent)	317.877	102.281	215.597
	(43.411)	(43.904)	
Suitability for rainfed crops	3.658	4.336	−0.678
	(0.066)	(0.066)	
Average precipitation per day (over year)	4.804	3.337	1.467
	(0.364)	(0.368)	
Distance 2,000 city (100 km)	7.166	8.306	−1.140
	(0.273)	(0.276)	
Distance to the coast (100 km)	569.029	385.200	183.829
	(12.820)	(12.965)	
Malaria ecology	15.253	9.108	6.145
	(0.367)	(0.371)	
Distance to mission/100	3.048	0.389	2.659
	(0.049)	(0.050)	
Historical characteristics			
Slave exports (per capita)	0.685	2.941	−2.255
	(0.260)	(0.263)	
Railway contact	0.995	0.530	0.465
	(0.034)	(0.034)	
Explorer contact	1.525	2.792	−1.266
	(0.107)	(0.108)	
Initial population density/1,000	0.232	0.320	−0.089
	(0.021)	(0.022)	
Distance 1,400 city (100 km)	5.701	8.425	−2.724
	(0.168)	(0.170)	
Distance 1,800 city (100 km)	8.295	12.095	−3.800
	(0.341)	(0.345)	
Observations	18,045	29,411	

Notes: The table compares geographical and historical characteristics of towns with and without missions. Towns with missions are towns located near (less than 100 km away) from a historical mission settlement. Towns without missions are towns located far (more than 100 km away) from a historical mission settlement. Column 1 presents the results for places without missions. Column 2 presents the results for places with a mission. In column 3, we perform a *t*-test on the equality of means. Standard errors in parentheses are clustered at the town-level. Variables are described in the online Appendix.

historical characteristics of missions with and without a printing press and perform a *t*-test on the equality of means. Missions with a printing press were not, on average, located in more geographically favored areas. None of the geographical indicators are significantly different between the two groups, except for malaria ecology which is higher for missions that invested in the printing press.

Historical characteristics exhibit a different pattern. Missions with a printing press have more favorable historical characteristics: they are closer to historical cities and explorer routes. All our specifications control for these characteristics.

TABLE 2—DETERMINANTS OF THE LOCATION OF THE PRINTING PRESS
(*comparing missions with and without the printing press*)

	No printing (1)	Printing (2)	Difference (3)
Geographical characteristics			
Number of growing days (percent)	53.123	60.049	−6.926
			(4.920)
Suitability for rainfed crops	4.992	4.750	0.242
			(0.356)
Average precipitation per day (over year)	3.413	3.791	−0.378
			(1.208)
Distance to 2,000 city (100 km)	2.702	2.655	0.047
			(0.374)
Distance to the coast (100 km)	2.310	2.747	−0.437
			(0.534)
Malaria ecology	5.187	10.295	−5.108
			(1.509)
Historical characteristics			
Slave exports, per capita	0.074	0.042	0.031
			(0.107)
Railway contact	0.237	0.107	0.129
			(0.081)
Explorer contact	0.143	0.286	−0.143
			(0.069)
Initial population density/100	11.803	13.760	−1.958
			(8.008)
Distance to 1,400 city (100 km)	8.872	6.969	1.903
			(0.932)
Distance to 1,800 city (100 km)	15.587	10.704	4.883
			(1.890)
Observations	651	28	679

Notes: The table compares the characteristics of the places where missions with and without a printing press did locate. Column 1 presents the results for missions without a printing press. Column 2 presents the results for missions with a printing press. In column 3, we perform a *t*-test on the equality of means (robust standard errors are in parentheses). Variables are described in the online Appendix.

Mission Investments.—Did missions with a printing press conduct different types of investments or have different characteristics? Table 3 presents descriptive statistics comparing investments and characteristics of missions with and without a printing press. Missions with a printing press arrived earlier and have a much higher probability of being Bible Societies.

Missions with a printing press have on average more schools, both in level and per student than missions without, as well as more teachers per student. We use various empirical strategies to check that our results are not driven by these higher investments in education. Finally, missions with a printing press have more health facilities in level. However they do not invest more in health per capita. Our specifications always control for missions' characteristics and investments.

TABLE 3—CHARACTERISTICS OF AND INVESTMENTS PERFORMED BY MISSIONS
WITH AND WITHOUT A PRINTING PRESS

	No printing (1)	Printing (2)	Difference (3)
Arrival date	1878	1872	7 (4)
Bible society	0.052	0.357	−0.305 (0.051)
Number of native workers	3.422	1.786	1.637 (3.202)
Total population	327.822	413.464	−85.642 (120.425)
Schools	0.261	1.643	−1.382 (0.174)
Number of students	321.363	397.286	−75.923 (119.386)
Schools per student (percent)	0.322	1.350	−1.028 (0.370)
Teachers per student (percent)	10.087	18.861	−8.773 (4.385)
Health facilities	0.187	1.464	−1.277 (0.139)
Physicians per capita (percent)	0.345	0.952	−0.607 (0.581)
Health facilities per capita (percent)	1.521	2.302	−0.781 (1.268)
Observations	651	28	679

Notes: The table compares the characteristics of and the investments performed by missions with and without a printing press location. Column 1 presents the results for missions without a printing press. Column 2 presents the results for missions with a printing press. In column 3, we perform a *t*-test on the equality of means (robust standard errors are in parentheses). Variables are described in the online Appendix.

III. Empirical Analysis

A. *Specification and Identification Strategy*

Let i index individuals, j index the town in which individuals live,[12] e index the ethnicity, and c index the country. r stands for the Afrobarometer round. Standard errors are clustered at the town level.

---

[12] In the Afrobarometer, individuals are assembled by the smallest unit among villages, cities, or districts. We defined this unit using the latitude and longitude provided in the Afrobarometer. We call "town" this unit in the remainder of the paper.

Equation 1 describes our preferred identification equation:

$$(1) \quad y_{ijec} = \alpha_1 \, Distance \ to \ printing \ press_j \ + \ \alpha_2 \, Distance \ to \ school_j$$

$$+ \ \alpha_3 \, Distance \ to \ health_j \ + \ \beta_1 \, Distance \ to \ Protestant \ mission_j$$

$$+ \ \beta_2 \, Distance \ to \ Catholic \ mission_j \ + \ \mathbf{X}_i' \beta_2 \ + \ \mathbf{Y}_j' \beta_3$$

$$+ \ \mathbf{Z}_e' \beta_4 \ + \ \delta_c \ + \ \rho_r \ + \ u_{ijecr},$$

where y_{ijec} is our outcome of interest (described in more details below).

