ON THE ROAD TO HEAVEN: SELF-SELECTION, RELIGION, AND SOCIOECONOMIC STATUS*

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Abstract

Inter-religion socioeconomic differences are often attributed to religion. Instead, I trace the phenomenon in Egypt to self-selection-on-socioeconomic-status during Egypt's conversion from Coptic Christianity to Islam. Self-selection was driven by a regressive tax-on-religion that was imposed upon the Arab Conquest of Egypt in 641 and lasted until 1856. Using novel data sources, I document that (a) the long-term trends of the tax, conversions, and the Coptic-Muslim occupational differences are consistent with the selection hypothesis, and (b) districts with a higher tax in 641-1100 had relatively fewer, but *differentially* better-off, Copts in 1848-1868. I discuss why the initial selection persisted over time.

Keywords: conversion; self-selection; endogenous group formation; discriminatory taxation; intergenerational persistence
JEL Classification: N35; O15

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1. Introduction

Scribes in the Levant and Egypt are Christians.

Al-Muqaddasi (1877, p. 183), Muslim historian and geographer, tenth century

Inter-religion differences in socioeconomic status (henceforth, SES) have been an intriguing topic in the social sciences since at least Max Weber's (1930 [1905]) seminal work on Protestantism. Explanations of the phenomenon abound. Weber traced the Protestant-Catholic SES gap to a causal impact of religion that operates through a Protestant work ethic, and, extending his thesis to Asia, he argued that Asiatic religions were less conducive to Capitalism. The recent economics of religion literature, while acknowledging the endogeneity of religion, attempts to disentangle its causal impact on SES in cross-country studies (Barro and McCleary, 2003; Guiso et al., 2006), or in single-country/religion studies that emphasize the impact of religion on human capital (Botticini and Eckstein, 2005; Boorooah and Iyer, 2005; Becker and Woessmann, 2009; Chaudhary and Rubin, 2011).

This paper proposes a different answer. Drawing on the inter-religion SES differences in Egypt, one of the largest countries in the Middle East, I argue that self-selection-on-SES during the process of formation of religious groups is likely an important cause of the observed differentials. Newly digitized data from Egypt's population censuses of 1848 and 1868 reveal that among adult active men 33 percent of Copts (Egyptian Christians) and only 14 percent of Muslims worked in white-collar jobs.[1] This phenomenon is striking if we take into account that Egypt was almost entirely Coptic Christian before the Arab Conquest in 639-641, and, because in- and out-migration were relatively small, Egypt's "Copts" and "Muslims" are mostly descendants of the pre-641 population who either chose to remain Coptic or to convert to Islam. Bearing this fact in mind, I argue that Copts' conversion to Islam in 641-1868 was characterized by selection-on-SES because of the Islamic tax

[1] I focus on the Coptic-Muslim SES gap because Coptic Christians constituted 94 percent of Egypt's non-Muslims in 1848-1868, besides non-Coptic Christians (4 percent) and Jews (2 percent). For this reason, I use the terms "Copts" and "non-Muslims" interchangeably throughout the paper.

system. Upon the Conquest, Arabs imposed an annual poll tax (*jizya*) on every adult free Coptic male; a tax that was enforced until 1856. As a *regressive* tax removed upon conversion to Islam, I hypothesize that the poll tax led to the conversion of poorer Copts to Islam and to the consequent shrinkage of Copts into a better-off minority.

The first suggestive evidence on the selection hypothesis is based on documenting the national-level long-term trends of the poll tax and of the two outcomes of interest, Copts' population share and the Coptic-Muslim SES gap. This draws on novel primary data sources including data on Christian churches and monasteries in 1200 and 1500 from medieval sources, data on religion and occupations in 641-969 from papyri documents, and, most importantly, individual-level population census samples from 1848 and 1868 that I digitized from the original manuscripts at the Egyptian Archives. These censuses are among the earliest pre-Colonial individual-level population censuses from any non-Western country.

Three key findings emerge in the long-term trends. (1) The poll tax rate among middle- and low-income Copts was, on average, 6-10 percent of the annual wage in 661-1250 but became negligible in 1250-1517; it was negligible though among high-income Copts in 661-1517. (2) Copts shrank from almost 100 percent of the population in 641 to 16 percent in 1200 and 7 percent in 1848-1868. This was mostly due to voluntary conversions to Islam. (3) The Coptic-Muslim SES gap emerged in 641-969, where Copts were over-represented among white-collar workers (specifically, mid-low bureaucrats) and artisans, and the gap persisted in 1848-1868.

These findings, I argue, are consistent with the selection hypothesis. Whereas the higher tax rate in 661-1250 caused a rapid decline in Copts' population share and the emergence of a positive Coptic-Muslim SES gap as farmers and unskilled Copts were more likely to convert, conversions subsided after 1200 as the tax rate declined.

Because the assessment and the collection of the poll tax were decentralized, the second evidence is based on exploiting the cross-district variation in the poll tax in 641-1100, the period where most conversions took place. A simple static framework

predicts that, ceteris paribus, districts with a higher poll tax would have a smaller Copts' population share but a larger Coptic-Muslim income gap (the latter result holds, for example, if the income distribution is Pareto). The ideal experiment to test this prediction would be to randomly assign the poll tax across districts that were otherwise identical before 641 and to compare Copts' population share and the Coptic-Muslim SES gap after the imposition of the tax. Unfortunately, this is impossible because (a) the tax was not random and (b) the earliest district-level data source on religion and SES (occupations) is the 1848-1868 census samples.

