On the Road to Heaven:
Self-Selection, Religion, and Socioeconomic Outcomes[*]

Mohamed Saleh[†]

(December 20, 2012)

Abstract

Correlation between religion and socioeconomic outcomes is observed in various contexts. In the Middle East, local non-Muslims are, on average, better off than the Muslim majority. I trace the origins of the phenomenon in Egypt to a historical process of self-selection across religions (based on socioeconomic status) that was motivated by an economic incentive: the imposition of the poll tax on non-Muslims upon the Islamic Conquest of the then-Coptic Christian Egypt in 640. The tax, which remained until 1855, led to the conversion of poor Copts to Islam to avoid paying the tax, and to the shrinking of Copts to a better off minority. Using new data sources that I digitized, including the 1848 and 1868 census manuscripts, I provide econometric evidence to support the hypothesis. I find that the spatial variation in poll tax enforcement in 640-900 and pre-Islamic attachment to Coptic Christianity, as measured by four historical proxies, predicts the Coptic population share in 1897. Consistent with the hypothesis predictions, the instrumented Coptic population share has a negative impact on the socioeconomic status for both Copts and Muslims, and on the Coptic-Muslim socioeconomic difference, particularly in rural Egypt, in 1848-68. I draw on a range of quantitative and qualitative evidence to support the underlying assumptions of the hypothesis and to examine the persistence of spatial and socioeconomic outcomes of Copts and Muslims.

Keywords: Islamic poll tax; Copts; persistence; Conversion; Middle East
JEL Classification: P48, N35

1. Introduction

Scribes in the Levant and Egypt are Christians.

Al-Muqaddasi, Muslim historian and geographer, tenth century[1]

Socioeconomic differences between religious groups are observed in various contexts (e.g. Protestants versus Catholics in Western Europe, Hindus versus Muslims in India, Jews versus non-Jews in the United States). In the Middle East, the relative success of local non-Muslim minorities compared to the Muslim majority has been documented both in the present day and in the past (Courbage and Fargues 1997, pp. 174-209). For example, in 1996 Egypt, one of the largest countries in the region, Egyptian Christians (Copts) were a small and relatively successful minority, comprising 6 percent of the population. The percent of adult active men working in a white-collar occupation stood at 43 percent for Copts compared to 30 percent for Egyptian Muslims.[2] The socioeconomic gap was even higher in the nineteenth century, prior to the twentieth century expansion of schooling and the out-migration of high-skilled Copts beginning in the 1960s. New data from Egypt's censuses of 1848 and 1868 reveal that among adult active men, 48 percent of Copts worked in white-collar occupations (mainly in the bureaucracy), whereas only 16 percent of Muslims worked in white-collar occupations.[3][4]

Why do we observe correlation between religion and socioeconomic outcomes? Drawing on the Coptic-Muslim socioeconomic gap in Egypt, this paper argues that the observed

---

[1] Al-Muqaddasi (1877), p. 183.

[2] Author's calculations from the 1996 10-percent census sample published on IPUMS International. The sample is restricted to Egyptian Muslim and Christian active males aged 35 to 65 who are born in Egypt, with non-missing values for province of birth, age, literacy, and occupation.

[3] Author's calculations from the 1848 and 1868 digitized census samples (Saleh 2012a and b). Sample is restricted to Egyptian Coptic and Muslim active males who are at least 15 years old.

[4] The educational gap was also in favor of Copts. In 1848 Cairo, 51 percent of Coptic male children of 5 to 14 years of age were enrolled in Coptic *kuttabs* (elementary religious schools), which taught arithmetic and geometry besides Arabic orthography (Heyworth-Dunne 1938, p. 85). Muslim *kuttabs*, focusing solely on memorizing Quran and Arabic orthography, enrolled only 34 percent.

correlation may be explained by a historical process of **self-selection** across religions (based on socioeconomic status) rather than by a **causal** impact of religion. In particular, I hypothesize that the Islamic poll tax (*jizya*) on non-Muslims that was imposed upon the Islamic Conquest of the then-Coptic Christian Egypt in 640 AD, and remained in effect until 1855, led to the conversion of poor Copts to Islam to avoid paying the tax, and to the shrinking of Copts into a better off minority.[5] Conceptually, a Copt's decision to convert to Islam depends on: (i) income, (ii) local poll tax enforcement, and (iii) local religiosity or attachment to Coptic Christianity. The hypothesis predicts that the lower the poll tax enforcement (or the higher the religiosity) in a district, the lower the conversion to Islam (relative to population) or, equivalently, the higher the Coptic population share. It also predicts that the higher the Coptic population share in a district (as a result of low enforcement and/or high religiosity): (a) the lower the expected income for both Copts and converts (Muslims), and (b) under specific conditions, the smaller the **difference** in expected income between Copts and converts (Muslims) (section 3).

The hypothesis, hence, suggests that, holding (the distribution of) income constant across districts, both poll tax enforcement and religiosity can be used as instruments for the Coptic population share. I thus find that the spatial variation in four historical proxies for these two factors, predicts the Coptic population share in 1897. The instrumented Coptic population share, in turn, is found to have a negative impact on the socioeconomic status for both Copts and Muslims and on the Coptic-Muslim socioeconomic difference in 1848-68, particularly in rural Egypt, as predicted by the hypothesis. I employ two proxies for poll tax enforcement: (1) Coptic

_____

[5] I focus on the Coptic-Muslim gap because Copts constituted 94 percent of non-Muslims in 1848-68. Other non-Muslim minorities included Jews (1 percent) and non-Coptic Christians (5 percent), such as *Ruum* (Ottoman Greeks), Armenians, Greeks, and Levantines. These groups had better socioeconomic outcomes than both Copts and Muslims. Unlike Copts, they were urban groups.

tax revolts in 726-68 ignited by strict enforcement, and (2) Arab immigration waves to Egypt in 640-900: Arabs became the local elites in the districts they immigrated to, and under the decentralized fiscal system, it was the local elites who enforced the poll tax. Arab elites were likely to enforce the poll tax on Coptic taxpayers as opposed to districts where Coptic elites remained in power. I proxy for religiosity by: (3) pre-Islamic Coptic monasteries (measured in 1200 and 1500), and (4) the route of the Holy Family in their biblical flight to Egypt as recorded in the Coptic tradition.[6] I control for the variation in (initial) mean income across districts using population size and male literacy rate in 1897.

I measure the socioeconomic status of Copts and Muslims through occupational outcomes using an individual-level sample of the 1848 and 1868 censuses that I digitized from the original manuscripts. This is the earliest comprehensive data source on religion, occupation, and geographic location, and is thus preferable to the twentieth century data where the expansion of education, urbanization, and Coptic out-migration may have altered the socioeconomic status of Copts and Muslims differentially. The Coptic population share is measured using the 1897 village/urban quarter-level census, which, unlike the 1848 and 1868 individual-level samples, has the population count by religion in each district.

Previous quantitative studies suggest that most conversions to Islam among Copts took place in 640-900 (section 2). Predicting the Coptic population share and socioeconomic status in 1897 and 1848-68 respectively, the findings suggest that the spatial and socioeconomic outcomes of early generations of Copts and converts (Muslims) both **persisted** for over a millennium. I evidence the spatial persistence by: (i) Coptic liturgical text from 800-1000, and (ii) Coptic churches in 1200 and 1500, and I evidence the socioeconomic persistence using: (i) quantitative

---

[6]Coptic monasteries and the route of the Holy Family are also proxies for the Coptic transfers system (section 5.1).

evidence on the religious composition of white-collar occupations found in the Arabic Papyri Database (APD) in 700-1500, and (ii) qualitative evidence from both primary and secondary historical accounts in 900-1848. Drawing on historical evidence, I explain the spatial persistence by the state's control of internal migration, and the socioeconomic persistence by the barriers to entry set up by the practitioners of each occupation, the religiously segregated educational system, and the limited cross marriage between Copts and Muslims, which all resulted in hereditary transmission of socioeconomic status. I also argue that Muslim rulers found it **beneficial** to employ Copts in the bureaucracy in 900-1848.

The paper contributes to the literature on the lasting impact of institutional changes on economic outcomes (e.g. Acemoglu, Johnson, and Robinson 2001; Acemoglu et al. 2011). I show that the Islamic poll tax institution, which was exported by the Islamic Conquest, shaped the membership in religious groups and generated socioeconomic inequalities that persisted for over a millennium. Thus, the paper provides an example of how institutions can shape both religious and socioeconomic outcomes. It also extends the literature on the economics of religion (Weber 1930; Botticinni and Eckstein 2002 and 2005; Barro and McCleary 2003 and 2005; Becker and Woessmann 2009; Boppart et al. 2008; Boorooah and Iyer 2005; Chaudhary and Rubin 2009). It provides an explanation for the correlation between religion and socioeconomic outcomes based on historical self-selection into religion. The self-selection process is motivated here by pure economic, and not by religion-related, incentives as in Botticinni and Eckstein (2002 and 2005) or Becker and Woessmann (2009). Finally, the persistence of Copts as an economic**,** yet not political**,** elite, contributes to the emerging literature on the persistence of elites (Acemoglu and Robinson 2008; Clark et al. 2012).

The Islamic Conquests of Egypt and the Levant and the subsequent Islamization of the southern half of the Byzantine Empire were the major cornerstone in the spread of Islam. Historians documented both the effect of the poll tax on conversion of Copts to Islam (John of Nikiu 1916; Severus 1910; Dennett 1950; Morimoto 1981), and the monopoly of Copts over medieval Egyptian bureaucracy (Al-Maqrizi 2002; Al-Muqqadasi 1877; Tagher 1998; Sheikho 1987; Samir 1996; Amer 2000). Yet, this paper is, to the best of my knowledge, the first to argue that the poll tax led to **selected** conversion of Copts to Islam (rather than **systematic** conversion), and that that, in turn, generated the observed Coptic-Muslim socioeconomic gap. By shifting the focus from identifying the causes of Islamization per se, which generated fierce debates in the literature, to examining the origins of the socioeconomic differences between Muslims and non-Muslims, the paper perhaps sheds a new light on the Islamization process.

The rest of the paper is organized as follows. Section 2 provides a historical background. I discuss the hypothesis in section 3, and I describe the data in section 4. Section 5 describes the empirical strategy and the results. I discuss the persistence of spatial and socioeconomic outcomes in section 6. Section 7 examines other possible explanations of the Coptic-Muslim socioeconomic gap. Finally, section 8 concludes.

2. Historical Background

Christianity has a long history in Egypt, reaching back to the first century, and the Church of Alexandria was a major theological center since the second century (Bowman 1989, pp. 191-202; Roberts 1979, pp. 1-26). The last pocket of paganism in Egypt was Christianized in the mid-sixth century (Bowman 1989, p. 192). The Church of Alexandria, followed by the Coptic (Egyptian) masses, separated from the Byzantine and Roman Churches on the grounds of

a theological debate in 451 (Atiya 2005, pp. 71-6; Tagher 1998, pp. 1-7). Greeks and Hellenized Egyptians remained loyal to the Roman and Byzantine churches forming the Melkite Church of Alexandria. Condemned as "heretics," Copts suffered from persecution under the Byzantines until the Islamic Conquest (Bowman 1989, p. 198; Atiya 2005, pp. 87-99).

When Arabs conquered Egypt in 640, Copts constituted the vast majority of the population, with Melkites and Jews forming two small **elite** minorities (Tagher 1998, p. 4; Lane-Poole 1969, p. 2; Wilfong 1998).[7] Two processes account for the subsequent Islamization of Egypt in 640-1848: Conversion of Copts to Islam and Arab immigration to Egypt. Two notes are in order: First, demographic evidence (Russell 1958) suggests that Arab immigration was insignificant relative to the pre-Islamic Coptic (Egyptian) population.[8] Second, there was no significant Coptic emigration from Egypt. Copts, because of their religious denomination that differed from both the Byzantine and Roman Churches, were an isolated group that was first "discovered" by Europeans in the fifteenth century (Hamilton 2006, pp. 1-5). Adding these two points together, it is perhaps safe to claim that Copts and Muslims in nineteenth century Egypt are (representative) descendants of the pre-Islamic Coptic (Egyptian) population.

In the absence of statistics, Wilfong (1998) points out that it is not possible to identify the point at which Copts shrank into a minority. One historical tradition (Al-Maqrizi 2002; Lane-Poole 1969; Dennett 1950; Mikhail 2004) argued that the Islamization of Egypt occurred in 640-1250 especially after the suppression of the eighth century Coptic tax revolts. Another tradition (Wiet 1927; Little 1976; Al-Leithy 2005; Werthmuller 2010) argued that the "deathblow" to

---

[7] There were other minor Christian factions in Egypt that were later assimilated into the Coptic or Melkite Churches (Mikhail 2004, p. 46).
[8] The population of the Arab peninsula in 600 AD was around 1 million, while the population of Egypt was around 2.7 million (Russell 1958, p. 89). Thus, had the entire Arab population immigrated to Egypt, it would not suffice, by itself, to account for the almost complete Islamization of the country.

6

Christianity only occurred in 1250-1517, as pressures by the Mamluk state triggered a wave of mass conversion to Islam among Copts. More concrete evidence comes from a third quantitative school which found that most conversions occurred in 640-900: Bulliet (1979) used lineages of individuals in medieval narratives in order to identify the point at which an individual's ancestors converted to Islam and thus adopted an Arabic name. He found that conversions peaked in the ninth century. Courbage and Fargues (1997), based on Russell (1958), used the time series of total poll tax revenues (from medieval narratives) in order to estimate the non-Muslim population share over time, assuming a fixed nominal poll tax per capita over time. They found a sharp decline in the revenues before 800, thus suggesting that Copts became a minority by then.