In our main specification, "*Distance to printing press$_j$*" is the logarithm of the distance from town j to the closest mission with a printing press. Distances are measured in kilometers; we discuss below less parametric specifications. The parameter α_1 is our parameter of interest. It captures the impact of the proximity to a printing press. "*Distance to Protestant mission$_j$*" is the logarithm of the distance from town j to the closest mission. The distances are computed using the geocoded information described in Figure 1 and Section IIIA.

We control for a large set of covariates that might determine individual behaviors today and historical mission settlement. The choice of the control set comes from Nunn (2008) and Michalopoulos and Papaioannou (2011).

The vector of individual controls $\mathbf{X}_i'$ includes the age of the surveyed individuals, their age squared and their sex.

The vector of town-level controls $\mathbf{Y}_j'$ includes a wide range of historical and geographical factors that may have played a role in determining both mission center locations and long-term economic development. At the town level, we control for the distance to the capital city; current and historical distance to the coast; the historical exposure to the trans-Atlantic and Indian slave trades; and the precolonial population density. We also control for the distance to the closest missionary investments that may be correlated with long-term development: schools and health facilities. Similarly, we add historical investments and geographic characteristics of the closest mission: the annual precipitation level; the suitability for rainfed crops; the number of agricultural growing days; the number of native workers, students, teachers and physicians; the total population of the mission; and the arrival date of the mission. Finally, we add the logarithm of the distance to the closest Catholic mission in 1889.

Finally, the vector of ethnicity-level controls $\mathbf{Z}_e'$ include the malaria ecology of the land; the average elevation; the share of land within 10 km of water; a binary variable equal to one if any part of the railway network was built on land historically inhabited by the ethnic group and zero otherwise; a binary variable equal to one if a European explorer traveled through land historically occupied by the ethnic group; and the distance to the closest precolonial city (cities in 1400).

Outcomes.—We begin by investigating the effects of the proximity to a printing press on different measures of civic and social capital. Our proxies for social capital

are newspaper readership and trust.[13] We use three different measures of political participation: registration for elections, voting in past elections, and how likely individuals are to participate in a collective action or a march ("Actions as citizen").

Finally, we also investigate the long-term effects of early missionary investments on education-related and on health-related outcomes (access to a clinic).

All these variables are described in more details in Section II as well as in the online Appendix.

Reducing the Sample to Individuals Close to a Protestant Mission.—We restrict our sample to regions close to historical mission settlements (we consider towns that fall in a 100 km radius buffer around missions—we show below that our results are robust to the use of other radii). We do so because, as shown in Section I, regions near historical mission settlements have on average a higher population density and better geographic conditions than regions farther. Moreover, all the mission stations invested in activities, especially education, are probably correlated with long-term development. The restrictions thus aim at correcting for possible selection in mission location.

B. *OLS Estimation*

Distance to a Mission.—We first estimate the long-term effects of proximity to a mission, considering both Catholic and Protestant missions, on newspaper readership, trust, education, and access to a clinic nowadays. The results are presented in Table 4. We find no statistically significant effect of proximity to a mission, either Protestant or Catholic. Hence, if missions have long-term effects, it seems that these effects are working through specific missionary investments.

Distance to Protestant Mission Investments.—In Table 5, we then focus on the long-term effects of a number of Protestant mission investments. As discussed above, we do not have detailed investment data for Catholic missions. Reassuringly, there is no evidence on Catholic missions importing the printing press. Table 5 presents the results of the OLS estimations.[14]

First, we find a positive and statistically significant effect of proximity to a mission with a printing press on our two proxies for social capital, newspaper readership and trust. A 1 percent increase in the proximity to the closest mission with a printing press is associated with a statistically significant increase in the probability of reading a newspaper of 2.5 percentage points (Table 5, panel A, columns 1 and 4).[15] Similarly, it is associated with a statistically significant increase in trust of

---

[13] Section IVD also discusses the results when TV and radio are used as outcomes.

[14] All the specifications control for the distances to Catholic and Protestant missions. The coefficients are not reported in the main text for the sake of space; none of them are statistically significant. Online Appendix Table D4 reports the estimated coefficients for all the covariates. All the coefficients are of the expected sign.

[15] Given this positive effect of proximity to a printing press, the lack of a statistically significant effect of proximity to a Protestant mission in Table 4 may seem surprising. Printing presses were only imported by Protestant missions, hence, unless Protestant missions without printing presses have the opposite effect, one should expect on average proximity to a Protestant mission to have a positive effect. This absence of effect is likely to be due to a lack of power.

TABLE 4—DISTANCE TO A MISSION AND CONTEMPORARY OUTCOMES, OLS ESTIMATION
(100 *km restriction*)

	b/se (1)	b/se (2)	b/se (3)
Panel A. Newspaper			
Distance to Protestant mission	−0.005		−0.005
	(0.007)		(0.007)
Distance to Catholic mission		0.001	0.001
		(0.009)	(0.009)
Observations	28,590	28,590	28,590
Clusters	2,213	2,213	2,213
R^2	0.18	0.18	0.18
Panel B. Trust			
Distance to Protestant mission	−0.003		−0.004
	(0.008)		(0.008)
Distance to Catholic mission		−0.014	−0.014
		(0.009)	(0.010)
Observations	15,511	15,511	15,511
Clusters	917	917	917
R^2	0.11	0.11	0.11
Panel C. Education			
Distance to Protestant mission	0.020		0.022
	(0.031)		(0.031)
Distance to Catholic mission		0.062	0.063
		(0.041)	(0.041)
Observations	28,720	28,720	28,720
Clusters	2,212	2,212	2,212
R^2	0.24	0.24	0.24
Panel D. Clinic			
Distance to Protestant mission	0.015		0.014
	(0.012)		(0.012)
Distance to Catholic mission		−0.017	−0.016
		(0.017)	(0.016)
Observations	28,267	28,267	28,267
Clusters	2,175	2,175	2,175
R^2	0.14	0.14	0.14
Country and wave FE	Yes	Yes	Yes

Notes: The table reports OLS estimates. The unit of observation is an individual. Dependent variables are contemporary outcomes described in more details in the text. Standard errors in parentheses are clustered at the town-level. Controls are the individual-level, town-level, and ethnicity-level controls described in the text. All specifications include country and Afrobarometer round fixed effects. The sample is restricted to individuals living in a 100 km radius around a historical missionary settlement.

3.6 percentage points (Table 5, panel B, columns 1 and 4). In terms of magnitude, a one-standard deviation increase in the logarithm of the proximity to the printing press increases the probability of reading newspapers by 5.3 percent of a standard deviation, and decreases trust by 8.1 percent of a standard deviation.[16]

---

[16] Table D5 in the online Appendix reports the standardized coefficients (beta coefficient) for all the covariates.