Hence, my empirical strategy compares Copts' population share and the Coptic-Muslim occupational differences across districts using a sample of Egyptian free local adult active men of a rural origin in 1848-1868. The main regressor is the poll tax in 641-1100 in an individual's district of origin, which I measure by two variables. First, I use an indicator variable that takes the value of one if the average nominal annual poll tax payment in the district in 641-1100 was "high." I computed this variable from papyri poll tax registers and receipts, which survived for only 4 *kuras* (Egypt's administrative units in 641-1036) that map into 11 out of 76 districts in 1848-1868. Second, I use an indicator variable =1 if at least one Arab tribe settled permanently in the district in 700-969, which is observed for all 76 districts. This is based on historical evidence of the stricter tax enforcement in the districts where Arabs settled and replaced the Coptic local elites who were in charge of the tax assessment and collection, compared to the districts where the Coptic elites remained intact.

The findings lend support to the selection hypothesis. I find that Copts whose origin is in a "high-tax" or in an "Arab-settlement" district are relatively fewer, but *differentially* more likely to be white-collar workers in 1848-1868. The findings are robust to controlling for geographic fixed effects and for proxies of a host of pre-641 characteristics of districts, including urbanization, the attachment to Coptic Christianity, the generosity of the intra-Coptic transfers, the power of the Coptic elites, and the resistance to Arabs. Since all districts were (almost) 100 percent Copt,

the findings suggest that high-tax districts witnessed relatively more conversions and a more extensive selection-on-SES that resulted in a larger Coptic-Muslim SES gap.

I conducted a number of robustness checks. The findings are robust to alternative measures of the poll tax (I also discuss alternative interpretations of the Arab settlement indicator). They are robust to using the distance to Arish, the first town on Egypt's North Eastern borders to be captured by Arabs in 639, as an instrumental variable for the poll tax (and Arab settlement). In order to address the possibility of poll-tax-induced cross-district movement in 641-1868, (a) I document a negative impact of the poll tax on the share of villages with at least one Coptic church or monastery in the district in 1200 and 1500 as a proxy of medieval Copts' population share in the district, and (b) I provide historical evidence on the state's restrictions on spatial mobility across villages in 641-1868.

A fundamental limitation of the empirical evidence though is that there are more than twelve centuries that elapsed between observing the poll tax and observing the outcomes. In the absence of sub-national information on religion and SES before 1848, it is difficult to rule out this criticism empirically. Furthermore, the long-term persistence of the outcomes poses certain theoretical dilemmas. Why did not Copts vanish, or, conversely, why did not converts switch back to Coptic Christianity? Why did the Coptic-Muslim SES gap persist although Becker and Tomes (1979)'s canonical model of intergenerational mobility would predict relatively rapid convergence even at very high values of intergenerational correlation of SES?

I suggest two mechanisms of persistence drawing on both theory and history. The first mechanism is that there were likely new conversions in every period because the poll tax persisted from 641 until 1856. On the one hand, conversions would cause Copts to disappear quite rapidly as Islamic laws, e.g. the death penalty of apostates, made conversion an "absorbing state." But, on the other hand, the Coptic-Muslim SES gap may actually *increase* over time as *poorer* Copts convert in every period. The second mechanism is that each religious group imposed barriers to entry in order to

preserve its over-representation in certain skilled jobs after the *initial* wave of selected conversions took place. These "group effects" slowed down the decline in Copts' population share and suppressed any trends in the SES gap. Those mechanisms, I argue, fit the historical evidence better than alternative explanations including that (1) Copts benefited from modern European influence, (2) Coptic Christianity was more conducive to Capitalism and/or to investment in human capital, and (3) Muslim rulers favored recruiting Copts, who lacked a local support base, in the bureaucracy.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 documents the long-term trends. Section 4 describes the econometric evidence. Section 5 discusses the mechanisms of persistence. Section 6 concludes.

2. Related Literature

The paper contributes to several literatures. First, it contributes to the economics of religion. There are three distinguishing features of the paper. (1) It explains the inter-religion SES differences by the self-selection-on-SES of converts. It appears that this idea was endorsed by Weber (1996 [1958], p. 6), who noted that conversions to Christianity and Islam in India came from the lower Hindu castes. (2) Unlike the self-selection mechanism in Botticini and Eckstein (2005) whereby Rabbinic Jews with lower taste for education converted out of Judaism because of its emphasis on literacy, selection of converts is caused in the Coptic-Muslim case by an economic incentive, the tax exemption, and not by a religious incentive, or the desire to read the scripts. (3) To the best of my knowledge, the paper provides, despite the data limitations, the first econometric evidence on the selection of converts.