3. Hypothesis

Does the poll tax explain the conversion of Copts to Islam in 640-900 and the emergence of the Coptic-Muslim socioeconomic gap? The Islamic poll tax, an institution dictated by the Quran,[9] was, in practice, a continuation of the Byzantine poll tax, yet, with an important innovation: exempting Muslim converts from it, and, hence, turning it into a "religion" tax. Historians emphasized the impact of the tax on the conversion of Copts to Islam. The earliest evidence comes from the seventh century Coptic chronicle of John of Nikiu (1916, p. 201) who stated that "[Arabs] *increased the taxes... And now many of the Egyptians who had been false Christians denied the holy orthodox faith and lifegiving baptism, and embraced the religion of the Moslem, the enemies of God*." The ninth century Coptic chronicle of Severus (1910, pp. 116-7) described that, in the early eighth century, "[Arabs] *proclaimed that all those, who would give*

---

[9] The Quran (9:29) orders Muslims to "Fight those who believe not in Allah, nor the Last Day, nor hold that forbidden which hath been forbidden by Allah and His Messenger, nor acknowledge the religion of Truth, (even if they are) of the People of the Book (Christians and Jews), until they pay the poll tax (*jizya*) with willing submission, and feel themselves subdued."

up their own religion and become Muslims, should be exempted from the poll tax… By means of this procedure Satan did much harm to many people who gave up their religion… and they amount to twenty-four thousand persons." Modern historians attempted to reconcile these narratives with Arabic papyri (Wellhausen 1927; Becker 1903; Dennett 1950; Morimoto 1981).

Conceptually, a Copt's decision to convert to Islam in a district j in 640-900 depends on: (i) income, (ii) local poll tax enforcement, and (iii) local religiosity or attachment to Coptic Christianity. Ceteris paribus, the rich are less likely to convert, and the **remaining** Copts have higher expected income than converts (Muslims) (figure 1). The hypothesis makes predictions on the impact of shifting the threshold income of conversion (w^*) as a result of changing tax enforcement and/or religiosity, holding income distribution constant. It follows that, for any district j, (1) Coptic population share is strictly decreasing in poll tax enforcement and strictly increasing in religiosity, (2) the expected income for both Copts and Muslims is strictly increasing in poll tax enforcement and strictly decreasing in religiosity, or alternatively, strictly decreasing in Coptic population share, and (3) if w^* lies above the median income but below the expected income, the Coptic-Muslim difference in expected income is strictly increasing in poll tax enforcement and strictly decreasing in religiosity, or, alternatively, strictly decreasing in Coptic population share (see appendix A for proofs). Notice that: (a) the expected income exceeds the median in any rightly-skewed distribution (e.g. lognormal), and (b) w^* exceeds the median income (i.e. converts (Muslims) constitute the majority) for any district in Egypt.

The hypothesis rests on a number of assumptions on poll tax enforcement, religiosity, and conversion. I examine here the historical validity of these assumptions:

ASSUMPTION 1: Conversion to Islam is an individual choice.

8

Historical evidence suggests that forced conversion was very limited in 640-900, the period of conversions: It only occurred under Al-Muttawakil (847-61). State persecution under Al-Hakim (996-1021) and the Mamluks (1250-1517) occurred later on.

ASSUMPTION 2: The poll tax is an individual-level tax conditional on being non-Muslim.

This assumption is supported by historical evidence. For the first point, the earliest post-conquest historian of Egypt, Ibn-Abdel-Hakam (1974, pp. 64-6), stated that the poll tax in 640 was per head. Islamic jurisprudence, starting from 750, distinguished the poll tax (*jizya*) imposed on adult non-Muslim males on the **individual** basis from the land tax (*kharaj*) imposed on the **territorial** basis, regardless of religion (Abu-Youssef 1979, pp. 122-4).[10] In fact, papyri tax registers, which are individual-level lists of taxpayers along with the land and poll taxes they had to pay (Morimoto 1981, pp. 67-79), show that the poll tax was indeed an individual tax. As to the second point, according to Islamic jurisprudence (from 750 onwards), Muslim converts are exempted from the tax (Abu-Youssef 1979, p. 122).[11]

ASSUMPTION 3: The poll tax is a lump-sum tax, or, if increasing in income, a regressive tax.

Here, I will provide evidence that both the **de jure** and **enforced** poll tax are regressive, i.e. the average poll tax rate is decreasing in income. The de jure annual poll tax in 640 was fixed at two dinars. After 750, Islamic jurists dictated that the poll tax is either fixed or is imposed according to three income brackets: one dinar on manual workers, two dinars on the middle-

---

[10] Historians, however, disagreed as to whether this distinction existed in 640-750. Wellhausen (1927, pp. 477-82) and Becker (1903, pp. 81-112) argued that the tax in 640-750 was, following the Byzantine system, a fixed tribute imposed at the village-level, with no distinction made between land and poll taxes, and that the distinction emerged only later on with the fiscal reform in 720. Dennett (1950, pp. 62-103) argued, to the contrary, that the poll tax was at the individual-level from the outset. Morimoto (1981, pp. 53-144) suggested that the individual basis was indeed applied in 640-750 in order to estimate each village's tribute and that the poll tax became fully institutionalized as an individual tax with the fiscal reform in 720.

[11] However, there are examples in 640-750 of collecting the tax from Muslim converts (Morimoto 1981, pp. 66-91).

income, and four dinars on the rich. [12] [13] I use Ashtor (1969) in order to obtain occupation-based wages in medieval Egypt, and I classify each occupation into one of the three income brackets according to the criteria mentioned in Abu-Youssef (1979, p. 122). Figure 2 depicts the scatter plot of wages and the average (de jure) poll tax rate under the three-bracket system in 660-1517. The figure exhibits a negatively sloping tax rate, i.e. a regressive de jure poll tax.

How about the enforced poll tax? Local elites played a crucial role in the (poll and land) tax assessment and collection throughout the fiscal history of Egypt in 640-1855 (Cuno 1992, p. 85).[14] Hence, the de facto tax was often arbitrary and subject to elites' discretion (Morimoto 1981, pp. 175-81; Ismail 1998, pp. 164-7; Mahmoud 2009a, pp. 147-81).[15] [16] Papyri tax registers, individual-level lists of taxpayers along with the land and poll taxes they had to pay (Morimoto

---

[12] Both the Hanafi Sunni school of Islamic jurisprudence, which formed the official viewpoint under the Abbasids (750-969) and the Ottomans (1517-1855), and the Ismaili Shiite school, under the Fatimids (969-1171), dictated that the poll tax is imposed according to the three-bracket formula (Hanafi: Abu-Youssef 1979, pp. 122-4; Ismaili: Al-Qadi Al-Nu'man 1963, pp. 379-381). The Shafi'i Sunni school under the Ayyubids (1171-1250) and the Mamluks (1250-1517) made the poll tax fixed (Al-Shafi'i 2001, pp. 423-30), although, in practice, the state often adhered to the three-bracket system (Mahmoud 2009a; pp. 32-7). The Hanbali and Maliki Sunni schools both assert that the poll tax should be assessed according to the individual's economic means (Hanbali: Abul-Fadl Saleh 1999, p. 344; Maliki: Malik 1985, pp. 278-80; Al-Baji 1999, pp. 275-9). These schools, however, were never adopted by the state in Egypt.

[13] Muslim jurists disagreed as to the exemption of the poor from the poll tax. While the Hanafi, Hanbali, and Maliki Sunni schools all dictated that the poor (defined as those living on charity or are without occupation) are exempt from the poll tax, both the Ismaili Shiite and the Shafi'i Sunni schools did not grant such exemption. For example, using evidence from the Cairo Geniza on destitute Jews who paid the poll tax, Goitein (1963) and Alshech (2003) argued that the Ayyubids applied the Shafi'i Sunni non-exemption viewpoint. Importantly, under both viewpoints, any **active** adult male is considered non-poor, and is thus **not** exempt from the tax.

[14] Under both the Byzantine and Islamic rules, land was owned by the state, which gave usufruct right to private landholders to farm the land in exchange for land-tax, which was technically considered a "rent." Only in the late Fatimid period (969-1171), private landownership emerged as rulers gave away areas of land to individuals for reclamation.

[15] Village headmen assessed the individual tax amounts, which were then aggregated to estimate the village's tribute (Bagnall 1996, p. 318; Morimoto 1981, pp. 66-91; Frantz-Murphy 1999).

[16] In 640-750, Arabs kept the Byzantine tax system, which relied on local elites, mostly intact. The state attempted to centralize the tax system starting from 720-50. However, in response to a series of tax revolts ignited by strict enforcement (section 5), the state resorted to the decentralized tax-farming system in the ninth century (Sijpesteijn 2009), which remained in effect, in various forms, until the nineteenth century (Cuno 1992, pp. 17-32). Under this system, the state contracted out (through auctions) the tax collection of each district to private individuals, who then collected taxes from the taxpayers (Morimoto 1981, pp. 231-3). Under the Ayyubids and the Mamluks in 1171-1517, tax-farming took the form of *Iqta'*, whereby high-ranked military officers were granted large landholdings and control over tax collection.

10

1981, pp. 67-79), allow me to examine the relationship between the de facto poll tax and land tax (as a proxy for income), yet with an important caveat: these lists may not be representative of the relationship in all Egypt. Using individual lists of three sub-districts in the Nile Valley from 703-4, I fail to find evidence that the de facto poll tax amount was increasing in income (table 1).

ASSUMPTION 4: The poll tax captures the Coptic-Muslim net tax differential.

The other taxes/benefits that were in place did **not** differ across Muslims and Copts, and thus, the poll tax captures the Coptic-Muslim **difference** in net taxes. First, the land tax (*kharaj*), in Islamic jurisprudence, was not different across Copts and Muslims. Second, Muslims were subject to Islamic alms (*zakat*), transfers from rich to poor Muslims. However, Coptic institutions and rich Copts, on their part, gave transfers to poor Copts. Finally, Muslims, unlike Copts, were subject to military conscription, which can be thought of as a non-financial regressive tax (poor were more likely to be drafted). However, I argue that this did not offset the poll tax incentive to convert to Islam for two reasons: (a) as a non-financial tax, it was affordable by the poor, and (b) unlike the poll tax which was paid annually until death, military conscription was a one-time tax.

ASSUMPTION 5: Religiosity is independent from, or positively increasing in, income.

This is supported by historical evidence. Wealthier and highly-educated Copts were probably more religious because they were able to read the Bible and understand the theological debates. In fact, the Coptic script was invented in the third century by the Coptic bilingual elite, who knew both Egyptian and Greek, for this purpose (Bagnall 1996, pp. 230-65).

ASSUMPTION 6: Reverse conversion is not permissible.

This is also supported by historical evidence. Islamic jurisprudence generally dictates that conversion from Islam to any other religion is punishable by death.

4. Data

I draw on various historical sources in order to measure the four historical proxies of poll tax enforcement and religiosity, which I employ in the empirical analysis (see appendix B). I use Morimoto (1981, pp. 145-72) and Mikhail (2004, pp. 195-211) for information on Coptic tax revolts in 726-68. These revolts are measured at the region-level (N=2), and, hence, are not used in the regressions. I construct a dummy at the district-level ($arabimm_j$) that takes the value of one if district j received an Arab immigration wave in 640-900, based on Al-Barri (1992), who, in turn, draws on Arabic medieval narratives. I measure the number of pre-Islamic Coptic monasteries at the district-level ($monast_j$), drawing on two medieval sources: (1) Abul-Makarim (1999) who provides a list of churches and monasteries that existed in Egypt circa 1200, and (2) Al-Maqrizi (2002) who provides a similar list circa 1500. Using the information in Anba-Bishoy (1999) and Gabra (2001), I construct a dummy at the district-level ($holyfamily_j$) that takes the value of one if the district was (believed to be) visited by the Holy Family.

The data on the Coptic-Muslim socioeconomic gap come from two nationally representative samples of the 1848 and 1868 Egyptian censuses that I digitized from the original manuscripts at the National Archives of Egypt (Saleh 2012a and b). I pool the two samples and restrict the analysis to Egyptian Coptic and Muslim active males who are at least 15 years old. In the absence of income data, I define the Coptic-Muslim socioeconomic gap in terms of the *Social Status Index* (henceforth, SSI), a measure of occupational attainment that assigns values from 1

to 12 to each occupational title, with 12 being the highest status.[17] Figure 3 shows that the SSI distribution for Copts in 1848-68 is more skewed to the right than for Muslims in both urban and rural Egypt. Importantly, Copts in the sample are more concentrated at SSI = 9 (50 percent and 14 percent in urban and rural Egypt respectively), which consists of bureaucratic occupations such as scribes, tax collectors, and secretaries (section 6.2).

Finally, I measure the Coptic population share in each district ($coptshare_j$) using the 1897 village/urban quarter-level census, which has the full population count. Table 2 demonstrates that both the (national and regional) religious distribution and the regional distribution of Copts do not change between 1848-68 and 1897, thus suggesting their stability over the second half of the nineteenth century, and confirming the national representativeness of the 1848-68 samples. In order to evidence the persistence of the Coptic spatial distribution in 640-1897, I use the spatial distribution of Coptic churches in 1200 and 1500 based on Abul-Makarim (1999) and Al-Maqrizi (2002) (section 6.1), as a measure of the pre-nineteenth century spatial variation in Coptic population share.

5. Empirical Analysis

5.1 Empirical Strategy

Controlling for the initial variation in income distribution across districts, the self-selection mechanism in my hypothesis makes predictions on the impact of both local poll tax enforcement in the period of conversions (640-900) and pre-Islamic local religiosity, as measured by the historical proxies, on: (a) Coptic population share in 1897, (b) mean SSI for both Copts and Muslims in 1848-68, and (c) difference in mean SSI between Copts and Muslims

---

[17] See the Data Appendix of Saleh (2012b) for details on the SSI construction.

in 1848-68. In the empirical model, I use the historical proxies as instruments in the first stage to predict Coptic population share in 1897 at the district-level. In the second stage, I use the **predicted** district-level Coptic population share to predict mean SSI for both Copts and Muslims and the difference in mean SSI between the two groups in 1848-68 at the individual-level:

$$(1) coptshare_j = \alpha_1 + \alpha_2 arabimm_j + \alpha_3 monast_j + \alpha_4 holyfamily_j + \alpha_5 X_j + \varepsilon_{1j}$$

$$(2) SSI_{ij} = \beta_1 + \beta_2 copt_{ij} + \beta_3 \widehat{coptshare}_j + \beta_4 \left(copt_{ij} \times \widehat{coptshare}_j \right) + \beta_5 Z_j + \varepsilon_{2ij}$$

Where $copt_{ij}$ is a dummy that takes the value of one if individual i in district j is a Copt. X_j includes log (population) and male literacy rate (both measured in 1897) as proxies for the district's (initial) mean income, while Z_j includes, in addition to these two controls, their interactions with $copt_{ij}$, in order to allow the effects to vary across Copts and Muslims. The hypothesis predicts that, in the first stage, $\alpha_2 < 0$, $\alpha_3 > 0$, and $\alpha_4 > 0$: poll tax enforcement (religiosity) should have a negative (positive) impact on Coptic population share, while in the second stage, $\beta_2 > 0$, $\beta_3 < 0$, and $\beta_4 < 0$: Copts have higher SSI, on average, than Muslims, and the instrumented Coptic population share should have a negative impact on the mean SSI for **both** Copts and Muslims, and under specific conditions, a negative impact on the Coptic-Muslim SSI difference (see appendix A). The hypothesis also predicts that a district's mean income itself should be positively correlated to Coptic population share.