TABLE 5—DISTANCE TO MISSION INVESTMENTS AND CONTEMPORARY OUTCOMES,
OLS ESTIMATION (100 *km restriction*)

	b/se (1)	b/se (2)	b/se (3)	b/se (4)
Panel A. Newspaper				
Distance to printing press	−0.024 (0.011)			−0.024 (0.011)
Distance to health		−0.002 (0.013)		−0.003 (0.012)
Distance to school			0.006 (0.009)	0.004 (0.009)
Observations	28,590	28,590	28,590	28,590
Clusters	2,213	2,213	2,213	2,213
R^2	0.18	0.18	0.18	0.18
Panel B. Trust				
Distance to printing press	−0.036 (0.011)			−0.036 (0.011)
Distance to health		0.006 (0.014)		0.003 (0.013)
Distance to school			−0.005 (0.011)	−0.007 (0.010)
Observations	15,511	15,511	15,511	15,511
Clusters	917	917	917	917
R^2	0.11	0.11	0.11	0.11
Panel C. Education				
Distance to printing press	−0.105 (0.038)			−0.110 (0.038)
Distance to health		0.027 (0.053)		0.012 (0.052)
Distance to school			−0.056 (0.030)	−0.062 (0.030)
Observations	28,720	28,720	28,720	28,720
Clusters	2,212	2,212	2,212	2,212
R^2	0.24	0.24	0.24	0.24
Panel D. Clinic				
Distance to printing press	0.005 (0.020)			0.006 (0.021)
Distance to health		0.041 (0.026)		0.040 (0.026)
Distance to school			−0.021 (0.016)	−0.019 (0.016)
Observations	28,267	28,267	28,267	28,267
Clusters	2,175	2,175	2,175	2,175
R^2	0.14	0.14	0.14	0.14
Country and wave FE	Yes	Yes	Yes	Yes

Notes: The table reports OLS estimates. The unit of observation is an individual. Dependent variables are contemporary outcomes described in more details in the text. Standard errors in parentheses are clustered at the town-level. Controls are the individual-level, town-level, and ethnicity-level controls described in the text. All specifications include country and Afrobarometer round fixed effects. The sample is restricted to individuals living in a 100 km radius around a historical missionary settlement.

A variance decomposition of the results show that the proximity to the printing press and the other covariates together explain respectively 11.8 percent of the total variation in newspaper readership. Of these 11.8 percent, 1.9 to 16.5 percent is explained by the distance to the printing press. The other investments performed by the missions (education-related and health-related investments) have no long-term effects on social capital proxied by trust and newspaper readership.

When we turn to the effects of mission investments on education-related and health-related contemporary outcomes, we first find that proximity to a mission with a printing press has a long-term effect on education. A 1 percent increase in the proximity to the closest mission with a printing press is associated with a statistically significant increase in the level of education by 10.9 to 11.5 percentage points (Table 5, panel C, columns 1 and 4). This corresponds to an increase in the level of education by 6.3 percent of a standard deviation. Moreover, not only the printing press investment has a long-term effect on education, but also the historical missionary investments in education. We find that a 1 percent increase in the proximity to the closest mission with a school is associated with a statistically significant increase in the level of education by 5.6 to 6.2 percentage points (Table 5, panel C, columns 3 and 4). Interestingly, there seems to be no effect of the mission printing press and school on contemporary health (as measured by proximity to a clinic). However, this lack of effect might be due to an imperfect measure of health (reported presence of a nearby clinic), as opposed to a measure of individual health conditions. In the remainder of the paper, we only focus on social capital and education.

Nonparametric Effect of Distance.—Figure 2 shows the locally weighted scatter-plot smoothing (LOWESS) estimations of different contemporary outcomes as a function of the distance to the printing press. These graphs show the nonparametric estimation of the expected outcomes, conditional on distance to the printing press. The figures are consistent with the hypothesis of a negative linear relationship between the outcomes and the log-distance of the printing press. The deviation from the negative linear relationships observed in Figure 2B is mostly located at the tail of the sample where the estimation is the least efficient.

Democracies.—Finally, we estimate the long-term effects of the different investments performed by Protestant missions on political participation. When considering measures of political participation—registration, turnout, and actions—we restrict our sample of analysis to democratic countries, where political participation is easier to interpret.[17] Table 6 presents the results.

We obtain no statistically significant effect of proximity to a printing press—nor to the other investments performed by the missions—on registration and turnout at elections nowadays. This absence of results could be explained by the well-known problem of overreporting of political participation at elections in the Afrobarometer. However, we find a positive and statistically significant effect of proximity to the printing press on the "action" variable. A 1 percent increase in the proximity to the

---

[17] Democracies are the countries defined as such in the Polity IV Project: www.systemicpeace.org/polity/polity4.htm.

Panel A. Newspaper readership

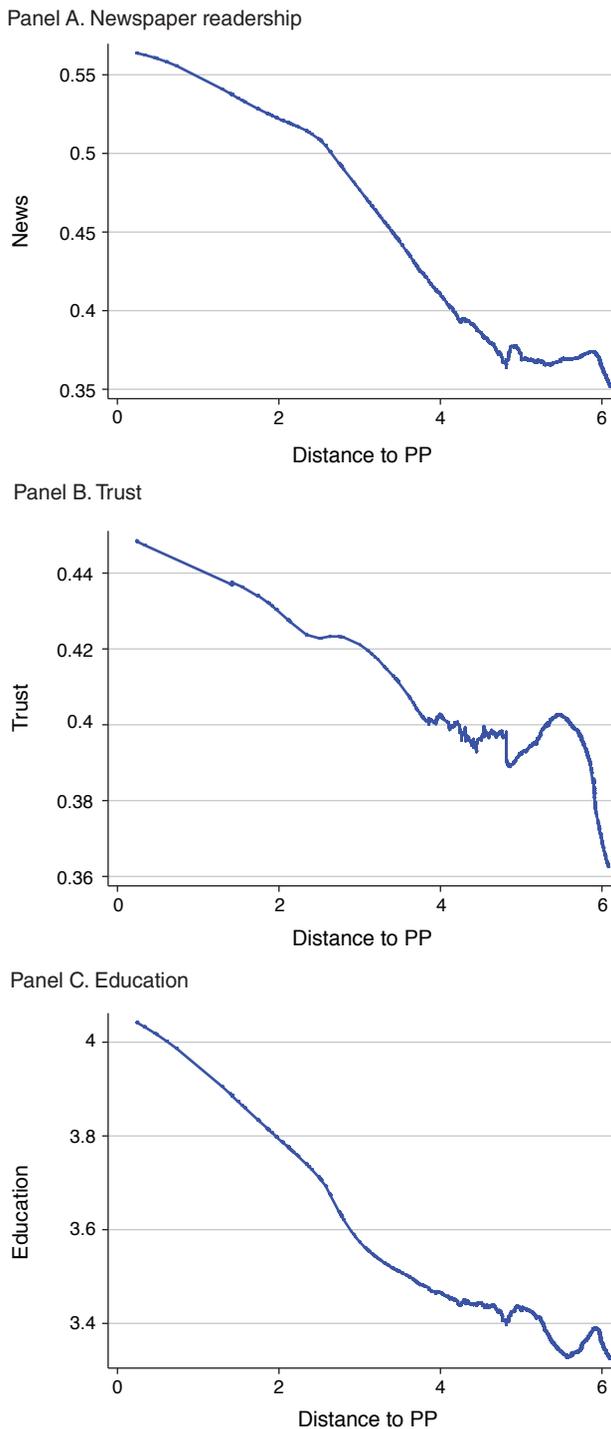
Panel B. Trust

Panel C. Education

FIGURE 2. EFFECT OF DISTANCE TO THE PRINTING PRESS ON CONTEMPORARY OUTCOMES. LOCALLY WEIGHTED
SCATTERPLOT SMOOTHING

Note: Distance to the printing press is reported in logs.