Second, the paper contributes to the empirical literature on institutions (Engerman and Sokoloff, 2000; Acemoglu, Johnson, and Robinson, 2001; Nunn, 2008; Dell, 2010), and particularly, institutions transplanted through military conquests (Acemoglu et al., 2011). I document that Islamic taxation that was exported to Egypt after a critical juncture, the Arab Conquest, shaped religious adherence and inter-group SES inequalities that persisted for over twelve centuries.

Third, the paper contributes to the intergenerational mobility literature (Becker and Tomes, 1979; Borjas, 1992), where I argue that continuous endogenous group formation may increase inter-group SES gaps over time. The persistence of the Coptic-Muslim SES gap is consistent with the literature on the persistence of SES across multiple generations (Long and Ferrie, 2013; Clark and Cummins, 2015).

Fourth, the paper contributes to one of the most intriguing topics in Middle Eastern economic history, the long-standing economic advantage of the non-Muslim minorities in the region. The paper is in line with Courbage and Fargues (1997, pp. 22-23)'s conjecture that the poll tax might have caused the phenomenon. I discuss Issawi's (1981) and Kuran's (2004) alternative theories in section 5.2.

Finally, the paper contributes to Egyptian history. Documenting the trend of Copts' population share using novel data contributes to a long-standing debate on the timing of Egypt's Islamization (section A1.4 in the appendix). Furthermore, the paper links two literatures: (a) the effect of the poll tax on conversions [Wellhausen (1927 [1902]), but debated by Dennett (1950) and El-Leithy (2005)] and (b) Copts' persistent over-representation in the bureaucracy (Tagher, 1998 [1951]). Strictly speaking, I do *not* claim that the tax was the *sole* cause of conversions. What I *do* argue though is that the tax was likely a major cause of the Coptic-Muslim SES gap.

3. Documenting the National-Level Long-Term Trends

3.1. Egypt's Taxation in 641-1856

3.1.1 The Coptic-Muslim Difference in Net Taxes

Arabs captured Egypt from the Byzantine Empire in 639-641. On the eve of the Conquest, Copts constituted the vast majority of the population, whereas non-Coptic Christians and Jews formed two small minorities (see section A1.4.2). The conquering Arabs introduced to Egypt a tax system that provided incentives to convert to Islam. Table (I) summarizes the taxes and benefits in 641-1856. Every free adult Coptic male had to pay a poll tax (*jizya*), an annual per head tax paid in coins, and Coptic landholders paid an additional land tax (*kharaj*) assessed on the area and

yield of their landholdings and paid in both coins and crops.[2] Copts also paid other miscellaneous taxes and Coptic churches and monasteries imposed taxes on the rich and gave transfers to the poor. By contrast, Muslims were *not* subject to the poll tax and, until around 750, did not pay the miscellaneous taxes. Muslim landholders also paid a *reduced* land tax (tithe, *ushur*). Yet, the decline in tax revenues, presumably due to conversions, led to the imposition of the *kharaj* and the miscellaneous taxes on Muslims since 750. In addition, Muslims were subject to the alms tax (*zakat*), an intra-group transfer, and military conscription in 641-833 and in 1822-1856.[3]

I make two approximations in order to compute the Coptic-Muslim difference in net taxes: (a) Muslim and Coptic transfers were equally generous, which is plausible but is hard to verify because of the difficulty of observing the intra-group transfers in 641-1856, and (b) conscription was compensated for by state pensions and war booty (*rizq*, '*ata*') in 641-833 and by wages in 1822-1856, which is supported by historical evidence. It follows that converts enjoyed in 641-750 more tax benefits than in 750-1856, although these tax exemptions were often violated before 750 (see section A1.5 in the online appendix for details). Since 750 though, the net tax difference became solely composed of the poll tax until its abolition in 1856.

3.1.2. The Long-Term Trend of the Poll Tax

Panel (A) of Figure (I) depicts the long-term trend of the de jure nominal annual poll tax among low-, middle-, and high-income brackets. The figure indicates that the nominal poll tax remained mostly stable until 1856. Panel (B) translates the nominal tax into real values in 701-1500 (data on the price level stop in 1500) showing that the real tax *decreased* among all income brackets. A better measure of the tax burden though is the poll tax *rate* (tax divided by wage), which is plotted in Panel (C). The figure indicates that the poll tax in 661-969 was, on average, 8-10 percent of the annual wage among low- and middle-income brackets, presumably a significant

[2] The Quran (9:29) orders Muslims explicitly to impose the poll tax on Christians and Jews.
[3] Conscription was abolished in 833-1822 with the shift to slave armies (Blaydes and Chaney, 2013).

financial burden, and that the tax declined to 6 percent in 969-1250 and 1.4 percent in 1250-1517. The tax was negligible though among the high-income bracket.

But did the *actual* tax coincide with the de jure values? (1) Papyri poll tax registers and receipts in 641-1100 reveal that the actual tax varied much more than the de jure amounts. However, the average tax in the papyri is 1.5 dinar (N = 552; SD = 3.7), which is close to the average de jure tax assuming that most Copts belonged to the low-income bracket. (2) The de jure amounts in 1101-1856 are from officials' handbooks, which, according to Goitein (1963, p. 286), are "basically correct."