Are the suggested historical proxies **valid** instruments? I first argue that they are good proxies for poll tax enforcement and pre-Islamic religiosity, which, conceptually, affect the endogenous Coptic population share. In 726-68, five Coptic revolts erupted because of high taxation (poll and land taxes) and strict tax enforcement (Morimoto 1981, pp. 145-72; Mikhail

14

2004, pp. 195-211).[18] According to Sijpesteijn (2009), the revolts were led by "disenfranchised Coptic rural elites," who used to control the tax collection since the Conquest, against the rising control of both the immigrant Arab elites and the state over fiscal administration.[19] The regional variation in the revolts may thus proxy for tax enforcement. But, since the variation is limited (N=2), they are **not** included in the regressions, and I discuss their results only as suggestive.

Arab immigration to Egypt in 640-900 may serve as a second proxy for poll tax enforcement. Arab immigration was mostly temporary in the seventh century, but became more permanent in the eighth and ninth centuries (Sijpesteijn 2009). Arab settlers formed the rural elites owning large landholdings in the districts they immigrated to, thus contributing to the Arabization of the fiscal administration (Sijpesteijn 2009).[20] Under the decentralized taxation, the poll tax was perhaps strictly enforced on Copts in the districts that received immigration, compared to districts where Coptic elites remained in power (possibly colluding with taxpayers).

Pre-Islamic Coptic monasteries and the route of the Holy Family in their biblical flight to Egypt may both proxy for the pre-Islamic attachment to Coptic Christianity.[21] On the one hand, monasteries may have enhanced the religiosity of the local population through the religious services they provided. On the other hand, Coptic local traditions preserved the route of the Holy Family along with the "miraculous" sites that Jesus or Mary are believed to have touched or created (e.g. hand and footprints of Jesus, trees that are believed to have sheltered Mary, wells

---

[18] Sijpesteijn (2009) mentions an early tax revolt that took place in the Nile Valley in 697. I also excluded ten tax revolts that erupted in 783-866 (nine of them in the Nile Delta) because **both** Arabs and Copts participated in them and so they may have been motivated by different reasons.

[19] Noticeably, the first revolt in 726 occurred after only 6 years of the earliest attempt at centralizing the fiscal administration in 720.

[20] In 833, the state stopped paying pensions to Arab immigrants, who lost their aristocracy status as a result (Morimoto 1981, p. 167). Consequently, Arab immigration to Egypt dropped after the ninth century.

[21] The flight of the Holy Family to Egypt is mentioned in the Bible: "When they had gone, an angel of the Lord appeared to Joseph in a dream. "Get up," he said, "take the child and his mother and escape to Egypt. Stay there until I tell you, for Herod is going to search for the child to kill him." Matthew 13.

that are believed to be created by Jesus). Regardless of the historical truth of the event, the route

could serve as a proxy for religiosity since it reflects local beliefs prior to the Islamic Conquest.

Both Coptic monasteries and the route of the Holy Family are also measures of Coptic

transfers. Monasteries provided financial and physical aid to Coptic taxpayers after the

Conquest:[22] They leased out their large landholdings to Coptic farmers for cultivation (Richter

2009). Papyri documents show loans (with and without interest) provided by Coptic monasteries,

or by monks and clergymen, to Coptic laymen for the purpose of (poll or land) tax payment, as

well as in exchange for future services provided by the debtor to the monastery (Markiewicz

2009). Morimoto (1981, p. 118) mentions that Coptic taxpayers often took refuge in monasteries

in order to avoid paying the poll tax.[23] The sites on the route of the Holy Family, on their part,

were pilgrimage destinations and a possible source of transfers for local Copts.[24]

But are the proxies exogenous once I control for the initial spatial variation in mean

income? First, it is perhaps reasonable to argue that each of the historical proxies should affect

the socioeconomic status for both Copts and Muslims (and the Coptic-Muslim socioeconomic

gap) in the nineteenth century through only conversion to Islam (or Coptic population share) (i.e.

that they satisfy the exclusion restriction). Second, they are all driven by exogenous factors that

are presumably uncorrelated with socioeconomic outcomes for Copts and Muslims (controlling

for initial spatial variation in mean income). Tax revolts and the destination of Arab tribes were

both motivated by exogenous factors: strict enforcement and distance from the Arab peninsula

---

[22] Monasteries played a similar role in the Byzantine period. Bagnall (1996, p. 316) mentions that priests in the fourth century assumed the leadership in villages, and Bowman (1989, pp. 117, 129-30) points out that monasteries provided economic aid and shelter to farmers. This is consistent with the evidence from Cairo Geniza on aids provided by Jewish institutions for the payment of the poll tax in the Ayyubid period (Alshech 2003).
[23] Monks were generally exempt from the poll tax. To control the monastic population, each monk was branded with an iron bracelet on his left hand identifying his name and the monastery he belonged to (Morimoto 1981, p. 118).
[24] I am indebted to Greg Clark for this observation.

respectively.[25] Pre-Islamic Coptic monasteries are measured in 1200 and 1500. Thus, one should be concerned that some may have been constructed, or demolished, in 640-1200, and may thus be affected by the Islamization. There are two reasons, however, to argue that the observed monasteries are pre-Islamic: (a) the construction of new non-Muslim institutions is prohibited under Islamic jurisprudence, and (b) while churches may have been demolished in 640-1200 or 640-1500 due to Islamization, monasteries were more likely to survive because of their larger size and wealth.[26] Although the Coptic traditions that invented the route of the Holy Family emerged in the Roman period, i.e. before Islamic Conquest, I cannot rule out the possibility that the route may have been altered throughout the centuries.

5.2 Results

Do the historical proxies predict the Coptic population share in 1897? The evidence on Coptic tax revolts is suggestive because the revolts are measured at the region-level (N=2). Table 3 shows the sequence of the Coptic tax revolts by year, region, reasons, and parties revolting. Out of the five revolts, four erupted in the Nile Delta, which has lower Coptic population share (2 percent) than the Nile Valley (12 percent) in 1897. Perhaps because of its proximity to the capital, and its consequent receipt of more Arab immigration waves, the Nile Delta witnessed wider Arabization of the fiscal administration and stricter tax enforcement than the Nile Valley, and thus larger conversions among Copts to Islam.[27]

---

[25] The distance from the Arab peninsula was not the sole motive: Arab tribes immigrated more to the further South Nile Valley than to the closer Middle Nile Valley because of their belief of the existence of gold mines over there (Al-Barri 1992).

[26] Archeological evidence may give us further clues in the future as to which of these Coptic monasteries are pre-Islamic. For example, there is an ongoing project of recording current Coptic monasteries, along with their archeological information (Howard Middleton-Jones Coptic Multimedia Database Project 1998).

[27] Besides the enforcement mechanism, the violent suppression of the revolts may have demoralized Copts in the Nile Delta and caused their conversion to Islam. This mechanism was first mentioned by Al-Maqrizi (2002), and is also found in Lane-Poole (1969), Dennett (1950), and Mikhail (2004).

The results on the other three proxies are shown in table 4. Columns 1-4 show the impact of these proxies when each is entered in a separate regression. Districts that received an Arab immigration wave in 640-900 have, on average, lower Coptic population share in 1897 by 3 percentage points. I interpret this coefficient as an indirect effect of Arab immigration, through poll tax enforcement, since the direct (demographic) impact of immigration on Islamization is small (section 2). Districts that have more pre-Islamic monasteries (measured in 1200 or 1500), or that lie on the route of the Holy Family have, on average, higher Coptic population share in 1897, although the coefficient on the route of the Holy Family is marginally significant. Columns 5 and 6 represent the two first stage regressions that are used to predict Coptic population share in equation (2), where all proxies are entered in the same regression. Column 5 shows the results when using pre-Islamic Coptic monasteries as measured in 1200 as a regressor, while column 6 uses monasteries as measured in 1500. All proxies retain their impact in both specifications.

Table 5 shows the second stage regression results: the impact of the instrumented Coptic population share on SSI for both Copts and Muslims and on the Coptic-Muslim SSI difference. I show the results for the full 1848-68 census sample (panel A), as well as for urban and rural Egypt separately (panels B and C). For comparison, the first column of each panel shows the OLS estimates where I use the **raw** Coptic population share as a regressor, while the second and third columns show the 2SLS estimates where I use the predicted Coptic population share from columns 5 and 6 of table 3 respectively. The estimates often lack statistical significance because of: (a) the small number of Copts in the sample (table 2), and (b) the limited variation of the instruments: The instruments only vary at the district-level (only 83 districts, out of 125, are represented in the 1848-68 individual-level census samples).

OLS regressions suggest that Copts have, on average, higher SSI than Muslims in the full sample, urban, and rural Egypt (but the difference is not significant in urban Egypt). For Copts, an increase in Coptic population share is negatively correlated with their SSI in all three panels. Also, an increase in Coptic population share is negatively correlated with SSI for Muslims in the full sample and in urban Egypt, but positively correlated in rural Egypt. Moreover, the Coptic-Muslim SSI difference is negatively correlated with Coptic population share (although the coefficient is not significant in urban Egypt).

The 2SLS regressions show the impact of poll tax enforcement and religiosity on the SSI for Copts and Muslims that operates through conversion to Islam (Coptic population share). As predicted by the hypothesis, the instrumented Coptic population share has a consistently negative impact on the SSI for Copts in the full sample, urban, and rural Egypt. The effect is, however, statistically insignificant except in rural Egypt when using pre-Islamic Coptic monasteries in 1500 in the first stage. Contrary to the predictions of the hypothesis, the effect for Muslims is positive and insignificant in the full sample. Interestingly, however, there is a heterogeneous effect on Muslims across urban and rural Egypt: The impact is positive and highly significant in urban Egypt (thus, contradicting the hypothesis), but is negative, and highly significant when using pre-Islamic Coptic monasteries in 1200, in rural Egypt, as predicted by the hypothesis. Finally, as the hypothesis predicts, the effect on the Coptic-Muslim SSI difference is negative in the full sample, urban, and rural Egypt, except when using pre-Islamic Coptic monasteries in 1200 in the first stage in the full sample. However, again, the effect is insignificant except in rural Egypt when using pre-Islamic Coptic monasteries in 1500 in the first stage. Overall, I interpret the results as supportive of the hypothesis particularly in rural Egypt. Since urban Egypt

witnessed a rapid population growth in the first half of the nineteenth century because of rural immigration, one should expect to find the effects of poll tax enforcement and religiosity more pronounced and persistent in rural Egypt.

5.3 Robustness Checks[28]

The validity of the empirical strategy rests on a number of assumptions given that both the outcome and control variables are measured in the nineteenth century. It is assumed that Copts and Muslims in the nineteenth century are descendants of the pre-Islamic Coptic (Egyptian) population. I thus rule out in- and out-migration within the two communities. This is, however, supported by historical evidence (section 2).

Controlling for the spatial variation in **mean** income using log (population) and male literacy rate in 1897 assumes: (a) that the spatial variation in the mean captures the spatial variation in the whole income distribution, and, (b) that these measures are good proxies for the initial spatial variation in mean income. To address (a), I will use both the mean and **variance** of the SSI at the district-level as controls as a robustness check. To address (b), I will use the distance of the district to the Nile, as a measure of initial mean income, as a control, since districts that were closer to the Nile were, on average, wealthier.

One caveat of the results in the second stage is the small number of Copts in the 1848-68 census samples. To address this concern, I will test the hypothesis using the 1986 and 1996 10-percent census samples as a robustness check. I also assume here that there was little internal migration, at least within rural Egypt, in 900-1848. I address this point in detail in the next section, but as a robustness check, I will re-estimate the regressions excluding villages that emerged only after 1477 (see appendix B). Finally, I assume here that the Coptic monastic

---

[28] In the current version of the paper, I do not have results on these robustness checks.

population in 1897 is small, and that the effect of pre-Islamic Coptic monasteries is operating on the non-monastic population. Given that most of these monasteries still function today, I will exclude, as a robustness check, villages that are named after Coptic monasteries, and are thus (presumably) mostly populated by the monastic population.

6. Persistence of Spatial and Socioeconomic Outcomes

6.1 Spatial Persistence

According to the hypothesis, the effect of poll tax enforcement and religiosity on the spatial variation in Coptic population share should reflect their effect on conversion to Islam. Given that most conversions took place in 640-900 and that the Coptic population share is observed in 1897, the first-stage regression thus implies the persistence of the religious map of Egypt between 900 and 1897. One counter interpretation would be that the observed effect is due to changes in the religious map, because of internal migration, in 900-1897.

There is evidence, however, on the persistence of the religious map of Egypt. A Coptic liturgical text dating back to the eighth to tenth centuries stated that, "*the remaining* [Copts] *in Upper Egypt* [Nile Valley] *who know the Coptic language and speak it are mocked and insulted*,"[29] implying that Coptic population share in 800-1000 was higher in the Nile Valley than in the Delta: the same regional variation that is observed in 1897. The spatial distribution of Coptic churches in 1200 and 1500, as a measure of the pre-nineteenth century spatial variation in Coptic population share, provides us with further evidence. Table 5 shows that the number of Coptic churches in 1200 and 1500, at the district-level, is positively correlated to the spatial variation in Coptic population share in 1897, thus suggesting the persistence of the Egyptian

---

[29] The text is an excerpt from the apocalypse of Samuel, Bishop of the Monastery of Qalamun (Ziadeh 1915-17). The document is undated, but it is suggested that it dates from the eighth to tenth centuries (Papaconstantinou 2007).

religious map in 1200-1897. More importantly, using the number of Coptic churches in 1200 and 1500 as the dependent variable in the first stage regression yields similar results to table 3, suggesting that the impact of poll tax enforcement and initial religiosity on conversion was manifested since at least 1200 and persisted until 1500 and 1897.