TABLE 6—DISTANCE TO MISSION INVESTMENTS AND POLITICAL PARTICIPATION,
CONSIDERING ONLY DEMOCRACIES, OLS ESTIMATION
(100 *km restriction*)

	b/se (1)	b/se (2)	b/se (3)	b/se (4)
Panel A. Turnout				
Distance to printing press	0.021 (0.014)			0.022 (0.014)
Distance to health		−0.004 (0.011)		−0.004 (0.011)
Distance to school			−0.003 (0.008)	−0.005 (0.008)
Observations	12,363	12,363	12,363	12,363
Clusters	1,188	1,188	1,188	1,188
R^2	0.17	0.17	0.17	0.17
Panel B. Registration				
Distance to printing press	−0.004 (0.016)			−0.005 (0.016)
Distance to health		−0.014 (0.011)		−0.012 (0.011)
Distance to school			0.012 (0.011)	0.012 (0.011)
Observations	5,225	5,225	5,225	5,225
Clusters	721	721	721	721
R^2	0.16	0.16	0.16	0.16
Panel C. Actions				
Distance to printing press	−0.027 (0.012)			−0.026 (0.012)
Distance to health		0.008 (0.013)		0.007 (0.013)
Distance to school			−0.005 (0.009)	−0.003 (0.008)
Observations	11,856	11,856	11,856	11,856
Clusters	1,188	1,188	1,188	1,188
R^2	0.10	0.10	0.10	0.10
Country and wave FE	Yes	Yes	Yes	Yes

Notes: The table reports OLS estimates. The unit of observation is an individual. Dependent variables are contemporary measures of political participation described in more details in the text. Standard errors in parentheses are clustered at the town-level. Controls are the individual-level, town-level, and ethnicity-level controls described in the text. All specifications include country and Afrobarometer round fixed effects. The sample is restricted to individuals living in a 100 km radius around a historical missionary settlement. Only democratic countries are included in the sample.

closest mission with a printing press is associated with a 2.6 to 2.7 percentage point increase in the probability of taking actions as a citizen (Table 6, panel C, columns 1 and 4). We find no effect on actions of the historical investment in education and health.

C. *Endogenous Selection of Missions into Printing and Other Investments*

The results suggest persistence of historical investments on contemporary outcomes, with the proximity to the printing press affecting social and civic capital as well as education, and the proximity to an historical location of a missionary school having a long-term effect on education nowadays.

Although regression (1) includes an extensive set of covariates, there is still the possibility of endogenous selection of missions into printing and other investments. To tackle this issue, we first develop a matching approach, and then use selection on observables to assess the bias from unobservables (Altonji, Elder, and Taber 2005; Oster 2013).

Matching.—As opposed to the OLS estimator that imposes linearity in the parameters, the matching estimator allows for nonlinear effects of observables (Acemoglu 2005). For the sake of simplicity, we only describe here the matching strategy with respect to selection of missions into printing, but also perform the same strategy for the health-related and education-related historical investments considered in previous regressions. Our matching results, presented below, cover the three types of missionary investments.

Using a Logit model, we regress the binary variable indicating whether missions are endowed with a printing press on all the observable characteristics available at the mission level (these observables correspond to the variables reported in Tables 2 and 3). From this regression we compute the propensity score, which is the estimated probability of having a printing press. We then match each mission with a printing press to the mission with the closest propensity score using a one-to-one matching. The sample of missions with a printing press is called PP. Online Appendix Tables B1 and B2 show respectively the results of the regression from which we compute the propensity score and the balance check comparing samples PP and $\overline{PP}$. There are no significant differences between the two samples.

Each town in the Afrobarometer is then associated to the closest mission in the sample $\{\overline{PP} \cup PP\}$. We construct the treatment area as follows: we decompose the map of Africa as a Voronoi diagram using the missions in $\{\overline{PP} \cup PP\}$ as generators (Figure 3). A Voronoi diagram divides space into a set of regions. A set of points, the seeds, 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.

We construct the following variables:

- $D\{\overline{PP} \cup PP\}_j$: the distance from town j to the closest mission station in the sample $\{\overline{PP} \cup PP\}$ ("Distance to printing press or likely").
- "*Treat printing press*"$_j$: a binary variable equal to one if town j is treated by a printing press (i.e., it is located in a polygon from Voronoi diagram with seed in the set PP).

We define similarly $D\{\overline{S} \cup S\}_j$ as the distance from town j to the closest mission station in the sample $\{\overline{S} \cup S\}$ ("Distance to school or likely") and $D\{\overline{H} \cup H\}_j$ ("Distance to health or likely"). "*Treat by school*"$_j$ (respectively "*Treat by health*"$_j$)
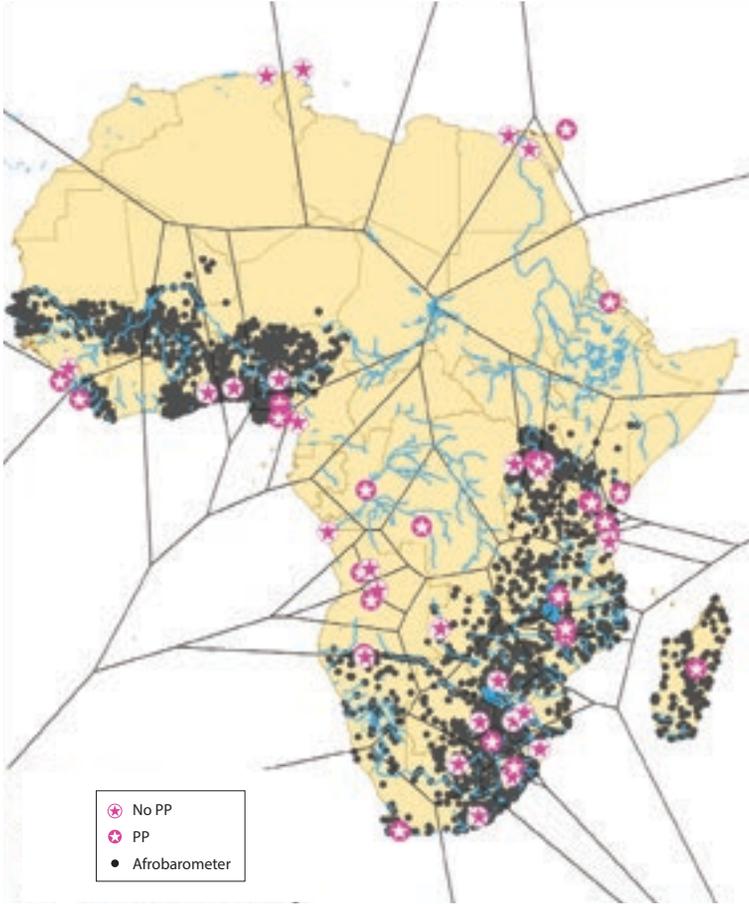
FIGURE 3. VORONOI DIAGRAM OF AFRICA