3.1.3. Was the Poll Tax Regressive?

Figure (II) reveals that the de jure poll tax rate is *decreasing* in wages, which indicates that the variation in the de jure tax did *not* offset the wage variation. But was the actual tax regressive? A few poll tax registers in 703-733 contain information on both the poll tax and the total land tax. Since the *total* land tax is assessed on the total area and yield of landholdings, I use it as a proxy of wealth among landholding farmers. I thus regress the poll tax rate (poll tax divided by total land tax) on the total land tax. The results in Table (II) indicate that the poll tax rate is decreasing in the total land tax; poorer landholders faced, on average, a higher poll tax rate.

3.2. Copts' Population Share in 641-1868

There are no statistics on Egypt's religious composition before 1848. Yet, using a dataset on churches and monasteries that I constructed from medieval sources, I estimated non-Muslims' population share in 1200 and 1500 by the share of Egypt's villages that had at least one Christian church or monastery [Figure (III)]. I find that the share was 16 percent in 1200 and decreased to 3 percent in 1500 (7 percent in the 1848-1868 censuses). My estimates are consistent with those of Courbage and Fargues (1997, pp. 27-28), who estimated that non-Muslims shrank to 42 percent in 680 and 23 percent in 813. Altogether, it appears that non-Muslims shrank into a minority by 680 or, at the latest, by 1200 (see section A1.4 in the online appendix for details on the churches' dataset and its contribution to the historical literature).

Four demographic processes may account for the decline in Copts' population share in 641-1868 (Fargues, 2001): (1) population replacement via Muslims' immigration or Copts' emigration, (2) Muslims' higher birth and/or lower death rates, (3) intermarriage between Coptic females and Muslim males (opposite scenario is prohibited), which results, by Islamic law, in Muslim children, and (4) conversion of Copts to Islam either voluntarily or by coercion. Historical evidence suggests that Islamization was driven by conversions (mostly, voluntary) and that the poll tax was an important cause of conversions in 641-800. Below, I argue why this is so.

First, *Arab* immigration, the largest *Muslim* immigration to Egypt, was small compared to Copts' population. On the Eve of the Arab Conquest, Egypt's population (2.7 millions) was three times that of the Arab peninsula (1 million) and Russell (1966) estimates Arab immigrants in 650 by 100,000. Arab immigration subsided after 969 as Arabs lost their elite position to Turks with the shift to slave armies. At the same time, Copts rarely emigrated from Egypt, because of their unique doctrine that differed from both Catholics and Greek Orthodox Christians.

Second, as the 1848-1868 censuses predate the demographic transition, they provide a glimpse of the demographics of medieval Egypt. The samples suggest that (a) within male household heads, Copts had, on average, *more* children than Muslims (1.48 versus 1.35),[4] and (b) Muslims had lower mortality at younger ages (10-29 or 10-39), but higher mortality at older ages (30-79 or 40-79).[5]

Third, cross-marriages were rare. This is indicated by the papyri in 641-969 (Mikhail, 2004, pp. 63-65) and by the 1848-1868 samples that record only two cases.

This leaves Copts' conversion as the main cause behind Islamization. Conversion was observable by the state; a convert had to endorse Islam in front of the authorities, and, in 641-833, had to become a client of an Arab patron and enlist in the army. Most conversions were by choice, except for two episodes of persecution

[4] Difference between Copts and Muslims is statistically significant (p-value = 0.003).
[5] See section A1.2 in the online appendix. Mortality differences may stem from age heaping and age exaggeration. Since both are negatively correlated with SES, they are less prevalent among Copts.

in 847-861 and in 996-1021. In fact, the largest persecution wave was in 1250-1517 *after* non-Muslims shrank into a minority. Historical evidence also indicates that the poll tax triggered waves of conversions. The Coptic chronicler, John of Nikiu (1916, p. 201), described the consequences of increasing the tax in 642-644, "… *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.*" Other poll-tax-induced conversions in 701-750 are mentioned by the Coptic chronicler, Sawirus Ibn-Al-Muqaffa' (1910).

3.3. The Coptic-Muslim SES Gap in 641-1868

Documenting the trend of the Coptic-Muslim SES gap is a more challenging task because it requires observing religion and occupational outcomes *simultaneously*. For this purpose, I collected all the available individual-level information on occupations and religion in 641-969 (N = 402) in the Arabic Papyrology Database (henceforth, APD), where I inferred a worker's religion from his name since converts adopted an Arabic name. I describe the dataset in section A1.3 in the online appendix but I note here that 72 percent of the sample is from administrative lists and receipts, where, arguably, each individual has an equal chance of appearance. I compare the APD sample to the 1848-1868 census samples (I describe the censuses in section A1.1).

In order to measure the SES, I constructed three dummy variables as measures of white-collar jobs: (1) White-Collar1 =1 if an individual is a professional, a high-level bureaucrat, or a mid-low bureaucrat; these are literate white-collar jobs that are non-political and non-religious. (2) White-Collar2 =1 if White-Collar1 =1 or if an individual belongs to the judiciary, the military/police, or the clergy and the rural elites; these additional occupations are literate white-collar jobs that are political or religious, and (3) White-Collar3 =1 if White-Collar2 =1 or if an individual is a merchant; a white-collar job that is not necessarily literate. I also created indicator variables for three other occupations: artisans, farmers, and unskilled (non-farmer) workers. By construction, the population shares of White-Collar3, artisans, farmers, and unskilled workers must sum up to one, exhausting the occupational distribution.