But why did the spatial variation of the Coptic population share persist over time? One reason is that the state in Egypt controlled the movement of individuals across districts since antiquity. Morimoto (1981) mentions the problem of fugitives, those who fled their villages in order to avoid paying the poll and land taxes, in the seventh to tenth centuries, and the state measures to control the phenomenon. Mahmoud (2009a, pp .159-60), Cuno (1992, pp. 121-4), and the 1848-68 census samples all show that the fugitives problem persisted in both Ottoman and nineteenth century Egypt. As a way of control, the state issued tickets to individuals showing their original villages (as a form of identification), and village headmen were required to report the fugitives in their villages in order for the state to send them back to their home villages.

6.2 Socioeconomic Persistence

The hypothesis also predicts that the Coptic-Muslim socioeconomic gap must have emerged after conversions took place. Again, given that most conversions took place in 640-900 and that I only observe the socioeconomic gap in 1848-68, the second-stage regression implies the persistence of the gap in 900-1848. Instead, one may explain the observed gap by differential changes in each religious group's socioeconomic distribution in 900-1848, due to, for example, Copt's higher investment in human capital **after** they shrank into a minority.

Both quantitative and qualitative evidence suggest, however, that the Coptic-Muslim socioeconomic gap indeed persisted in 900-1848. Using Mughawiri (2000) and the Arabic

Papyrology Database (APD), I am currently constructing the religious distribution of each occupation mentioned in the APD based on names of practitioners. Table 7 shows preliminary results on three bureaucratic occupations in the APD. Similar to the statistics in the 1848-68 census samples, I find that Copts were over-represented in the bureaucracy in 701-1055.

Coptic domination of the bureaucracy in 900-1848 is also well documented in the historical literature (Tagher 1998; Sheikho 1987; Amer 2000; Samir 1996; Al-Muqaddasi 1877; Al-Maqrizi 2002). Before the Conquest, Copts were, on average, worse off than the two minorities: Melkites (Byzantines) and Jews (see section 2). Melkites, who spoke only Greek (Mikhail 2004, p. 133), the language of the Byzantine bureaucracy, held a privilege in this domain. Copts, on their part, were mostly farmers with a small elite working in the bureaucracy.[30][31] Upon the Conquest, Arabs left the bureaucracy in the hands of the locals (Butler 1996, p. 465). By the end of the seventh century, Copts, favored by Arabs, replaced Melkites in the bureaucracy,[32] which they dominated until the late nineteenth century.[33] Tagher (1998, p. 142) states that, "the condition of the Copt did not change during the six centuries preceding (the nineteenth century)… His work, tax collecting, was the basis of his existence and

---

[30] Unlike Melkites and Jews, Copts were mostly rural. Based on the dataset on churches and monasteries that I constructed from Abul-Makarim (1991), only 2 percent of Christian religious institutions in the twelfth century were Melkite, of which 89 percent were in the Nile Delta and urban centers (Cairo, Alexandria, and the deserted city of Tinnis). This evidence is consistent with Mikhail (2004, p. 134), who states that there is no literary or documentary evidence on Melkite presence in the Nile Valley in the post-Conquest period. The Melkites' situation before the Conquest was not much different: In the early seventh century, there were only 7 Melkite churches in Egypt (Mikhail 2004, p. 48).

[31] Many Copts learned Greek in order to have access to the bureaucracy, and a large part of ancient Coptic literature and theology was composed in Greek (Mikhail 2004, pp. 135-48). The Coptic bilingual elite invented the Coptic script in the third century to express Egyptian phonetics with Greek alphabets (Bagnall 1996, pp. 230-65).

[32] This occurred because of the animosity between Arabs and Melkites (Byzantines), and the latters' consequent increased emigration from Egypt (Lane-Poole 1969, p. 26; Mikhail 2004, pp. 105-6).

[33] Coptic domination of the bureaucracy reached its height under the Fatimids (969-1171), the "Golden Age of Non-Muslims," where Copts, Melkites, Jews, and Armenians, assumed the high-rank, and not only the middle- and low-rank, bureaucracy. Under the Ayyubids and the Mamluks (1171-1517), the state's attempts to Islamize the bureaucracy were not successful.

his only hope to accumulate wealth." In this regard, two similar quotations are striking: Circa 1000, Al-Muaqqadasi (1877, p. 183) noticed that, "scribes in the Levant and Egypt are Christians." A **millennium** later, Lord Cromer, the British Consul of Egypt (1883-1908), observed that, "when the English took Egyptian affairs in hand, the accountants in the employment of the Egyptian government were almost exclusively Copts" (Tagher 1998, p. 213).

But does Coptic domination of the bureaucracy reflect an occupational **premium** over Muslims? It could be, for example, that Muslims dominated other white-collar occupations, which declined, for some reason, in 900-1848. Traditionally, Muslims dominated five white-collar domains: the top state positions, the military, the judiciary, the police, and the *ulama* (Muslim clergy). Since the nineteenth century was a century of unprecedented state-led modernization, there is no reason to believe that the relative size of these occupations was smaller in 1848 than in 900. Moreover, starting from Al-Mu'tasim's reign (833-42), officers' ranks in the army were taken by Turks, i.e. non-Egyptian Muslims (Morimoto 1981, p. 160). In fact, the hostility that Muslims expressed towards the dominance of Copts over the bureaucracy perhaps indicates that it was not compensated for by other white-collar venues.[34]

I explain the persistence of the Coptic-Muslim socioeconomic gap in 900-1848, which is mostly attributable to the Coptic domination of the bureaucracy, by four interconnected mechanisms. First, the barriers to entry set up by the practitioners of each occupation allowed Copts to preserve the know-how of the bureaucracy within their community. The hereditary

---

[34] Some Muslim jurists in the fourteenth century propagated for prohibiting non-Muslims from working in the bureaucracy (e.g. Ibn-Al-Naqqash's *Reprehensibility of Hiring Ahl-Al-Dhimma* (Christians and Jews), and Ibn-Al-Durayhim's *The Right Way to Explain the Ugliness of Hiring the People of the Book* (Christians and Jews)) (Tagher 1998, p. 36). A tenth century Muslim poet, Al-Hassan Ibn-Bishr Al-Dimashqi, mocked three Christian top state officials in Egypt at the time: "*Convert to Christianity for Christianity is the true religion! This is evidenced by our era! Believe in three who achieved lordliness and glory! Do not believe in others who are idle! The Father is Jacob the minister, Aziz is the Son, and the Holy Spirit is Fadl,*" (Sheikho 1987, p. 20).

transmission of occupations was the norm in the pre-modern period. Tagher (1998, pp. 212-3) and Samir (1996) describe the barriers to entry set up by Copts in order to maintain their monopoly of administrative jobs. Copts used the difficult fraction system "with ambiguous abbreviations" in accounting.[35] In the words of Lord Cromer, the Coptic accounting system was "archaic" and "incomprehensible to anyone but themselves," and Copts resisted all attempts at reform or simplification of the system (Tagher 1998, p. 213). Dor Bey, the Swiss inspector of education in nineteenth century Egypt, argued that, "the Coptic children have acquired a skill in arithmetic through practical exercises when accompanying their fathers to government offices, sitting by their side or at their feet, and beginning to practice those methods. Later, they entered the government service, [initially] without pay," (Tagher 1998, p. 213). Lev makes a similar observation on the Fatimid period (969-1171) (Samir 1998, p. 190).[36]

Second, education in 900-1848 was religiously segregated and thus did not serve as an upward mobility device for Muslims in order to reduce religious occupational segregation. Religious institutions were the sole providers of education (Heyworth-Dunne 1938, pp. 2-7, 84-92). Despite the dominant religious character of schooling in this period, there were important

---

[35] Duke d'Harcourt in nineteenth century Egypt mentioned that Copts' "unique calculating genius made them use figures according to methods that they had learned since childhood, making very complex calculations based on 1/24, 1/3, 1/4, 1/2, 1/24 out of 1/24. It is difficult for us to follow their method of calculation because they conduct it with great speed, using certain ambiguous abbreviations, which are recorded on paper. Undoubtedly we can reach the accurate solution faster than they do by using the methods of calculation followed in Europe. But because their methods are based on measurements in use in the country and because they do not use the decimal fraction system, their speed in calculations exceeds ours. Due to these complex methods of calculation known to them alone, the Arabs [Muslims] have become dependent on them. Although the Copts have had to acknowledge the supremacy of the Europeans, they continue to have the upper hand in the eyes of the Muslim nationals," (Tagher 1998, p. 212).

[36] Lev argues that "the persistence of Coptic administrative personnel" under the Fatimids (969-1171) was because "the agrarian administration was very complex and not easily mastered. In it the Copts played an important role at the local level as well as at the central offices in the capital… The administrative knowledge was passed on by the officials in their families when fathers employed their sons, thus maintaining the hold of the family over posts." Interestingly, Lev seems to endorse the idea of selected conversion of Copts to Islam, as he mentions that, "the large number of Christians in the administration also reflected the partial Islamization of Egypt. It was a situation that prevailed prior to the Fatimid rule and did not change under the Fatimids," (Samir 1998, p. 190).

differences between Coptic and Muslim schools. Coptic schools taught arithmetic and geometry besides religious subjects, perhaps to prepare the students for their future careers in the bureaucracy, a preparation that was later supplemented by apprenticeship.[37] By contrast, Muslim schools focused only on learning Arabic orthography through memorizing Quran. Moreover, 20 percent of the teachers in Muslim schools in 1848 were blind, and thus unable to teach reading and writing, unlike teachers in Coptic schools. Overall, the Coptic educational system was more inclined towards "useful" knowledge than the Muslim system.[38]

Third, the persistence of Copts, as a religious minority, in the bureaucracy is puzzling given that the political elite were Muslim: Why did not Muslim rulers Islamize the bureaucracy in order to have a loyal bureaucratic apparatus? I argue that rulers found it beneficial in 900-1848 to recruit Copts as scribes, accountants, secretaries, and tax collectors in order to mitigate the principal-agent problem in fiscal administration. In particular, Copts were less likely to collude with Muslim taxpayers, who became the majority since 900.

Finally, limited cross-marriage between Copts and Muslims contributed to preserve the inter-religious occupational segregation structure after it was formed circa 900. Islamic jurisprudence does not allow Coptic males to marry Muslim females, although the opposite is allowed. Since Coptic males possessed the know-how of the bureaucracy, this marital segregation allowed Copts to remain as a closed group. This is consistent with Clark's (2012) explanation of the persistence of the Hindu-Muslim socioeconomic difference in India.

---

[37] Heyworth-Dunne (1938, p. 85) mentions the following passage as the earliest account on Coptic schools written by Sadlier (1693): "... the children were taught religion, good manners, to read and write Arabic *and Coptic...* and were taught geometry and arithmetic because *these two sciences are very useful and necessary on account of the overflowing of the Nile, whereby the limits are lost; so that it becomes necessary for them to measure out their land, and by the benefit of the first of these sciences they compute the yearly increase.*" Italics are mine to identify the words of Sadlier (1693).

[38] See Mokyr (2005) on the concept of useful knowledge.

7. Other Explanations

Historical evidence seems to support my explanation of the Coptic-Muslim socioeconomic gap over alternative hypotheses that were introduced in order to explain the socioeconomic gaps between Protestants and Catholic, Jews and non-Jews, or Muslims and non-Muslims. In his seminal book, Weber (1930) explained Protestants' socioeconomic premium over Catholics by their stronger work ethic. There is no evidence, however, that the Coptic culture is different from the Egyptian Muslim culture, and, in fact, both cultures are mystical in nature. Issawi (1981) and Kuran (2004) postulated that the socioeconomic gap between non-Muslim minorities and Muslims in the Middle East did not exist before the nineteenth century, and that the currently observed gap is thus explained by the rise of modern European influence in the Middle East that favored local non-Muslims (Issawi 1981), or to the latters' adoption of European legal structures (Kuran 2004). I showed in section 6.2, however, that the Coptic-Muslim socioeconomic gap emerged as early as 900. Following Kuznets' (1960) explanation of Jews' superior socioeconomic outcomes, one may argue that Copts, as a minority, attempted to preserve their religious identity by specializing in administrative occupations in which they had built a tradition. Although this may be appealing in explaining the persistence of Coptic domination of administrative jobs **after** they became a minority, it does not explain how Copts, who initially constituted almost the entire population, made the occupational transition. The Jewish socioeconomic premium is also often explained by Jews' ban from specific occupations such as farming (Abrahams 1896, pp. 211-50). Yet, Copts were not banned from farming and, unlike Jews, were not an urban population. In 1848-68, 33 percent of adult active male Copts were farmers. Finally, Botticinni and Eckstein (2002 and 2005) both argued that the literacy

requirement under Rabbinic Judaism led, via positive selection, to Jew's higher human capital. Yet, no literacy requirement existed under Coptic Christianity, and illiteracy among adult male Copts was as high as 34 percent in 1986.

Historical evidence also allows me to rule out alternative hypotheses that are specific to the Coptic-Muslim socioeconomic gap. For example, one may argue that Arab immigrants, who may have had different initial socioeconomic outcomes, grew at a faster rate than Copts in 640-1848. This could serve as an alternative to the conversion of Copts to Islam mechanism. However, the 1848 and 1868 census samples show that Copts in both urban and rural Egypt had significantly higher fertility (measured by number of children residing with the household's head) than Muslims. Second, since Copts were banned from specific white-collar domains (top state officials, the military, the police, and the judiciary), one may hypothesize that Copts converted to Islam in order to access these domains. However, this hypothesis does not explain the observed **positive** Coptic-Muslim socioeconomic gap. Also, banning Muslims from Coptic-dominated occupations such as making, selling, or serving alcohol cannot explain the phenomenon, because the share of such occupations was very small. Finally, one could argue that large Coptic landholders may have preferred to remain Copts in order to avoid the Islamic inheritance laws that would fragment their landholdings among their heirs. However, the observed Coptic-Muslim socioeconomic gap is not attributable to the existence of large Coptic landholding elite, but rather to the large Coptic bureaucracy.