Notes: The seeds generating each polygon in the Voronoi Diagram are a subset of the historical missionary settlement. This subset includes all those with a printing press and those with similar characteristics but that did not import the printing press.

is a binary variable equal to one if town j is treated by a historical missionary school (similarly a historical missionary health facility).

Equation (2) describes the identification:

$$(2) \quad y_{ijec} = \lambda_1 D\{\overline{PP} \cup PP\}_j + \lambda_2 \textit{Treat printing press}_j$$

$$+ \lambda_3 D\{\overline{PP} \cup PP\}_j \times \textit{Treat printing press}$$

$$+ \gamma_1 D\{\overline{S} \cup S\}_j + \gamma_2 \textit{Treat school}_j + \gamma_3 D\{\overline{S} \cup S\}_j \times \textit{Treat school}$$

$$+ \eta_1 D\{\overline{H} \cup H\}_j + \eta_2 \textit{Treat health}_j + \eta_3 D\{\overline{H} \cup H\}_j \times \textit{Treat health}$$

$$+ \mathbf{X}'_i \boldsymbol{\beta}_2 + \mathbf{Y}'_j \boldsymbol{\beta}_3 + \mathbf{Z}'_e \boldsymbol{\beta}_4 + \delta_c + u_{ijec},$$

where the sets of controls $\mathbf{X}'_i$, $\mathbf{Y}'_j$, and $\mathbf{Z}'_e$ are the same as before and y_{ijec} is our outcome of interest (contemporary newspaper readership, trust, and education).

This specification aims at disentangling the effect of proximity to the printing press (respectively school and health) from the effect of proximity to a mission with similar characteristics. To ensure that "Treat by printing press" can be compared to a treatment effect of proximity to the printing press, we drop the Afrobarometer towns just at the border of each Voronoi diagram by defining a buffer around the border.

Table 7 presents the results of the estimation. The effect of the proximity to the closest mission in $\{\overline{PP} \cup PP\}$ is only statistically significant if the mission did invest in the printing press. Moreover, the results are of the same order of magnitude than those we obtain with the OLS estimation. A one standard deviation increase in the distance to the printing press decreases newspaper readership by 7.4 percent of a standard deviation and trust by 6.9 percent of a standard deviation. The effects on education are not statistically significant, but are of the expected signs.

Using Selection on Observables to Assess the Bias from Unobservables.—Despite our attempts to control for observable factors, the estimates may still be biased by unobservable factors correlated with selection into printing and subsequent social capital. We follow Nunn and Wantchekon (2011) and assess the likelihood that the estimates are biased by unobservables.

A common heuristic for evaluating the robustness of a result to omitted variable bias concerns is to look at the sensitivity of the treatment effect to the inclusion of observed controls. A key issue is the need to make an assumption about the share of the outcome variance that could be explained by observed and unobserved variables together (Oster 2013). Nunn and Wantchekon (2011) undertake direct calculations based on the theory of Altonji, Elder, and Taber (2005). Oster (2013) discusses their analysis and shows that this simple approximation is misleading. She makes explicit the link between coefficient movements, R-squared movements and omitted variable bias. In this paper, we follow Oster's (2013) implementation strategy. We use the full estimator and find that it is unlikely that the entire estimated effect of the distance to the printing press is driven by unobserved variables. The results and the technical details of the estimation are presented in the online Appendix Section C.

D. *Robustness Checks*

We perform several robustness checks. This section briefly describes them; the detailed results for these tests are available in the online Appendix.

Distance.—In our main empirical specification, we reduce our sample to individuals close to a Protestant mission. Because of this specification, the effects found can be lower than the real ones if the investments performed by the missions, and in particular the printing press, have a spillover effect across regions. If the effect of the printing press vanishes in the regions outside the threshold but is present in the regions considered, then our estimates might be downward biased because of spatial externalities (Miguel and Kremer 2004, Michalopoulos and Papaioannou 2011). Table E1 in the online Appendix gives the results when the sample is not restricted. The effects we obtain are statistically significant and of the same order of magnitude.

TABLE 7—DISTANCE TO MISSION INVESTMENTS AND CONTEMPORARY OUTCOMES,
MATCHING ESTIMATION

	News b/se (1)	Trust b/se (2)	Education b/se (3)
Printing press			
Distance to printing press or likely	−0.022	0.074	−0.136
	(0.034)	(0.034)	(0.158)
Treat printing press	0.464	0.395	0.643
	(0.162)	(0.183)	(0.848)
Distance to printing press or likely × Treat printing press	−0.067	−0.067	0.007
	(0.030)	(0.033)	(0.168)
Education			
Distance to school or likely	−0.018	−0.044	0.007
	(0.021)	(0.022)	(0.106)
Treat school	−0.058	−0.432	0.592
	(0.135)	(0.123)	(0.474)
Distance to school or likely × Treat school	0.012	0.072	−0.130
	(0.026)	(0.025)	(0.100)
Health			
Distance to health or likely	−0.017	−0.034	0.004
	(0.029)	(0.031)	(0.139)
Treat health	−0.094	0.036	0.759
	(0.114)	(0.115)	(0.577)
Distance to health or likely × Treat health	0.029	−0.006	−0.091
	(0.022)	(0.020)	(0.106)
Observations	7,937	4,780	8,008
Country and wave FE	Yes	Yes	Yes
Clusters	636	297	636
R^2	0.21	0.10	0.30

Notes: The table reports matching estimates. The unit of observation is an individual. Dependent variables are contemporary outcomes described in more details in the text. Standard errors in parentheses are clustered at the town-level. Controls are the individual-level, town-level, and ethnicity-level controls described in the text. All specifications include country and Afrobarometer round fixed effects.