The findings are in Table (III). Copts (56 percent of the APD sample) are over-represented among white-collar workers in 641-969, which is *entirely* attributable to their over-representation in the mid-low bureaucracy (scribes, land tax collectors, accountants). In fact, Muslims are slightly over-represented among the judiciary, the military/police, and the merchants, but the differences are not statistically significant and the population share of these jobs among Muslims is too small to offset Copts' over-representation in the mid-low bureaucracy. The advantage of Copts is not limited to white-collar jobs, however, as they are over-represented among artisans (weavers, carpenters, tailors) (p-value = 0.13) and are under-represented among farmers. The results in 1848-1868 are strikingly similar. Copts are more likely to be white-collar workers (as mid-low bureaucrats) and artisans and are less likely to be farmers or unskilled workers. And even though Muslims are over-represented among professionals, the high-level bureaucracy, the judiciary, the military/police, the clergy, and the rural elites, the population share of these jobs is still too small.

Comparing the figures in 641-969 and 1848-1868 indicates that the Coptic-Muslim differences *persisted* with respect to most jobs, although the gaps with respect to mid-low bureaucrats, artisans, and unskilled workers increased significantly.

A few notes on the findings are in order. (1) The judiciary, the military/police, the Muslim clergy, and, perhaps, the high-level bureaucracy were restricted to Muslims by law because of their political/religious nature. Nonetheless, Egyptian Muslims (converts) were under-represented in these jobs vis-à-vis non-Egyptian Muslim elites (Arabs, and later on, Turks) for political reasons.[6] (2) Although the evidence above relies on occupations, Ashtor (1969) suggests that bureaucrats were better paid than artisans and unskilled workers, which indicates that the occupational gaps reflected an income difference. (3) The Coptic-Muslim occupational gaps that I described above and their long-term persistence are documented in history (see section A1.3.3).

[6] Egyptian Muslims entered the military/police as soldiers, and possibly officers, in 641-833, and they later gained access to the judiciary and the Muslim clergy (but less to the high-level bureaucracy). They were excluded from the military though from 833 until the reintroduction of conscription in 1822.

3.4. Interpretation of the Long-Term Trends

The key findings in the long-term trends could be summarized as follows. (1) The poll tax rate among the low- and middle-income brackets was high in 661-1250 but became negligible in 1250-1517; it was negligible though among the high-income bracket throughout the whole period. (2) Copts shrank from (almost) 100 percent of the population in 641 to 16 percent in 1200 and 7 percent in 1848-1868. (3) Copts were better off than Muslims in 641-969 and the gap persisted in 1848-1868.

Overall, the trends are consistent with the selection hypothesis. The high tax rate in 641-1250 caused a rapid decline in Copts' population share and the emergence of a Coptic-Muslim SES gap as farmers and unskilled Copts were more likely to convert, leaving behind a Coptic minority that was over-represented among artisans and white-collar workers. Then, conversions subsided after 1200 with the decline in the tax rate. What I still have to explain though is why the initial SES gap, or the initial selection, persisted until 1848-1868. I will come back to this point in section 5.

4. Empirical Evidence from the 1848-1868 Census Samples

4.1. Conceptual Framework

I use a simple static framework to guide the empirical analysis. Each Copt is endowed with income $y \sim f(y)$ and religiosity $r \sim g(r)$ where $y > 0, r > 0$, and f and g are density functions. For the purpose of the model, I assume that income and religiosity are independent but I am agnostic about their relationship in the empirics. I think of y as SES that has multiple dimensions besides income such as education, occupation, and wealth, and of r as the non-pecuniary cost of conversion which includes the psychological attachment to Coptic Christianity and the potentially bad treatment of converts as outcasts by Copts or as subordinates by Arabs. Population size is of measure one: $\int f(y)dy = \int g(r)dr = 1$. Copts pay a lump-sum poll tax τ that is removed upon conversion. More broadly, I think of τ as the Coptic-Muslim net tax difference. A Copt chooses consumption (c) and religious affiliation ($\kappa = 1$ if he remains Coptic Christian and $\kappa = 0$ if converts to Islam) in order to maximize:

$$(1)\ U = u(c) - (1-\kappa)r$$

Subject to: $(2)\ c \leq y - \tau\kappa$

where $u'(.) > 0$ and $u''(.) < 0$. A Copt converts to Islam if:

$$(3)\ u(y) - u(y-\tau) \geq r$$

Hence, holding religiosity constant, poorer Copts are more likely to convert, and, similarly, holding income constant, less religious Copts are more likely to convert. I examine the effects of changing the poll tax on converts' population share and on the difference in average income between those who remain Copts and converts (Muslims), which captures the selection-on-income effect of the poll tax. The following propositions hold (proofs are in section A3 in the online Appendix).