8. Conclusion

Drawing on both quantitative and qualitative evidence, I traced the origins of the superior economic status of non-Muslim minorities in Egypt to the Islamic Conquest and the subsequent

imposition of the Islamic poll tax in 640. The tax, which remained in effect until 1855, led to the conversion of poor Copts to Islam to avoid paying the tax, and the shrinking of Copts to a better off minority. State controls on internal migration and the barriers to entry into occupations, which reduced both spatial and occupational mobility, perpetuated the socioeconomic gap between Copts and Muslims. My quantitative work showed that the spatial variation in the enforcement of the poll tax, as proxied by the eighth century Coptic tax revolts and by the Arab immigration waves in the seventh to ninth centuries, and in attachment to Christianity, as proxied by pre-Islamic Coptic monasteries and the route of the Holy Family, explains the spatial variation in the Coptic population share in 1897. The instrumented Coptic population share, in turn, is found to have a negative impact on the socioeconomic status of both Copts and Muslims and on the Coptic-Muslim socioeconomic gap, particularly in rural Egypt.

The main contribution of the paper is in endogenizing religion: A fiscal institution, the poll tax, which was exported by a military conquest, is used as an exogenous factor to explain the observed correlation between religion and socioeconomic success, because it created an economic incentive to self-select across religions. The findings raise new, and perhaps more challenging, questions: Did the Islamic poll tax institution that operated in other countries in the Middle East, and the European parts of the Ottoman Empire, produce similar inter-religious socioeconomic gaps? Can we explain the Christian-Muslim socioeconomic gaps that are observed in Lebanon and Syria for example by the poll tax? Why did Christianity survive, in varying degrees, in Egypt, Lebanon, Syria, and Iraq, but was completely wiped out from North Africa? Can this be explained by cross-country variation in the Islamic poll tax institution or is it due to other factors? There are new data sources that may shed light on these questions: The tax

registers (*Tahrir Defterleri*) from sixteenth century Ottoman Syria, Palestine, and Transjordan (Hütteroth and Abdulfattah 1977) include information on poll tax amount and religious composition at the village-level. Also, the recently discovered 1528 cadastral survey from Ottoman Egypt described in Mahmoud (2009b) includes similar information. These sources can be combined with the Ottoman (non-digitized) individual-level censuses from Lebanon, Syria, and Palestine in 1881-92 (Karpat 1978) and the 1848-68 Egyptian census samples. Overall, these data sources may deepen our understanding of the historical process of Islamization of the Middle East, and of the role of institutions in shaping religious and socioeconomic outcomes.

References

Abrahams, I. (1896), *Jewish Life in the Middle Ages*, New York: Macmillan Company.

Abul-Fadl Saleh (1999), *Masa'il al-imam Ahmed Ibn-Hanbal* (Arguments of Al-Imam Ahmed Ibn-Hanbal), Al-Riyadh: Dar Al-Watan.

Abul-Makarim (1999), *Churches and Monasteries of Egypt*, Two Volumes, Anba-Samuel (Ed.), Cairo: Dar Al-Na'aam.

Abu-Youssef (1979), *Kitab al-kharaj* (The Book of Land Tax), Beirut: Dar Al-Ma'rifa.

Acemoglu, D., D. Cantoni, S. Johnson, and J. Robinson (2012), "The Consequences of Radical Reform: The French Revolution," *American Economic Review*. Vol. 101, pp. 3286–3307.

Acemoglu, D., S. Johnson, and J. Robinson (2001), "The Colonial Origins of Economic Development: An Empirical Investigation," *American Economic Review*, Vol. 91, pp. 1369-1401.

Acemoglu, D. and J. Robinson (2008), "Persistence of Power, Elites, and Institutions," *American Economic Review*, 98:1, pp. 267–293.

Al-Baji (1999), *Al-muntaqa: sharh muwatta' Malik* (The Chosen: Interpreting Malik's Muwatta'), M. Atta (Ed.), Volumes 3 and 4, Beirut: Dar Al-Kutub Al-'Ilmiya.

Al-Barri, A. (1992), *Al-qaba'il al-'arabiya fi misr fil qoroun al-thalatha al-oula lil hijra* (Arab Tribes in Egypt in the First Three Hijri Centuries), Cairo: Egyptian General Book Authority.

Al-Maqrizi (2002), *Al-mawa'iz wal i'tibar fi zhikr al-khitat wal athar* (Lessons in Examining the Plans and Monuments), Four Volumes, A. F. Sayyid (Ed.), London: Al-Furqan Islamic Heritage Foundation.

Al-Muqqadasi (1877), *Ahsan al-taqaseem fi ma'rifat al-aqaleem* (The Best of Compositions in the Knowledge of Regions), Leiden: Brill Publishing.

Al-Qadi Al-Nu'man (1963), *Da'aim Al-Islam* (Foundations of Islam), Vol. 1, A. Faydy (Ed.), Cairo: Dar Al-Ma'arif.

Alshech, E. (2003), "Islamic Law, Practice, and Legal Doctrine: Exempting the Poor from the Jizya under the Ayyubids (1171-1250)," *Islamic Law and Society*, Vol. 10(3), pp. 348-375.

Al-Shafi'i (2001), *Al-umm* (The Comprehensive), Vol. 5, R. Abdel-Muttalib (Ed.), al-Mansoura: Dar Al-Wafa'.

Amer, F. (2000), *Tarikh ahl-al-dhimma fi misr al-islamiyya min al-fath al-araby ila nihayat al-'asr al-fatemy* (History of Christians and Jews in Islamic Egypt from the Arab Conquest to the End of the Fatimid Era), Two volumes, Cairo: Egyptian General Book Authority.

Anba-Bishoy, P. (1999), *The Flight of the Holy Family to Egypt*, Cairo: Nubar Printing House.

Ashtor, E. (1969), *Histoire des Prix et des Salaires dans l'Orient Médiéval*, Paris: Ecole Pratique des Hautes Etudes.

Atiya, A. S. (2005), *Tarikh al-massihiya al-sharqiya (History of Eastern Christianity)*, Ishaq Ebeid (Tr.), Cairo: Supreme Council of Culture.

Bagnall, R. (1996), *Egypt in Late Antiquity*, Princeton: Princeton University Press.

Barro, R. J. and R. M. McCleary (2003), "Religion and Economic Growth across Countries," *American Sociological Review*, Vol. 68(5), pp. 760-781.

_____ (2005), "Which Countries Have State Religions?" *Quarterly Journal of Economics*, Vol. 120(4), pp. 1331-1370.

Becker, C. (1903), *Beitraege zur Geschichte Aegyptens unter dem Islam*, Vol. 2, Strassburg: Verlag Von Karl J. Trübner.

Becker, S. O. and L. Woessmann (2007), "Was Weber Wrong? A Human Capital Theory of Protestant Economic History," *CESifo Working Paper No. 1987 and IZA Discussion Paper No. 2886.*

Boppart, T., J. Falkinger, V. Grossmann, and U. Woitek (2008), "Qualifying Religion: The Role of Plural Identities for Educational Production," *Institute for Empirical Research in Economics University of Zurich Working Paper No. 360 and CESifo Working Paper No. 2283.*

Borooah, V. K. and S. I. (2005), "Vidya, Veda, and Varna: The Influence of Religion and Caste on Education in Rural India," *Journal of Development Studies*, Vol. 41(8), pp. 1369- 1404.

Botticini, M. and Z. Eckstein (2005), "Jewish Occupational Selection: Education, Restrictions, or Minorities?" *Journal of Economic History*, Vol. 65(4), pp. 922-48.

_____ (2002), "From Farmers to Merchants: A Human Capital Interpretation of Jewish Economic History," *IZA Discussion Paper No. 670*.

Bowman, A. (1989), *Egypt after the Pharaohs: 332 BC- 642 AD From Alexander to the Arab Conquest*, Berkeley: California University Press.

Bulliet, R. (1979), *Conversion to Islam in the Medieval Period: An Essay in Quantitative History*, Cambridge: Harvard University Press.
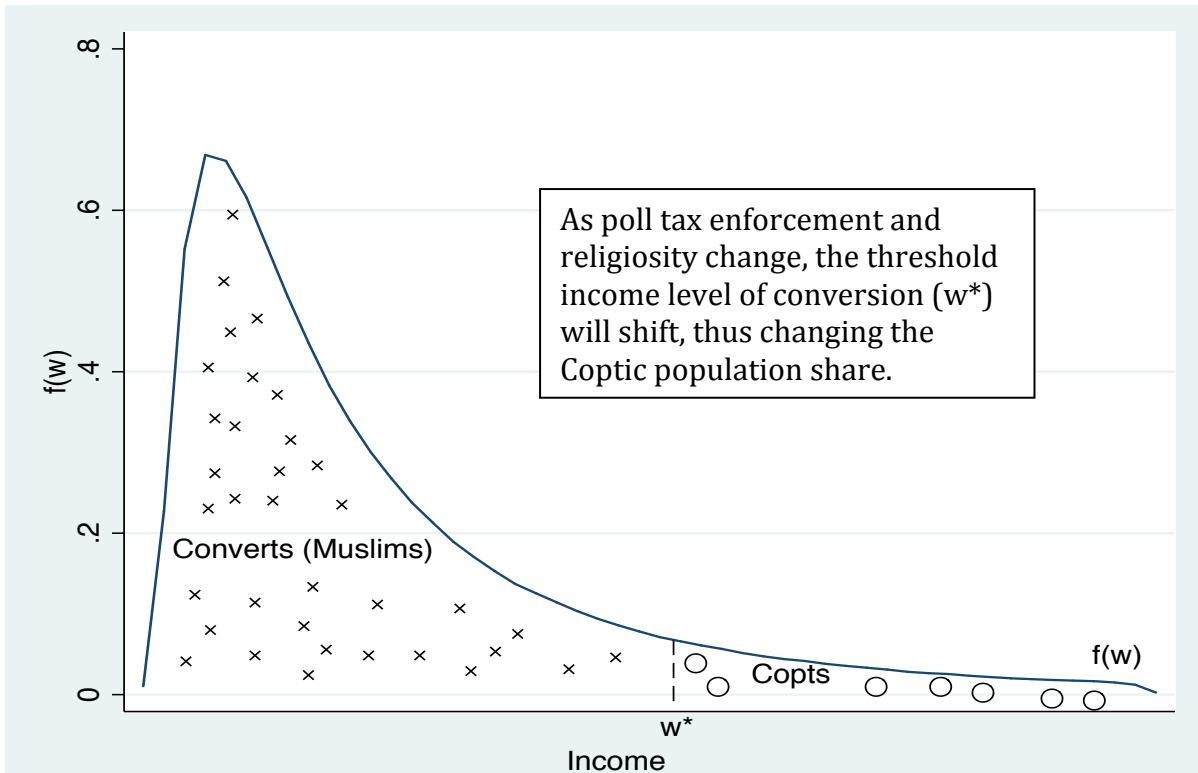
Butler, A. G. (1996), *Fath al-arab li misr* (Arab Conquest of Egypt), M. Abu-Hadid (Tr.), Cairo: Madbuli Library.

Chaudhary, L. and J. Rubin (2009), "Reading, Writing, and Religion: Explaining Hindu and Muslim Literacy Differences in Colonial India," *Unpublished Manuscript*.

Clark, G., N. Cummins, M. Hao, and Z. Landes (2012), "Surnames and the Laws of Social Mobility," *Working paper*.

Courbage, Youssef and Philippe Fargues (1997), *Christians and Jews under Islam*, J. Mabro (Tr.), London- New York: I. B. Tauris Publishers.

Cuno, K. (1992), *The Pasha's Peasants: Land, Society, and Economy in Lower Egypt 1740-1858*, Cambridge: Cambridge University Press.

Dennett, D. (1950), *Conversion and the Poll Tax in Early Islam*, Cambridge, MA.

El-Leithy, T. (2005), *Coptic Culture and Conversion in Medieval Cairo 1293-1524 AD*, PhD Dissertation in History, Princeton University.

Frantz-Murphy, G. (1999), "Land Tenure in Egypt in the First Five Centuries of Islamic Rule (Seventh-Twelfth Centuries AD)," in *Agriculture in Egypt from Pharaonic to Modern Times*, A. Bowman and E. Rogan (Eds.), Oxford: Oxford University Press, pp. 237-66.

Gabra. G. (2001), *Be Thou There: The Holy Family's Journey in Egypt*, Cairo: American University in Cairo Press.

Goitein, S. D. (1963), "Evidence on the Muslim Poll Tax from Non-Muslim Sources: A Geniza Study," *Journal of the Economic and Social History of the Orient*, Vol. 6(3), pp. 278-95.

Hamilton, A. (2006), *The Copts and the West 1439-1822*, Oxford: Oxford University Press.

Heyworth-Dunne, J. (1938), *An Introduction to the History of Education in Modern Egypt*, UK: Luzac & Co.

Hütteroth, W. and K. Abdulfattah (1977), *Historical Geography of Palestine, Transjordan and Southern Syria in the Late 16th Century*, Erlangen: Selbstverlag der Fränkischen Geographischen Gesellschaft.

Ibn-Abdel-Hakam (1974), *Futuhat misr wa akhbaruha* (Conquest of Egypt and its History), M. Sabeeh (Ed.), Cairo: Mu'assasat Dar Al-Ta'awun.

Ibn-Al-Gy'aan (1898), *Al-tuhfa al-sanneya bi asmaa' al-bilad al-misriya* (The Treasure Book of Names of Egyptian Localities), Cairo: Al-Matba'a Al-Ahliya.

Ismail, A. (1998), *Al-nuzum al-maliya fi misr wal sham zaman salateen al-mamaleek* (Fiscal Systems in Egypt and the Levant under the Mamluk Sultans), Cairo: Egyptian General Book Authority.

Issawi, Charles (1981), "The Transformation of the Position of the Millets in the Nineteenth Century," In *The Arab World's Legacy* by Charles Issawi, Princeton: The Darwin Press.

John of Nikiu (1916), *The Chronicle of John Bishop of Nikiu*, R. H. Charles (Tr.), London: Williams & Norgate.

Karpat, K. H. (1978), "Ottoman Population Records and the Census of 1881/82- 1893," *International Journal of Middle East Studies*, Vol. 9, pp. 237-274.

Kuran, T. (2004), "The Economic Ascent of the Middle East's Religious Minorities: The Role of Islamic Legal Pluralism," *Journal of Legal Studies*, Vol. 33, pp. 475-515.

Kuznets, S. (1960), "Economic Structure and Life of the Jews," In *The Jews: Their History, Culture, and Religion*, L. Finkelstein (Ed.), pp. 1597-1666. Philadelphia: Jewish Publication Society of America.

Lane-Poole, S. (1969), *A History of Egypt in the Middle Ages*, New York: Haskell House Publishers.