We show in the online Appendix that our results are robust to the use of different specifications for distance. First, Figure E1 plots the effect of distance to the printing press from the baseline specification with different restrictions on the maximum distance to a mission. The coefficients appear to be stable across restrictions. Second, Table E2 shows that our results are robust to an alternative specification in which the variable of interest is binary, equal to 1 for individuals living close to a missionary printing press (maximum 25 km away from the printing press).

Bad Controls.—In the main specification, we do not introduce contemporary controls that may be *bad controls* in the sense of Angrist and Pischke (2009). This issue would arise if any of the contemporary controls were also outcomes. Online Appendix Table E4 presents the results of the estimation of equation (1) when controlling for these bad controls (contemporary religion, cash constraints, water constraints, population density in 2005). The results are not significantly different from those presented in Table 5.

Mission Size.—Because missions that invested in the printing press might be larger, we also check that our effect is not driven by the mission size. As a falsification test, we estimate equation (1) with the distance to the 30 largest missions as the main explanatory variable.[18] The results are given in the online Appendix Table E5. Distance to the largest missions has no effect on newspaper readership nowadays.

British Colonies and Legal Origins.—Online Appendix Table E7 shows the results of the estimation of equation (1) for a sample restricted to former British colonies. Our results are robust to this restriction and the magnitude of the effect remains unchanged. Our results thus cannot be entirely attributed to the colonizer's legal origins.

Cluster.—We also estimate equation (1) using two-way clustering at the closest mission and town levels. Clustering the standard errors at the mission level might be relevant should the closest mission be also considered as a treatment. Table E6 shows that our results are robust to this two-way clustering strategy.

Probit.—Our results are also robust to using a Probit rather than an OLS specification (online Appendix Table E3).

E. *Additional Results*

Radio and Television.—We investigate the long-term effects of proximity to the printing press on other media outlets, and more specifically on whether individuals listen to the news on radio or watch the news on television. The results are presented in the online Appendix Table D1. The empirical specification is the same as that in Table 5. Whether we should expect a significant effect of proximity to a printing mission on radio and television, and the direction of the effect, is an open question. Depending on the circumstances, television and radio can indeed be either complements or substitutes to newspapers. For example, Strömberg (2004) shows that the spread of radio in 1920–1940 in the United States increased voter turnout, particularly in rural areas. This finding contrasts with Gentzkow (2006) who provides strong evidence that television caused substitution away from newspapers, leading in turn to a large drop in turnout. Both findings can be rationalized; because of its new technological feature, the radio caused less substitution away from newspapers.

We find a negative and statistically significant effect of the distance to a printing mission on listening to the news on radio and watching the news on television. The magnitude of the effect is small, however, and is only significant at the 10 percent level for television. A 1 percent increase in the distance to the closest mission with a printing press is associated with a 1.2 percentage point decrease in the probability of listening to the news on radio, and a 2.1 percentage points decrease in the probability of watching the news on television. When we turn to the standardized coefficients, we obtain that a one standard deviation increase in the logarithm of the

---

[18] The size of the mission is the total number of students, missionaries, and indigenous teachers and workers. Within these 30 largest missions, only two have a printing press.

distance to the printing press decreases the probability of listening to the radio or watching television by around 4 percent of a standard deviation. There is no statistically significant effect of the distance to the closest mission with a school or a health facility on radio and television consumption nowadays.

Societies.—Finally, based on our historical readings of the different preferences of missionary societies for different investments, and in particular the printing press, we use missionary societies to construct an alternative proxy for mission investments.[19]

In the early period of missionary expansion, missionaries faced numerous difficulties despite the support of an increasing number of church ministers (Ellis 1844). As a result of the raising popularity of the missionary work and the struggles missionaries faced, different associations of missionaries and evangelists started to emerge in the late eighteenth century. The first societies were mostly launched under the impulsion of the evangelists, for instance the Baptist Missionary Society (BMS) founded in 1792.

In the early nineteenth century, numerous and diverse societies had been created. The Church Missionary Society (CMS), for instance, was founded in 1800 by the Church of England in response to the raising popularity of missionary work (Stock 1899). The aim of these organizations was to coordinate efforts and funds of the missionary work. Their priorities differed and depended on the preferences and means of the societies' command. The CMS, for instance, "in the absence of missionaries,[…] fell back upon the printing press as an agent of evangelization" from the start of its activity (Stock 1899, 75). On the contrary, the Christian Missionary Alliance, founded in 1887, had not invested in a single printing press 10 years later, even though it had already settled 52 missions around the globe (Dennis, Beach, and Fahs 1903).

There are 5,535 missions in the entire world outside sub-Saharan Africa (6,258 including sub-Saharan Africa) reported in the *Geography and Atlas of Christian Missions*. Only 2.3 percent of these missions had a printing press.[20] These missions were affiliated with 262 different societies among which 69 are present in both sub-Saharan Africa and the rest of the world.

Let "*Society PP$_m$*" be the share of missions from mission *m*'s society equipped with (at least) a printing press in all the regions of the world *outside* sub-Saharan Africa. In sub-Saharan Africa, we know the originating society for 679 out of our 723 missions (44 missions were either affiliated to a society existing only in sub-Saharan Africa or not affiliated to a society). Among the 69 originating societies recorded, 16.8 percent had a printing press in at least one of their missions. Assuming that the larger this share, the more likely it was for a mission associated with this society to invest in a printing press in sub-Saharan Africa, we use the society as an alternative proxy for missions' investments.

---

[19] Bai and Kung (2011), in their study of Protestantism and economic prosperity in China, similarly compare the effects different Protestant denominations had on economic outcome, different denominations emphasizing Calvinist principles differently.

[20] This is slightly lower than in sub-Saharan Africa where the percentage of the missions with a printing press was 3.7 percent.

Online Appendix Table D2 presents the results. The empirical specification is the same as that in Table 5, but the explanatory variable is now the distance to the closest mission from a society with at least a printing press outside SSA. We find that this distance has a negative and statistically significant effect on newspaper readership nowadays. The effect is only statistically significant at the 10 percent level.

Channels.—We have shown that areas close to missions with printing presses in 1903 have higher civic and social capital today. These effects seem specific to missions with printing presses; they are not related to other observed mission characteristics. One can interpret these results as a suggestive evidence of a causal effect of printing presses on newspaper readership and social capital nowadays. However, a caveat of our analysis is that we cannot separate the effect of printing per se from other mission characteristics that might be associated with it. In particular, determining whether the persistence of the effect works through the supply side or the demand side is particularly challenging empirically.