Proposition 1: *Holding religiosity constant, Copts' population share is decreasing in the poll tax.*

Proposition 2: *Holding religiosity constant, the average (before-tax) income of those who remain Copts,* $E(y|y > y^*)$*, and of those who convert to Islam,* $E(y|y \leq y^*)$*, are increasing in the poll tax. Thus, the Coptic-Muslim difference in average income could be either increasing or decreasing in the poll tax depending on the income distribution.*

Proposition 3 (Jewitt, 2004): *Holding religiosity constant, the Coptic-Muslim difference in average income is increasing in the poll tax if* $f(y)$ *is everywhere decreasing.*

Figure (IV) illustrates the intuition behind these results. Let $y^*(\tau; r)$ denote the threshold level of income at which a Copt is indifferent about conversion to Islam at a given level of religiosity. The concavity of u implies that y^* moves rightwards in response to an increase in τ, which decreases Copts' population share (Proposition 1). As y^* increases, the remaining Copts are richer on average as they lost their poorest members who were just above y^*. A less intuitive result is that the same effect holds for converts who are richer on average because they gained new converts who are richer than any previous convert. Hence, the average incomes for Copts and converts increase and the Coptic-Muslim income gap may go up or down depending on the income distribution (Proposition 2). For example, it increases if the distribution is Pareto, which is commonly used in the literature (Proposition 3).

Two notes are in order. (1) I do not endogenize the poll tax as this goes beyond the scope of the paper (see conclusion), but I allow for its endogeneity in the empirics. (2) I assume that the tax is a lump-sum tax, which implies a greater incentive to convert among poor Copts. This is a simplification because there were other policies that triggered conversions among rich Copts. For example, rich Copts were probably willing to convert in order to access political and religious white-collar jobs that were restricted to Muslims. I argue though that the model captures the empirical facts because (a) the political and religious jobs were less accessible to converts and (b) the population share of these jobs was too small [Table (III)].

4.2. Data and Empirical Strategy

In order to test the conceptual framework, I exploit the cross-district variation in the poll tax in 641-1100, the period where most conversions took place. This is motivated by the fact that the tax assessment and collection were both decentralized, where the local elites in each district played a pivotal role (section 4.3).[7]

I observe the two outcomes, religious affiliation and occupational outcomes, in the 1848 and 1868 censuses, the earliest data source on religion and occupations with information on each individual's sub-national (district) location.[8] I digitized a nationally representative sample of each census. I then pooled the two samples and restricted the analysis to Egyptian local free Coptic and Muslim active men of a rural origin who are at least 15 years of age and with non-missing age, religion, occupation,

[7] In 641-720, Arabs kept the Byzantine tax system intact, whereby village headmen assessed the poll and land taxes. Starting from 720, rulers attempted to tighten their control over taxation via appointing Arabs as headmen of districts (Morimoto, 1981, pp. 66-91; 175-81). This process coincided with Arabs' settlement in rural Egypt starting from 700. However, in response to a series of tax revolts that were ignited by strict tax enforcement, the state resorted to the decentralized tax contracting/farming system in the ninth century (Sijpesteijn, 2009), which remained in effect until 1813 (Cuno, 1992, pp. 17-32). Under that system, the state contracted out through auctions the tax collection of each district to individuals (Morimoto, 1981, pp. 231-3). In 1171-1813, tax farming took the form of feudalism, whereby high-ranked military officers were granted large landholdings and control over the taxation of districts. However, throughout the whole period in 641-1813, villages' elites remained influential in the tax assessment and collection whether they did so directly in 641-720 or in cooperation with tax collectors who were either appointed by the state in 720-900 or by tax contractors/farmers in 900-1856 (Ismail, 1998, pp. 164-7; Mahmoud, 2009, pp. 147-81).

[8] The sub-national location (*kura*) of 65 percent of the APD sample is unknown (see section 3.3).

and district of origin. These restrictions aim at (a) limiting the analysis to the likely descendants of the pre-641 population and (b) mitigating the possibility of cross-district migration of an individual's ancestors in 641-1868 by excluding those whose family origin is in major cities and deserts (see section A1.1 for details).

Hence, the empirical strategy is based on regressing an individual's religious affiliation and occupational outcome in 1848-1868 on the level of the poll tax in 641-1100 in his district of origin. Specifically, I estimate the following OLS regressions:

$$(4)\ copt_{ij} = \beta_k + \beta_{11}\tau_j + X_j'\beta_{12} + \varepsilon_{1ij}$$

$$(5)\ y_{ij}^o = \beta_j + \beta_{21}^o copt_i + \beta_{22}^o\left(copt_i.\tau_j\right) + \left(copt_i.X_j'\right)\beta_{23}^o + \varepsilon_{2ij}^o; o = 1, \dots, 12$$

where $copt$ =1 if an individual *i* of district of origin *j* is Coptic Christian and y^o =1 if an individual works in occupation o. I estimate equation 5 for twelve occupations separately: (1) the three white-collar indicators, (2) indicators for the six sub-outcomes that comprise the white-collar indicators, and (3) indicators for artisan, farmer, and unskilled jobs. β_k and β_j are full sets of province and district of origin fixed effects respectively (11 provinces, 76 districts), τ_j is the poll tax in 641-1100 in the district of origin, and X_j is a vector of pre-641 district-level controls (I describe the poll tax measures and the pre-641 controls in the next two sub-sections).