Little, D. (1976), "Coptic Conversion to Islam under the Bahri Mamluks 692-755/1293-1354," *Bulletin of the School of Oriental and African Studies*, Vol. 39(3), pp. 552-569.

Mahmoud, A. (2009a), *Al-jizya fi misr 1713-1856* (The Poll Tax in Egypt 1713-1856), Cairo: Supreme Council of Culture.

Mahmoud, A. (2009b), "Dafatir tarabee' al-misaha (Cadastral Registers)," in *Abhath nadwat khamsun 'aman 'ala insha' dar al-wathai'q al-qawmiya* (Proceedings of the Seminar on Fifty Years since the Establishment of the National Archives of Egypt), R. Hilal et al. (Eds.), Cairo: National Archives and Library of Egypt.

Malik (1985), *Al-Muwatta'*, M. Abdel-Baqi (Ed.), Cairo: Al-Halabi.

Markiewicz, T. (2009), "The Church, Clerics, Monks and Credit in the Papyri," in *Monastic Estates in Late Antiquity and Early Islamic Egypt: Ostraca, Papyri, and Essays in Memory of Sarah Clackson*, A. Boud'hors et al. (Eds.), Cincinnati: The American Society of Papyrologists, pp. 178-204.

Mikhail, M. (2004), *Egypt from Late Antiquity to Early Islam: Copts, Melkites, and Muslims Shaping a New Society*, PhD Dissertation in History, UCLA.

Mokyr, J. (2005), "The Intellectual Origins of Modern Economic Growth," *Journal of Economic History*, Vol. 65(2), pp. 285-351.

Morimoto, K. (1981), *The Fiscal Administration of Egypt in the Early Islamic Period*, Dohosha.

Mughawiri, S. (2000), *Al-alqab wa asma' al-hiraf wal-waza'if fi daw' al-bardiyat al-arabiya* (Titles and Names of Crafts and Jobs in the Light of Arabic Papyri), Three Volumes, Cairo: National Library Press.

Papaconstantinou, A. (2007), "They Shall Speak the Arabic Language and Take Pride in it: Reconsidering the Fate of Coptic after the Arab Conquest," *Le Muséon*, Vol. 120 (3-4), pp. 273-99.

Ramzi, M. (1994), *Al-qamus al-gughrafy lil bilad al-misriya min 'ahd qudama' al-misriyeen ila sanat 1945* (Geographic Dictionary of Egyptian Localities from the Time of Ancient Egyptians Until 1945), Five Volumes, Cairo: Egyptian General Book Authority.

Richter, T. S. (2009), "The Cultivation of Monastic Estates in Late Antique and Early Islamic Egypt: Some Evidence from Coptic Land Leases and Related Documents," in *Monastic Estates*
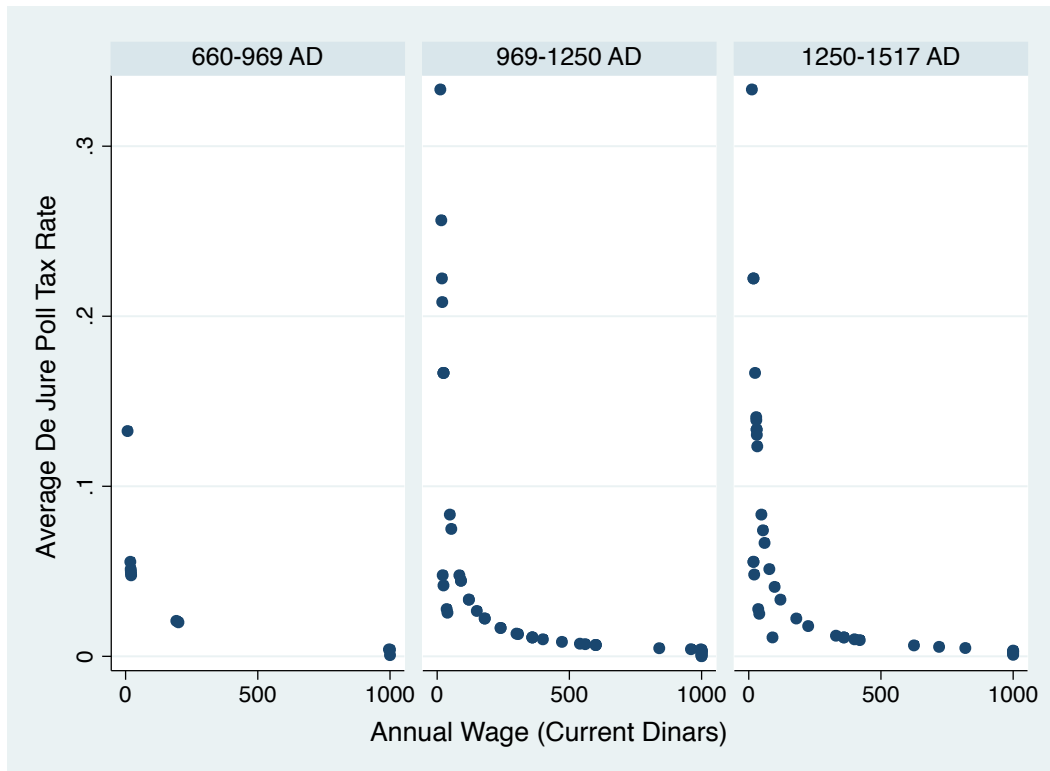
in Late Antiquity and Early Islamic Egypt: Ostraca, Papyri, and Essays in Memory of Sarah Clackson, A. Boud'hors et al. (Eds.), Cincinnati: The American Society of Papyrologists, pp. 205-12.

Roberts, C. (1979), *Manuscript, Society, and Belief in Early Christian Egypt*, Oxford: Oxford University Press.

Russell, J. C. (1958), *Late Ancient and Medieval Population*, Philadelphia: The American Philosophical Society.

Saleh, M. (2011a), "A Pre-Colonial Population Brought to Light: Digitization of the Nineteenth Century Egyptian Censuses," Forthcoming in *Historical Methods*.

Saleh, M. (2011b), "The Reluctant Transformation: Modernization, Religion, and Human Capital in Nineteenth Century Egypt," *Working Paper*.

Saleh, M. (2011c), "From *Kuttabs* to Schools: Educational Modernization, Religion, and Human Capital in Twentieth Century Egypt," *Working Paper*.

Samir, S. K. (1996), "The Role of Christians in the Fatimid Government Services of Egypt to the Reign of Al-Hafiz," *Medieval Encounters*, Vol. 2(3), pp. 177- 99.

Severus (1907), *History of the Patriarchs of the Coptic Church of Alexandria*, Four Volumes, B. Evetts (Tr.), In *Patrologia Orientalis* (Volumes I, V, and X).

Sheikho, L. (1987), *Wuzara' al-nusraneya wa kuttabuha fil islam 622-1517* (Christian Ministers and Scribes in Islamic History 622-1517), K. Al-Yasu'yi (Ed.), Beirut: Al-Maktaba Al-Paulisiyca.

Sijpesteijn, P. (2009), "Landholding Patterns in Early Islamic Egypt," *Journal of Agrarian Change*, Vol. 9(1), pp. 120–133.

Tagher, Jacques (1998), *Christians in Muslim Egypt: A Historical Study of the Relations between Copts and Muslims from 640 to 1922*, Oros Verlage, Altenberge.

Tousson, O. (1926), *La Géographie de l'Egypte à l'Epoque Arabe*, Volumes 1 and 2, Cairo: L'Institut Français de l'Archéologie Orientale.

Wellhausen, J. (1927), *The Arab Kingdom and its Fall*, M. G. Weir (Tr.), Calcutta: University of Calcutta.

Weber, M. (1930), *The Protestant Ethic and the Spirit of Capitalism*, T. Parsons (Tr.), New York: Charles Scribner's Sons, London: George Allen & Unwin Lmtd.

Werthmuller, K. (2010), *Coptic Identity and Ayyubid Politics in Egypt 1218-1250*, Cairo: American University in Cairo Press.

Wiet, G. (1927), "Kibt," in *The Encyclopædia of Islam: A Dictionary of the Geography, Ethnography and Biography of the Muhammadan Peoples,* Vol. 2, M. Houtsma, A. Wensinck, and T. Arnold (Eds.), Leiden: Late E.J. Brill and London: Luzac.

Wilfong, T. (1998), "The Non- Muslim Communities: Christian Communities", in *The Cambridge History of Egypt*, Vol. 1, C. F. Petry (Ed.), Cambridge: Cambridge University Press.

Ziadeh (1915-17), "L'Apocalypse de Samuel, Supérieur de Deir-el-Qalamoun," in *Revue de L'Orient Chrétien*, Vol. 20, pp. 374-407.

Figure 1: Income Distribution, Poll Tax Enforcement, Attachment to Coptic Christianity, and Conversion to Islam

As poll tax enforcement and religiosity change, the threshold income level of conversion (w*) will shift, thus changing the Coptic population share.

Converts (Muslims)

Copts

f(w)

w*

Income

Figure 2: Was the De Jure Poll Tax Regressive?

Wage is defined as the average annual wage across the practitioners of each occupational title mentioned in Ashtor (1969) in the specified time period. Each occupational title is classified into one of the three de jure poll tax brackets according to the criteria in Abu-Youssef (1979, pp. 122-4), in order to assign the annual poll tax amount. Average de jure poll tax rate is the annual de jure poll tax amount divided by the annual wage, both measured in current dinars.

Figure 3: SSI Distribution by Religious Group
(1848 and 1868 Pooled Census Samples)
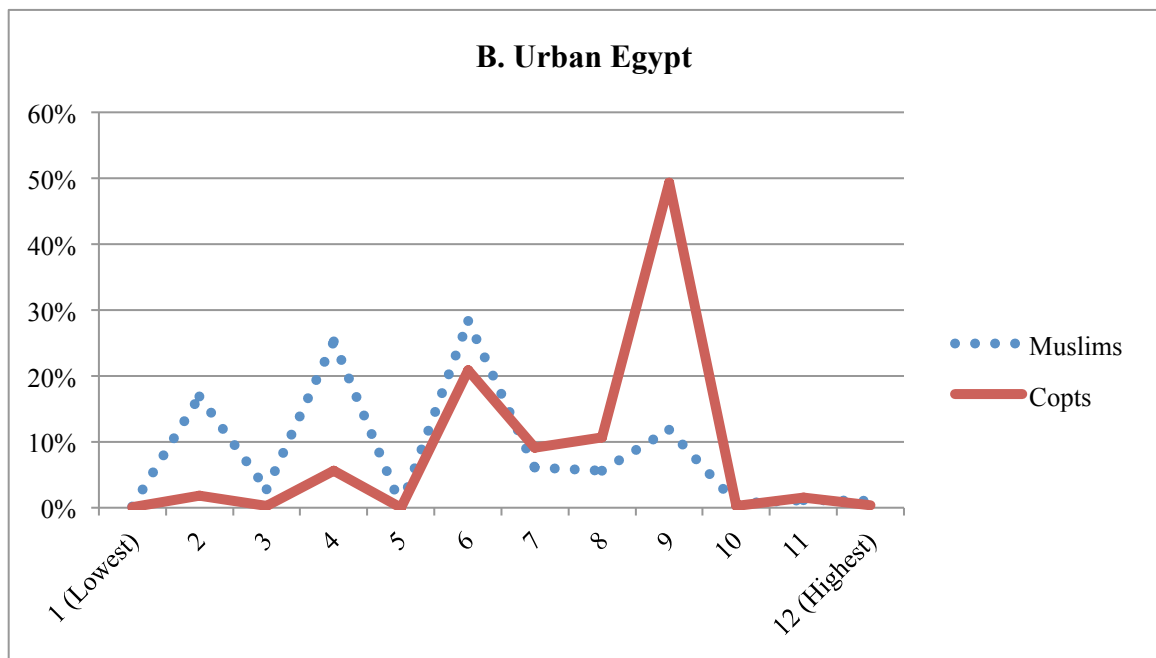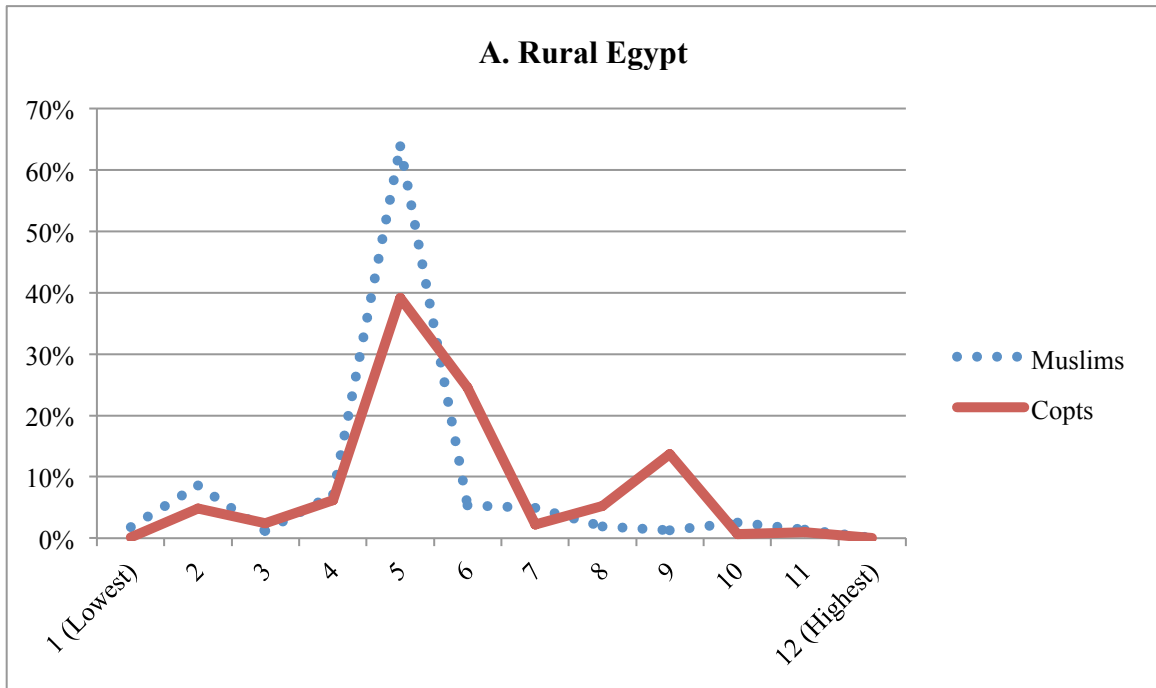
A. Rural Egypt

B. Urban Egypt

Sample is restricted to Egyptian Coptic and Muslim active males who are at least 15 years old. See Data Appendix of Saleh (2012b) for information on the construction of SSI.