It may be that places with printing missions were more likely to have newspapers, and that these places also built up physical and human capital that made it cheaper to run newspapers there today. A limitation of our dataset is that we do not know the location of current and historical newspapers nor the location of current printing presses. We circumvent this limitation by using alternative historical sources. Using Rowling and Wilson's (1923) inventory of all the books and reviews published by the missionaries, we gather information on the number of publications printed at each mission press until 1923. In the publication record data, we find that 18 missions with a printing press (out of the 27 missions equipped with a printing press in 1903) had a publication record in 1923. These printing presses were probably the most productive or the ones with the most stable production across time.

The missions where these printing presses were located did not exhibit any particular type of geographical or historical characteristics, nor did they specialize in any kind of specific investments (online Appendix Tables A4 and A5). We therefore interpret the presence of such records as a proxy for the activity of the printing presses: printing presses with a publication record in 1923 were probably the most active. Online Appendix Table D3 shows the result of regression (1) when we add distance to the closest mission with a publication record in 1923 as a control.

We obtain a negative and statistically significant effect of the distance to a printing press with a publication record in 1923 on newspaper readership nowadays. A 1 percent increase in the proximity to the closest mission with a printing press and a publication record increases the probability of reading a newspaper by 5.9 to 7.8 percentage points (columns 2 to 4). Moreover, once we control for the distance to a mission with a printing press and a publication record, the coefficient associated with the distance to a printing press is no longer statistically significant.[21] This suggests that the impact of the distance to a printing press on newspaper readership may be explained by the development of publishing activities. However, these results

---

[21] In the online Appendix Tables E8 and E9, we show respectively that these results are robust to clustering the standard errors at the closest mission with a publication record level and to using two-way clustering at the closest mission with a publication record and the village levels.

have to be taken carefully since they rely heavily on the only archival source we found to track the middle-run evolution of the publishing activities of missions with a printing press. We cannot ultimately separate the effect of printing per se from other mission characteristics that might be associated with it, nor net out the supply and the demand effects that may explain persistence.

IV. Conclusion

In this paper, we study the impact of the early introduction of the printing press by Protestant missionaries in the nineteenth century sub-Saharan Africa. The evidence we obtain from a variety of identification strategies is consistent with our hypothesis that the early introduction of the printing press has long-term effects on contemporary civic and social capital. A wide literature points to higher social capital leading to higher economic activity and higher well-being. Our results suggest that a better understanding of African media development and of the determinants of social capital at the subnational level will be key for the future of African democracy and economic change.

REFERENCES

Acemoglu, Daron. 2005. "Constitutions, Politics, and Economics: A Review Essay on Persson and Tabellini's the Economic Effects of Constitutions." *Journal of Economic Literature* 43 (4): 1025–48.

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91 (5): 1369–1401.

Acemoglu, Daron, Tristan Reed, and James A. Robinson. 2014. "Chiefs: Economic Development and Elite Control of Civil Society in Sierra Leone." *Journal of Political Economy* 122 (2): 319–68.

Alesina, Alberto, William Easterly, and Janina Matuszeski. 2011. "Artificial States." *Journal of the European Economic Association* 9 (2): 246–77.

Algan, Yann, and Pierre Cahuc. 2014. "Trust, Growth, and Well-Being: New Evidence and Policy Implications." In *Handbook of Economic Growth,* Vol. 2, edited by Philippe Aghion and Steven N. Durlauf, 49–120. Amsterdam: North-Holland.

Altonji, Joseph G., Todd E. Elder, and Christopher R. Taber. 2005. "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools." *Journal of Political Economy* 113 (1): 151–84.

Angrist, Joshua D., and Jörn-Steffen Pischke. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion.* Princeton: Princeton University Press.

Bai, Ying, and James Kai-sing Kung. 2011. "Diffusing Useful Knowledge While Spreading God's Message: Protestantism and Economic Prosperity in China, 1841–1920." Unpublished.

Beach, Harlan. 1903. *A Geography and Atlas of Protestant Missions: Their Environment, Forces, Distribution, Methods, Problems, Results and Prospects at the Opening of the Twentieth Century.* Vol. II. New York: Student Volunteer Movement for Foreign Missions.

Becker, Sascha O., and Ludger Woessmann. 2009. "Was Weber Wrong? A Human Capital Theory of Protestant Economic History." *Quarterly Journal of Economics* 124 (2): 531–96.

Béthune, Léon. 1889. *Les Missions Catholiques d'Afrique.* Lille, France: Société de Saint-Agustin.

Bratton, Michael, Robert Mattes, and E. Gyimah-Boadi. 2005. *Public Opinion, Democracy, and Market Reform in Africa.* Cambridge: Cambridge University Press.

Cagé, Julia. 2014. "Media Competition, Information Provision and Political Participation." Unpublished.

Cagé, Julia. 2015. "The Economics of the African Media." In *The Oxford Handbook of Africa and Economics*, edited by Célestin Monga and Justin Yifu Lin, 605–25. Oxford: Oxford University Press.

Cagé, Julia, and Valeria Rueda. 2016. "The Long-Term Effects of the Printing Press in sub-Saharan Africa: Dataset." *American Economic Journal: Applied Economics*. http://dx.doi.org/10.1257/app.20140379.

Cantoni, Davide. 2013. "The Economic Effects of the Protestant Reformation: Testing the Weber Hypothesis in the German Lands." University of Munich Department of Economics Discussion Paper 2013-4.

Casey, Katherine. 2013. "Crossing Party Lines: The Effects of Information on Redistributive Politics." http://leitner.yale.edu/sites/default/files/files/resources/papers/CPL_Casey_28March2013.pdf.

Church Missionary Society. 1896. *The Church Missionary Atlas.* London: Church Missionary Society.

Clair, Colin. 1976. *A History of European Printing.* New York: Academic Press.

Cogneau, Denis, and Alexander Moradi. 2014. "Borders That Divide: Education and Religion in Ghana and Togo Since Colonial Times." *Journal of Economic History* 74 (3): 694–729.

De Gruchy, John W. 1999. *The London Missionary Society in Southern Africa: Historical Essays in Celebration of the Bicentenary of the LMS in Southern Africa, 1799–1999.* Cape Town, South Africa: David Philip Publishers.

Dell, Melissa. 2010. "The Persistent Effects of Peru's Mining *Mita*." *Econometrica* 78 (6): 1863–1903.

Dittmar, Jeremiah E. 2011. "Information Technology and Economic Change: The Impact of the Printing Press." *Quarterly Journal of Economics* 126 (3): 1133–72.

Eisenstein, Elizabeth L. 1980. *The Printing Press as an Agent of Change.* Cambridge: Cambridge University Press.

Ellis, William. 1844. *The History of the London Missionary Society.* London: John Snow.

Fahs, Charles H., and Helen E. Davis. 1935. *Conspectus of Cooperative Missionary Enterprise.* New York: International Missionary Council.