The conceptual framework makes the following predictions about the coefficients of interest. (1) $\beta_{11} < 0$; districts with a higher tax would have relatively fewer Copts in 1848-1868. As all districts were almost 100 percent Copt in 641, Copts' population share in 1848-1868 is approximately equal to one minus the share of converts in 641-1868. (2) $\beta_{21}^o > 0$ for the white-collar and artisanal indicators and < 0 for the farmer and unskilled indicators; Copts are better off than Muslims in "low-tax" districts because of the positive selection of Copts in every district. (3) $\beta_{22}^o > 0$ for the white-collar and artisanal indicators and < 0 for the farmer and unskilled indicators; Copts in "high-tax" districts are *differentially* more likely to be white-collar workers and artisans and *differentially* less likely to be farmers and unskilled workers.

4.3. The Cross-District Variation in the Poll Tax in 641-1100

The empirical strategy relies on observing the cross-district variation in the poll tax in 641-1100, a difficult task given the remoteness of the time period. For this purpose, I collected all the available individual annual nominal poll tax payments in 641-1100 from all *surviving* papyri poll tax registers and receipts with information on the sub-national location (N = 408) (see section A1.7). Unfortunately though, poll tax papyri survived for only four *kuras* (Egypt's administrative units in 641-1036), all in the Nile Valley. Panel (A) of Table (IV) shows the summary statistics of the tax payments in each *kura*. The average tax is lower in *Qahqawa* than in the three other *kuras* by 25 percent, which is due to the high share of Copts who paid *zero* tax in that *kura*, indicating that there were cross-*kura* differences in the tax enforcement. I mapped the 4 *kuras* into 11 districts in 1848-1868 and created my first measure of the poll tax, an indicator =1 if the average poll tax payment in the district in 641-1100 was "high," defined as being greater than 1.3 dinars, the cross-district average.

As a second measure of the poll tax in the district that is observed for all 76 districts, I use an indicator =1 if at least one Arab tribe settled permanently in the district in 700-969. The usage of Arab settlement as a proxy of the poll tax is supported by historical evidence. Panel (B) of Table (IV) reveals that individual poll tax payments in 641-1100 are positively correlated, on average, with the incidence of Arab settlement in the *kura*. I argue that this is because Arab settlement altered the composition of the local elites who were in charge of the poll tax assessment and collection. In *kuras* where Arab tribes settled permanently by acquiring land in 700-969, they replaced the indigenous Coptic elites as large landholders and village- and *kura*-headmen (Sijpesteijn, 2009). In those *kuras*, I argue, Arabs were likely stricter in enforcing the poll tax on Copts. By contrast, in *kuras* where Arabs did not settle, Coptic elites remained in power and were likely more lenient in taxation with their fellow Copts. That was manifested in their higher tolerance for (a) Copts paying a zero or a reduced tax, (b) the piling-up of tax arrears, and (c) fugitives who fled their

villages in order to avoid taxation. These three phenomena, but not their variation across *kuras*, are well documented in history (Morimoto, 1981).

Figure (V) maps the key variables in the analysis. First, within the 11 districts for which I have poll tax information, the tax is higher in the north. Second, Arabs settled in all regions, but less so in the Nile Valley.[9] Third, Copts are a minority in all districts in 1848-1868, but are relatively more concentrated in the Nile Valley. Finally, Copts are better off than Muslims in 41 out of the 49 districts in which there are any Copts, but the gap is larger in districts with a relatively smaller Coptic minority.[10]

4.4. Controlling for the Pre-641 Cross-District Differences

Cross-district differences in the tax enforcement could be driven by a host of pre-641 district-level characteristics and their omission would bias the OLS estimates. I discuss below the controls that I include in the analysis (see section A1.9 for details).

First, I expect Arabs to enforce a higher tax (or to settle) in richer districts. I thus control for a district's pre-641 average income (or urbanization) by the natural logarithm of the district's urban population size circa 300. Urbanization is commonly used in the literature as a measure of economic development.

Second, I predict that Arabs may enforce a higher tax (or settle) in more religious districts as Copts in those districts could afford a higher tax without converting to Islam. I thus control for a district's pre-641 average psychological attachment to Coptic Christianity by an indicator that takes the value of one if the district is believed, according to pre-641 Coptic traditions, to have been visited by the Holy Family during its legendary flight to Egypt.[11] The legendary path of the Holy Family in Egypt that is officially endorsed by the Coptic Church today is based on a book

[9] The Nile Delta is the northern triangle on the map. The Nile Valley extends from the south of the Nile Delta to Egypt's southern border with Sudan.

[10] The negative correlation between Copts' population share and the Coptic-Muslim SES gap, which follows from propositions 1-3, is confirmed by the regression: $y_{ij}^{o} = \beta_j + \beta_{41}^{o} copt_i + \beta_{42}^{o}\left(copt_i \times coptpopshare_j\right) + \varepsilon_{4ij}^{o}; o = 1, \dots, 12$, where $coptpopshare$ is Copts' population share in a district in 1848-1868 and the other variables are as in equations 4 and 5. The results are in Table (A.10).

[11] The path may also reflect cross-district variation in income, because it included sites that became pilgrimage destinations at some point and a potential source of income for Copts in the district.

that was written, according to Coptic traditions, around 400. Nevertheless, because the date of the book is not certain, this variable must be interpreted with caution.