Table 1: Was the De Facto Poll Tax Regressive?
(Dependent Variable: Poll Tax Amount)

	(1)	(2)
Land tax amount	-0.077**	-0.015
	(0.009)	(0.036)
Constant	1.232***	1.119***
	(0.488)	(0.067)
Sub-district fixed effects?	N	Y
Adjusted R-Squared	0.019	0.309
N	281	281

Clustered standard errors at the sub-district level are in parentheses. Data come from the papyri tax registers of three sub-districts in the pagarchy of Aphrodito (Morimoto 1981, pp. 67-79).

Table 2: Descriptive Statistics

	1848/68	1897
Social Status Index (Min = 1, Max = 12)	Mean (SD)	
Urban Provinces		
Muslims (N = 20,891)	5.34 (2.32)	-
Copts (N = 758)	7.61 (1.82)	-
Rural Provinces		
Muslims (N = 11,248)	5.05 (1.72)	-
Copts (N = 898)	5.85 (1.85)	-
National Religious Distribution		
% Muslims	91%	92%
% Copts	6%	6%
% Other Non-Muslims	1%	2%
% Unspecified Religion	2%	0%
% Copts (Out of the Region's Population) by Region		
Urban Provinces	3%	3%
Nile Delta	2%	2%
Northern Nile Valley	4%	5%
Middle Nile Valley	18%	19%
Southern Nile Valley	3%	6%
Regional Distribution of Copts		
Urban Provinces	9%	6%
Nile Delta	13%	15%
Northern Nile Valley	10%	8%
Middle Nile Valley	65%	62%
Southern Nile Valley	3%	10%

Statistics in the first column are computed from the 1848 and 1868 pooled individual-level census samples, which are restricted to Egyptian Coptic and Muslim active males who are at least 15 years old. Sampling weights are used to account for different sampling rates across urban and rural provinces when computing national-level statistics. Statistics in the second column are computed from the 1897 village/urban quarter -level census. See Saleh (2011a) for details on the 1848-68 census sampling methodology, Saleh (2011b) for details on the construction of the Social Status Index, and Saleh (2011c) for details on the 1897 census data.

Table 3: Coptic Tax Revolts in the Eighth Century

Year	Region	Reason(s) Cited	Parties Revolting
726	Nile Delta	Tightening state control over the tax system	Copts
740	Nile Valley	Higher tax enforcement, collecting poll tax from fugitives, higher tax rate, uniform tax regardless of income	Copts
750	Nile Delta	Heavy taxation and general suffering	Copts; Arabs also revolted to overthrow the Umayyads
753	Nile Delta	Reorganizing the tax system under the Abbasids and heavy taxation	Copts
768	Nile Delta	Abbasids' fiscal reforms	Copts

References: Morimoto (1981, pp. 145-72) and Mikhail (2004, pp. 195-211)

Table 4: Historical Origins of Coptic Spatial Distribution in 1897
(First Stage Least Squares- Dependent Variable: Coptic Population Share in 1897)

Historical Proxy	(1)	(2)	(3)	(4)	(5)	(6)
Arab immigration in 640-900 dummy	-0.032*** (0.014)	-	-	-	-0.042*** (0.014)	-0.039*** (0.014)
Pre-Islamic Coptic monasteries (1200)	-	0.006** (0.003)	-	-	0.006** (0.003)	-
Pre-Islamic Coptic monasteries (1500)	-	-	0.012** (0.005)	-	-	0.011** (0.005)
Route of the Holy Family dummy	-	-	-	0.025 (0.016)	0.035** (0.016)	0.035** (0.016)
Log (population) in 1897	0.010*** (0.003)	0.008*** (0.003)	0.008*** (0.003)	0.008*** (0.003)	0.009*** (0.003)	0.009*** (0.003)
% Males who are able to read and write in 1897	0.012 (0.051)	0.026 (0.051)	0.021 (0.051)	0.027 (0.052)	0.017 (0.050)	0.013 (0.050)
Constant	-0.041 (0.030)	-0.035 (0.030)	-0.036 (0.030)	-0.037 (0.031)	-0.035 (0.029)	-0.037 (0.029)
Adjusted R-squared	0.127	0.121	0.127	0.106	0.182	0.180
N (Districts)	125	125	125	125	125	125

Standard errors are in parentheses. All districts in the 1897 census are included except one district, which is inhabited by only foreigners. Coptic population share in a district is defined as: Coptic population in the district divided by the sum of Coptic and Muslim populations. * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level, and *** indicates significance at the 1 percent level.

Table 5: Coptic Population Share and Socioeconomic Status
(Dependent Variable: SSI in 1848-68)

	Full 1848-68 Census Sample			Urban Egypt in 1848-68			Rural Egypt in 1848-68		
	(1) OLS	(2) 2SLS (A)	(3) 2SLS (B)	(4) OLS	(5) 2SLS (A)	(6) 2SLS (B)	(7) OLS	(8) 2SLS (A)	(9) 2SLS (B)
Copt dummy	3.841***	-0.732	-0.546	2.070	2.476*	3.659	8.285***	3.010	2.581
	(1.115)	(1.003)	(1.027)	(1.497)	(1.453)	(2.363)	(2.582)	(2.603)	(2.522)
Coptic population share (1897)	-0.225	0.152	0.928	-1.092***	5.881***	4.363***	0.520**	-2.112***	-0.861
	(0.142)	(0.652)	(0.569)	(0.231)	(1.948)	(1.442)	(0.209)	(0.599)	(0.589)
Copt dummy * Coptic population share (1897)	-4.227***	1.210	-1.400	-0.433	-13.549	-10.281	-4.789***	-0.994	-6.456***
	(0.482)	(2.411)	(1.891)	(1.488)	(13.536)	(10.291)	(0.643)	(2.345)	(2.003)
Log (population) in 1897	-0.201***	-0.192***	-0.184***	-0.272***	-0.225***	-0.176***	0.212***	0.252***	0.223***
	(0.162)	(0.151)	(0.016)	(0.020)	(0.017)	(0.023)	(0.042)	(0.044)	(0.043)
Copt dummy * Log (population) in 1897	-0.229**	0.116	0.116	0.003	0.073	-0.045	-0.705***	-0.319	-0.280
	(0.093)	(0.086)	(0.085)	(0.142)	(0.010)	(0.141)	(0.224)	(0.230)	(0.221)
Male literacy rate in 1897	1.657***	1.609***	1.614***	2.216***	1.519***	1.634***	-3.570***	-3.892***	-3.718***
	(0.121)	(0.118)	(0.118)	(0.254)	(0.200)	(0.207)	(0.805)	(0.784)	(0.814)
Copt dummy * Male literacy rate in 1897	5.407***	4.201***	4.185***	0.378	-0.964	-1.318	22.600***	24.825***	30.837***
	(0.467)	(0.448)	(0.451)	(1.994)	(0.896)	(1.102)	(3.325)	(3.634)	(3.963)
Constant	7.311***	7.189***	7.049***	8.064***	7.199***	6.725***	2.784***	2.521***	2.760***
	(0.192)	(0.180)	(0.199)	(0.228)	(0.246)	(0.356)	(0.480)	(0.490)	(0.487)
Adjusted R-squared	0.039	0.037	0.037	0.042	0.042	0.042	0.024	0.021	0.021
N (Individuals)	33,795	33,795	33,795	21,649	21,649	21,649	12,146	12,146	12,146

Standard errors are in parentheses. The 1848-68 pooled census sample is restricted to Egyptian Coptic and Muslim active males who are at least 15 years old. 2SLS estimates use the predicted Coptic population share (at the district-level) from the first stage regressions in columns 5 and 6 of table 3, where 2SLS (A) is based on using Pre-Islamic Coptic monasteries (as measured in 1200) among the instruments in the first stage (column 5 of table 3), while 2SLS (B) is based on using Pre-Islamic Coptic monasteries (as measured in 1500) among the instruments in the first stage (column 6 of table 3). Urban Egypt includes three cities: Cairo, Alexandria, and Al-Arish. Rural Egypt includes all the provinces in the Nile Delta and Nile Valley. * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level, and *** indicates significance at the 1 percent level.

Table 6: Persistence of the Spatial Variation in Coptic Population Share in 1200-1897

Pairwise Correlations between Coptic Churches in 1200, Coptic Churches in 1500, and Coptic Population Share in 1897 at the District-Level

	(1) Number of Coptic Churches (1200)	(2) Number of Coptic Churches (1500)	(3) Coptic Population Share (1897)
(1) Number of Coptic Churches (1200)	1.0000		
(2) Number of Coptic Churches (1500)	0.0829	1.0000	
(3) Coptic Population Share (1897)	0.4448	0.4107	1.0000

OLS Regression- Dependent Variable Indicated on Top of Each Column

	(1) Number of Coptic Churches (1200)	(2) Number of Coptic Churches (1200)	(3) Number of Coptic Churches (1500)	(4) Number of Coptic Churches (1500)	(5) Coptic Population Share (1897)	(6) Coptic Population Share (1897)
Arab immigration in 640-900 dummy	-0.278 (2.087)	0.199 (2.249)	-0.686* (0.392)	-0.509 (0.388)	-0.042*** (0.014)	-0.039*** (0.014)
Pre-Islamic Coptic monasteries (1200)	1.925*** (0.441)	-	0.310*** (0.083)	-	0.006** (0.003)	-
Pre-Islamic Coptic monasteries (1500)	-	0.391 (0.843)	-	0.601*** (0.145)	-	0.011** (0.005)
Route of the Holy Family dummy	5.467** (2.427)	6.155** (2.611)	1.590*** (0.456)	1.597*** (0.450)	0.035** (0.016)	0.035** (0.016)
Log (population) in 1897	1.011** (0.390)	1.262*** (0.416)	0.086 (0.073)	0.101*** (0.072)	0.009*** (0.003)	0.009*** (0.003)
% Males who are able to read and write in 1897	2.704 (7.426)	1.987 (7.991)	-0.430 (1.394)	-0.617 (1.378)	0.017 (0.050)	0.013 (0.050)
Constant	-5.452 (4.382)	-6.458 (4.711)	-0.178 (0.823)	-0.229 (0.813)	-0.035 (0.029)	-0.037 (0.029)
Adjusted R-squared	0.269	0.153	0.208	0.226	0.182	0.180
N	125	125	125	125	125	125

Standard errors are in parentheses. All districts in the 1897 census are included except one district, which is inhabited by only foreigners. Coptic population share in a district is defined as: Coptic population in the district divided by the sum of Coptic and Muslim populations. * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level, and *** indicates significance at the 1 percent level.

Table 7: Persistence of Socioeconomic Outcomes (700-1848)

Occupational Title	Percentage of Coptic Names	Number of Observations	Time Period	Percentage of Copts in 1848-68
Tax collector (*Jahbaz*)	83	18	863-1055	50 (N=56)
Scribe (*Katib*)	62	13	640-1000	49 (N=808)
Secretary (*Qistal*)	90	20	701-1044	N/A

Table is based on the Arabic Papyri Database (APD).

APPENDIX A: MODEL

Each Copt living in district j is endowed with income w $(0 < \underline{w} \leq w \leq \overline{w})$ where $w \sim f^j(w)$. Each Copt faces τ_j $(0 < \tau_j \leq T)$, the amount of local poll tax enforcement, and σ_j $(0 < \underline{\sigma} \leq \sigma_j \leq \overline{\sigma})$, the utility loss of conversion to Islam, or the attachment to Coptic Christianity.[39] T is the **de jure** poll tax amount.[40] The initial population mass in a district is all Coptic and is normalized to one: $\int_{\underline{w}}^{\overline{w}} f_j(w)dw = 1$. Each Copt chooses c and R in order to maximize $u(c) - \sigma_j R$ subject to: $c \leq w - \tau_j(1 - R)$, where R equals one if converts to Islam, and zero otherwise. Finally, $u'(.) > 0$ and $u''(.) < 0$. Optimally, a Copt will convert to Islam if $u(w) - \sigma_j \geq u(w - \tau_j)$. Let w_j^* denote the threshold income at which a Copt is just indifferent about conversion to Islam. A Copt's decision to convert to Islam is thus strictly decreasing in both w and σ_j and strictly increasing in τ_j.

RESULT 1: The Coptic population share in a district j is strictly decreasing in τ_j and strictly increasing in σ_j.[41]

PROOF: The Coptic population share in a district j is given by $M_{cj} = \int_{w_j^*}^{\overline{w}} f_j(w)dw = 1 - F_j(w_j^*)$. The threshold value of income w_j^* solves: $x_j(w_j^*; \tau_j, \sigma_j) = u(w_j^*) - \sigma_j - u(w_j^* - \tau_j) = 0$. Then:

---

[39] Alternatively, one can model τ_j as a probability of paying the de jure poll tax amount T. One can show that this does not change the results.

[40] In the extension of the model at the end of appendix A, I allow both poll tax enforcement and religiosity to be individual-level variables that vary with income.

[41] It is also interesting to examine the impact of a change in $f_j(w)$ on Coptic population share. Let $f_j(w) \sim lognormal(\mu_j, v_j)$. One can show that Coptic population share is increasing in μ_j, and, if $w_j^* < \exp(\mu_j) = E(w)$, decreasing in v_j.

$$\frac{\partial M_{cj}}{\partial \tau_j} = -f_j(w_j^*) \times \frac{\partial w_j^*}{\partial \tau_j} = -f_j(w_j^*) \times \frac{-u'(w_j^* - \tau_j)}{u'(w_j^*) - u'(w_j^* - \tau_j)} < 0$$

$$\frac{\partial M_{cj}}{\partial \sigma_j} = -f_j(w_j^*) \times \frac{\partial w_j^*}{\partial \sigma_j} = -f_j(w_j^*) \times \frac{1}{u'(w_j^*) - u'(w_j^* - \tau_j)} > 0$$

Because $u'(.) > 0$ and $u''(.) < 0$.

RESULT 2: The expected income for both Copts and converts (Muslims) is strictly increasing in τ_j and strictly decreasing in σ_j. It follows that it is strictly decreasing in Coptic population share.