Feyrer, James, and Bruce Sacerdote. 2009. "Colonialism and Modern Income: Islands as Natural Experiments." *Review of Economics and Statistics* 91 (2): 245–62.

Fraser, Robert. 2008. *Book History through Postcolonial Eyes: Rewriting the Script.* New York: Routledge.

Gentzkow, Matthew. 2006. "Television and Voter Turnout." *Quarterly Journal of Economics* 121 (3): 931–72.

Gentzkow, Matthew, Jesse M. Shapiro, and Michael Sinkinson. 2011. "The Effect of Newspaper Entry and Exit on Electoral Politics." *American Economic Review* 101 (7): 2980–3018.

Glaeser, Edward L., and Andrei Shleifer. 2002. "Legal Origins." *Quarterly Journal of Economics* 117 (4): 1193–1229.

Gordon-Brown, Alfred. 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.* Cape Town, South Africa: A. A. Balkema.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2004. "The Role of Social Capital in Financial Development." *American Economic Review* 94 (3): 526–56.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2008. "Long Term Persistence." National Bureau of Economic Research (NBER) Working Paper 14278.

Habermas, Jürgen. 1989. *The Structural Transformation of the Public Sphere: An Inquiry into a Bourgeois Society.* Cambridge: MIT Press.

Harmsen, H. Richard. 1982. "The Printing Industry in Sub-Saharan Africa: An Exploratory Study." PhD diss. Rochester Institute of Technology.

Huillery, Elise. 2009. "History Matters: The Long-Term Impact of Colonial Public Investments in French West Africa." *American Economic Journal: Applied Economics* 1 (2): 176–215.

Huillery, Elise. 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.

Johnson, Hildegard Binder. 1967. "The Location of Christian Missions in Africa." *Geographical Review* 57 (2): 168–202.

La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2008. "The Economic Consequences of Legal Origins." *Journal of Economic Literature* 46 (2): 285–332.

Maake, Nhlanhla. 2000. "Publishing and Perishing: People, Books and Reading in African Languages." In *Politics of Publishing in South Africa*, edited by Nick Evans and Monica Seeber, 127–62. Durban, South Africa: University of Natal Press.

McCleary, Rachel, and José de Jesús Pesina. 2012. "Protestantism and Human Capital in Guatemala." Unpublished.

Michalopoulos, Stelios, and Elias Papaioannou. 2011. "The Long-Run Effects of the Scramble for Africa." National Bureau of Economic Research (NBER) Working Papers 17620.

Michalopoulos, Stelios, and Elias Papaioannou. 2013. "Pre-Colonial Ethnic Institutions and Contemporary African Development." *Econometrica* 81 (1): 113–52.

Michalopoulos, Stelios, and Elias Papaioannou. 2014. "National Institutions and Subnational Development in Africa." *Quarterly Journal of Economics* 129 (1): 151–213.

Miguel, Edward, and Michael Kremer. 2004. "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities." *Econometrica* 72 (1): 159–217.

Moran, James. 1973. *Printing Presses: History and Development from the Fifteenth Century to Modern Times.* Berkeley: University of California Press.

Murdock, George Peter. 1967. "Ethnographic Atlas: A Summary." *Ethnology* 6 (2): 109–236.

Mytton, Graham. 1983. *Mass Communication in Africa.* London: Edward Arnold.

Nunn, Nathan. 2008. "The Long-term Effects of Africa's Slave Trade." *Quarterly Journal of Economics* 123 (1): 139–76.

Nunn, Nathan. 2009. "Christians in Colonial Africa." Unpublished.

Nunn, Nathan. 2010. "Religious Conversion in Colonial Africa." *American Economic Review* 100 (2): 147–52.

Nunn, Nathan, and Leonard Wantchekon. 2011. "The Slave Trade and the Origins of Mistrust in Africa." *American Economic Review* 101 (7): 3221–52.

Omu, Fred I. A. 1978. *Press and Politics in Nigeria, 1880–1937.* New York: Longman.

Oster, Emily. 2013. "Unobservable Selection and Coefficient Stability: Theory and Validation." http://fmwww.bc.edu/RePEc/bocode/s/selection.pdf.

Piketty, Thomas, and Gabriel Zucman. 2014. "Capital Is Back: Wealth-Income Ratios in Rich Countries, 1700–2010." *Quarterly Journal of Economics* 129 (3): 1255–1310.

Putnam, Robert D. 2000. *Bowling Alone: The Collapse and Revival of American Community.* New York: Simon and Schuster.

Rowling, Canon F., and C. E. Wilson. 1923. *Bibliography of African Christian Literature.* London: London Conference of Missionary Societies of Great Britain and Ireland.

Rubin, Jared. 2014. "Printing and Protestants: An Empirical Test of the Role of Printing in the Reformation." *Review of Economics and Statistics* 96 (2): 270–86.

Snyder, James M., Jr., and David Strömberg. 2010. "Press Coverage and Political Accountability." *Journal of Political Economy* 118 (2): 355–408.

Stock, Eugene. 1899. *The History of the Church Missionary Society: Its Environment, its Men, and its Work.* London: Church Missionary Society.

Strömberg, David. 2004. "Radio's Impact on Public Spending." *Quarterly Journal of Economics* 119 (1): 189–221.

Switzer, Les. 1984. "The African Christian Community and its Press in Victorian South Africa." *Cahiers d'Études africaines* 24 (96): 455–76.

Switzer, Les, and Donna 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. Boston: G. K. Hall.

Tabellini, Guido. 2010. "Culture and Institutions: Economic Development in the Regions of Europe." *Journal of the European Economic Association* 8 (4): 677–716.

Tudesq, André-Jean. 1995. *Feuilles d'Afrique: étude de la presse de l'Afrique sub-saharienne.* Pessac, France: Maison des sciences de l'homme d'Aquitaine.

Voigtländer, Nico, and Hans-Joachim Voth. 2012. "Persecution Perpetuated: The Medieval Origins of Anti-Semitic Violence in Nazi Germany." *Quarterly Journal of Economics* 127 (3): 1339–92.

Wantchekon, Leonard, Marko Klašnja, and Natalija Novta. 2012. "Education and Human Capital Externalities: Evidence from Colonial Benin." Unpublished.

Weber, Max. 1930. *The Protestant Ethic and the Spirit of Capitalism.* London: George Allen and Unwin Limited.

Woodberry, Robert D. 2004. "The Shadow of Empire: Christian Missions, Colonial Policy, and Democracy in Postcolonial Societies." PhD diss. University of North Carolina at Chapel Hill.

Woodberry, Robert D. 2012. "The Missionary Roots of Liberal Democracy." *American Political Science Review* 106 (2): 244–74.

Woodberry, Robert D., and Timothy S. Shah. 2004. "Christianity and Democracy: The Pioneering Protestants." *Journal of Democracy* 15 (2): 47–61.