PROOF:

$$\frac{\partial}{\partial \tau_j} E(w|Copt) = \frac{\partial}{\partial \tau_j} E(w|w > w_j^*) = \frac{\partial}{\partial \tau_j} \left[\frac{\int_{w_j^*}^{\overline{w}} w f_j(w) dw}{1 - F_j(w_j^*)} \right]$$

$$= \frac{1}{\left(1 - F_j(w_j^*)\right)^2} \left[-w_j^* f_j(w_j^*) \frac{\partial w_j^*}{\partial \tau_j} \left(1 - F_j(w_j^*)\right) + f_j(w_j^*) \frac{\partial w_j^*}{\partial \tau_j} \int_{w_j^*}^{\overline{w}} w f_j(w) dw \right]$$

$$= \frac{f_j(w_j^*) \frac{\partial w_j^*}{\partial \tau_j}}{1 - F_j(w_j^*)} \left[-w_j^* + \frac{\int_{w_j^*}^{\overline{w}} w f_j(w) dw}{1 - F_j(w_j^*)} \right] = \frac{f_j(w_j^*) \frac{\partial w_j^*}{\partial \tau_j}}{1 - F_j(w_j^*)} \left[E(w|w > w_j^*) - w_j^* \right] > 0$$

$$\frac{\partial}{\partial \tau_j} E(w|Muslim) = \frac{\partial}{\partial \tau_j} E(w|w < w_j^*) = \frac{\partial}{\partial \tau_j} \left[\frac{\int_{\underline{w}}^{w_j^*} w f_j(w) dw}{F_j(w_j^*)} \right]$$

$$= \frac{1}{\left(F_j(w_j^*)\right)^2} \left[w_j^* f_j(w_j^*) \frac{\partial w_j^*}{\partial \tau_j} \left(F_j(w_j^*)\right) - f_j(w_j^*) \frac{\partial w_j^*}{\partial \tau_j} \int_{\underline{w}}^{w_j^*} w f_j(w) dw \right]$$

$$= \frac{f_j(w_j^*) \frac{\partial w_j^*}{\partial \tau_j}}{F_j(w_j^*)} \left[w_j^* - \frac{\int_{\underline{w}}^{w_j^*} w f_j(w) dw}{F_j(w_j^*)} \right] = \frac{f_j(w_j^*) \frac{\partial w_j^*}{\partial \tau_j}}{F_j(w_j^*)} \left[w_j^* - E(w|w < w_j^*) \right] > 0$$

The proof of the effect of σ_j is similar.

45

RESULT 3: If $E(w) > w_j^* > Med(w)$, the Coptic-Muslim difference in expected income is strictly increasing in τ_j and strictly decreasing in σ_j. It follows that it is strictly decreasing in Coptic population share. $E(w) > Med(w)$ if f^j is rightly skewed.

PROOF:

$$\frac{\partial}{\partial \tau_j}[E(w|Copt) - E(w|Muslim)] =$$

$$f_j(w_j^*)\frac{\partial w_j^*}{\partial \tau_j}\left[\frac{1}{1-F_j(w_j^*)}\left(E(w|w > w_j^*) - w_j^*\right) - \frac{1}{F_j(w_j^*)}\left(w_j^* - E(w|w < w_j^*)\right)\right] > 0$$

Thus, we need to show that the following inequality holds under specific conditions:

$$\frac{1}{1-F_j(w_j^*)}\left(E(w|w > w_j^*) - w_j^*\right) - \frac{1}{F_j(w_j^*)}\left(w_j^* - E(w|w < w_j^*)\right) > 0 \ldots \ldots \ldots (A)$$

Assuming that $w_j^* > Median(w)$: $1 - F_j(w_j^*) < F_j(w_j^*)$, (A) is implied by:

$$\left(1 - F_j(w_j^*)\right)\left(E(w|w > w_j^*) - w_j^*\right) - F_j(w_j^*)\left(w_j^* - E(w|w < w_j^*)\right) > 0 \ldots \ldots \ldots (B)$$

Because if we multiply (B) by $\left[\frac{1}{F_j(w_j^*)}\right]^2$ we obtain:

$$\frac{1 - F_j(w_j^*)}{\left(F_j(w_j^*)\right)^2}\left(E(w|w > w_j^*) - w_j^*\right) - \frac{1}{F_j(w_j^*)}\left(w_j^* - E(w|w < w_j^*)\right) > 0$$

But notice that because $1 - F_j(w_j^*) < F_j(w_j^*)$ we have:

$$\frac{1 - F_j(w_j^*)}{\left(F_j(w_j^*)\right)^2} > \frac{1}{1 - F_j(w_j^*)}$$

But (B) is equivalent to: $\int_{\underline{w}}^{w_j^*} wf_j(w)dw + \int_{w_j^*}^{\overline{w}} wf_j(w)dw = E(w) > w_j^*$

The proof of the effect of σ_j is similar.

EXTENSION OF BASIC MODEL:

46

Here, I extend the basic model in order to allow both poll tax enforcement and religiosity to be strictly increasing in income. Define the amount of local poll tax enforcement $\tau_j(w) = a + \bar{\tau}_j w$; religiosity $\sigma_j(w) = \bar{\sigma}_j w$; and $u(.) = \log(.)$. Assume that $\bar{\sigma}_j > 0$, $\bar{\tau}_j > 0$, and $a > 0$. Define the locally enforced average poll tax rate: $\theta_j(w) = \frac{\tau_j(w)}{w} = \frac{a}{w} + \bar{\tau}_j$. Notice that:

$\theta_j'(w) = \frac{\tau_j'(w) - \theta_j(w)}{w} = -\frac{a}{w} < 0$. In other words, local poll tax enforcement is regressive (the locally enforced average poll tax rate is decreasing in income). It is straightforward to show that results 1, 2, 3, and 4 will hold with respect to $\bar{\tau}_j$ and $\bar{\sigma}_j$.

PROOF: A Copt will convert to Islam if $x(w; \bar{\tau}_j, \bar{\sigma}_j) = \log(w) - \bar{\sigma}_j w - \log\left((1 - \bar{\tau}_j)w - a\right) \geq 0$. Deriving this function with respect to its arguments:

$$\frac{\partial x}{\partial w} = \frac{1}{w} - \bar{\sigma}_j - \frac{1 - \bar{\tau}_j}{(1 - \bar{\tau}_j)w - a} < 0; \quad \frac{\partial x}{\partial \bar{\tau}_j} = \frac{w}{(1 - \bar{\tau}_j)w - a} > 0; \quad \frac{\partial x}{\partial \bar{\sigma}_j} = -w < 0$$

Define w_j^* as the solution of: $x_j(w_j^*; \bar{\tau}_j, \bar{\sigma}_j) = 0$. It follows that w_j^* is strictly increasing in $\bar{\tau}_j$ and strictly decreasing in $\bar{\sigma}_j$. Hence, RESULTS 2, 3, and 4 hold.

APPENDIX B: DATA APPENDIX

1. <u>Arab Immigration Waves to Egypt in the Seventh to Ninth Centuries</u>: The information is based on Al-Barri's (1992) *Arab Tribes in Egypt in the First Three Hijri Centuries*, which, in turn, draws on Arabic medieval narratives. The author traces, for almost all the immigrating tribes, their destination in Egypt mostly at the *kura*-level, the administrative division that existed in 640-1036. Drawing on Ramzi's (1994) *Geographic Dictionary of Egypt* and Tousson's (1926) *La Géographie de l'Egypte à l'Epoque Arabe*, I matched the *kuras* to the 1897-districts, based on the location of the chef-lieu of each *kura*. No information on the borders of the *kuras* survived, but one can perhaps assume that the average surface area of the *kura* was comparable to that of the 1897 district (*markaz*). This is because: (a) the number of *kuras* in the Nile Delta and Valley in the seventh to ninth centuries (76) (Ramzi 1994, p. 31) was almost the same as the number of rural districts in 1897 (81), and (b) Egypt's inhabited area, the Nile Delta and Valley, hardly changed since ancient times. In a few cases, the destination of the Arab tribe is recorded at the village- or *iqlim* (province)-level. In the first case, I matched the destination to the district that the village belongs to in the 1897 census. In the second case, I matched the destination to the districts in the 1897 census that comprise the *iqlim* using Ramzi (1994).

2. <u>Coptic Churches and Monasteries in 1200 and 1500</u>: I draw on two medieval sources: (1) Abul-Makarim's (1999) *Churches and Monasteries of Egypt* provides a comprehensive list of the Christian religious establishments (Coptic, Melkite, and Armenian), that existed in Egypt at the end of the twelfth century. There are two versions of this book. The first is *The Churches and Monasteries of Egypt and Some Neighboring Countries* that was edited by Evetts and was first published in an English translation from the original Arabic manuscript in 1895 where it was

48

attributed *wrongly* to Abu-Saleh the Armenian. This early version included only the institutions in Nile Valley. Fortunately, in 1999, Anba-Samuel published a two-volume version of the book in both Arabic and English. The first volume included the missing part about the Nile Delta, while the second volume was a re-publication of Evetts' edition on Nile Valley. The book is now believed to belong to the twelfth century Coptic chronicler Abul-Makarim. (2) Al-Maqrizi's (2002) *Lessons in Examining Plans and Monuments* includes a similar list of churches and monasteries (Coptic and Melkite) in the fifteenth century.

Both lists from Abul-Makarim and Al-Maqrizi are organized on a geographic basis at the urban street- and rural village-levels. I matched the locations in both sources to the urban districts and rural villages in the 1897 census based on the streets' and villages' names, and the information provided by the books' editors in identifying the streets and/or villages. In this matching procedure, I excluded the churches and monasteries in "extinct" medieval locations that were deserted by 1897 based on Ramzi (1994). As a robustness check, I use Ramzi (1994) and the 1477 medieval source, Ibn-Al-Gay'an's (1898) *Names of Egyptian Villages*, to exclude, from the 1897 rural villages list, the "post-1477" villages that emerged after the Ottoman Conquest (1517) (43 percent), and, hence, to construct a modified list of the 1897 villages that reflects the map of medieval rural Egypt.[42] In addition, I excluded the villages that were named after Coptic monasteries in 1897 since the vast majority of inhabitants of these villages in 1897 are, presumably, from the monastic population.

---

[42] Ibn-Al-Gay'an's 1477-list is based on *Al-Rok Al-Nasseri*, the computation of Egypt's area that was carried out under the Mamluk sultan Al-Nasser Muhammad Ibn-Qalawun in 1315. However, Ibn-al-Gay'an updated the original list to 1477 and thus his list includes the villages that emerged between 1315 and 1477. An improvement over this 1477-village list is possible through using the *first* comprehensive village list in Egypt that was produced in *Al-Rok Al-Hussami*, after Hussam-Al-Din Lajeen in 1298, and that was, preserved *without updates* in a contemporary manuscript called *Tuhfat Al-Irshad* that presumably exists in some library in Egypt (Ramzi 1994, pp. 18-21). I was not able, however, to find this 1298 manuscript.

Table B.1 shows the descriptive statistics for the historical proxies. 17 percent of Arab immigration waves to Egypt in 640-900 are temporary (*Irtiba'*) and are thus excluded from the sample.[43] 66 percent of the permanent Arab immigration waves were from Qahtan tribes in Southern Arab Peninsula, and about half of the waves were destined to urban Egypt. More than 90 percent of churches and monasteries in the twelfth and fifteenth centuries were Coptic. The percentage of churches and monasteries that were demolished shortly before the time of the medieval chronicle is particularly large in the fifteenth century (43 percent), because of the so-called "Churches' Event" under which Muslim masses burned a large number of churches nationwide in one of the first incidents of wide scale inter-religious violence (Al-Maqrizi 2002, pp. 1066-76). Interestingly, Coptic churches in the twelfth and fifteenth century are relatively more concentrated in the Nile Valley. Similarly, the majority (57 percent) of the sites visited by the Holy Family are located in the Nile Valley.

---

[43] *Irtiba'* is derived from *rabi'* the Arabic word for "spring," and refers to the post-Islamic Conquest tradition that Arab tribes were allowed to move in the spring to any village of their choice for grazing their animals. Egyptians (Copts) were required to provide them with food and shelter (Al-Barri 1992, pp. 56-60).

Table B.1: Descriptive Statistics: Historical Proxies

1. Arab Immigration in 640-900	
Number of Arab immigration waves	296
% in unknown destination (excluded from sample)	1%
% in temporary non-settlement migration (*Irtiba'*) (excluded from sample)	17%
Origin of Arab Migration Waves in the Sample (N = 244)	
% Adnan tribes immigration waves (from North Arab Peninsula)	31%
% Qahtan tribes immigration waves (from South Arab Peninsula)	66%
Destination of Arab Migration Waves in the Sample (N = 244)	
% in Urban Provinces	49%
% in Lower Egypt	25%
% in Upper Egypt	26%
% 1897-Districts that received at least one Arab immigration wave in the 7th- 9th centuries	42%
2. Churches and Monasteries in 1200	
Number of churches	1,118
Number of monasteries	136
% in deserted or unknown village (excluded from sample)	9%
% Recently Demolished by the 12th century (excluded from sample)	3%
Denomination of Institutions in the Sample (N = 1,110)	
% Coptic	96%
Spatial Distribution of Coptic Churches and Monasteries in the Sample (N = 1,062)	
% in Urban Provinces	13%
% in Lower Egypt	42%
% in Upper Egypt	45%
3. Churches and Monasteries in 1500	
Number of churches	201
Number of monasteries	87
% in deserted or unknown village (excluded from sample)	11%
% Recently Demolished by the 15th century (excluded from sample)	43%
Denomination of Institutions in the Sample (N = 154)	
% Coptic	93%
Spatial Distribution of Coptic Churches and Monasteries in the Sample (N = 145)	
% in Urban Provinces	21%
% in Lower Egypt	10%
% in Upper Egypt	69%
% 1897-Villages that existed before 1477, are not Coptic monasteries in 1897, and had at least one Coptic church/monastery in the 15th century	3%
4. Route of the Holy Family	
Number of sites visited by the Holy Family	38
% in deserted or unknown village (excluded from sample)	3%
Spatial Distribution of the Sites in the Sample (N = 37)	
% in Urban Provinces	11%
% in Lower Egypt	32%
% in Upper Egypt	57%
% 1897-Villages that existed before 1477, are not Coptic monasteries in 1897, and are believed to have been visited by the Holy Family	1%