Third, because the pre-641 generosity of the intra-Coptic transfer system in a district may affect Arabs' taxation and settlement policies, I control for this variable by the share of villages with at least one Coptic monastery in each district in 1200, since monasteries were the main Coptic charity institutions before 641.[12] The number of Coptic monasteries in a district in 1200 should not differ too much from their number before 641 because (a) monasteries likely survived because of their large size and wealth, and (b) building new monasteries was prohibited under Islam.

Fourth, I control for the pre-641 power of the Coptic elites in each district, which may have reduced the Arabs' ability to enforce a higher tax (or to settle). As a proxy for this variable, I use an indicator =1 if the district had an *autopract* agricultural estate in 600. The *autopragia* status was a privilege granted to large landholders in late Byzantine Egypt that allowed them to (a) pay taxes directly to the capital rather than to local authorities and (b) collect taxes from taxpayers in their constituencies.

Finally, I control for the resistance to Arabs in each district, which may have also mitigated tax enforcement and settlement. As a proxy for *military* resistance, I use an indicator =1 if there was a Byzantine garrison in district in 600; those garrisons fought against the Arab army in 639-641. And as a proxy for *popular* resistance, I examined Copts' tax revolts in 726-768 (this variable is at the region level though and so is *not* included in the regressions). Table (A.9) in the online appendix shows that 4 out of 5 revolts were in the Delta, indicating that revolts were negligible in the Valley. Since districts for which I have tax information are all in the Valley, it seems unlikely that the poll tax variation is explained by popular resistance.

Table (V) shows the summary statistics for all the variables in the analysis [statistics on occupational outcomes are in Table (III)]. Muslims are more likely to be

[12] Coptic monasteries leased out land to farmers and gave loans and grants to Copts to help pay taxes. Copts often took refuge in monasteries in order to avoid paying the poll tax (Morimoto, 1981, p. 118).

of an origin in districts with a higher tax in 641-1100 or where Arabs settled in 700-969. Those districts had a slightly larger urban population in 300, were slightly more likely to lie on the Holy Family legendary path, had a slightly smaller share of villages with a Coptic monastery in 1200, and were more likely to have a garrison in 600. They did not differ though in the incidence of having an *autopract* estate in 600.

4.5. Findings

Table (VI) shows the results on religious affiliation (equation 4). Using the poll tax indicator, I find that individuals whose origin is in districts with a higher tax in 641-1100 are less likely to be Copts in 1848-1868 by about 16 percentage points; a large magnitude given that the average Copts' population share is 6 percent. The effect remains negative and statistically significant if I include the pre-641 controls and province fixed effects. Using the full sample with the Arab settlement indicator generates qualitatively similar results that are smaller in magnitude. Individuals whose origin is in districts where Arabs settled in 700-969 (hence, faced a higher tax) are less likely to be Copts in 1848-1868 by 6-9 percentage points, and the effect is robust to including the pre-641 controls and province fixed effects.[13]

Results on occupational outcomes (equation 5) are in Table (VII). Using the poll tax indicator in Panel (A), I document that Copts in high-tax districts are *differentially* more likely to be professionals and bureaucrats (White-Collar1=1) than their co-religionists in low-tax districts. Basically, the Coptic-Muslim gap with respect to White-Collar1 is positive in low-tax districts, but is *larger* in high-tax districts by 85 percent. The effect stems from Copts' *higher* over-representation among mid-low bureaucrats in high-tax districts, but the effect holds if I use wider definitions of white-collar workers in White-Collar2 and White-Collar3. The results on artisan, farmer, and unskilled indicators all have the expected signs but are statistically insignificant. Panel (B) controls for the interactions of the pre-641 controls with the

[13] I am not able to include both the poll tax and Arab settlement indicator variables in the same regression because they are identical in the 11 districts for which I observe the poll tax.

Coptic indicator. Although the standard errors are large because of multicollinearity, the interaction of the poll tax and the Coptic indicator remains positive and statistically significant in the case of the white-collar and artisanal outcomes.

Results in Panel (C) which uses the Arab settlement indicator are similar but of a greater magnitude. Among individuals whose origin is in districts where Arabs did *not* settle (low-tax districts), Copts are more likely than Muslims to be professionals and bureaucrats by 10 percentage points, but the Coptic-Muslim difference in "Arab-settlement" districts is greater by an additional 15 percentage points. I obtain similar results if I use White-Collar2 or White-Collar3. The findings with respect to artisanal, farmer, and unskilled outcomes are mostly of the expected signs but are not statistically significant. Including the interactions of the controls with the Coptic indicator in Panel (D) restricts the sample to 35 districts (all in the Nile Valley) where I have information on the *autopract* estates, which reduces the magnitude and the statistical significance of the interaction of Arab settlement and the Coptic indicator.

Overall, the results suggest that Copts whose origin is in districts with a higher tax in 641-1100, or where Arabs settled in 700-969, are relatively fewer, but differentially better off. They are *differentially* more likely to be white-collar workers (mid-low bureaucrats). They are also differentially more likely to be artisans and differentially less likely to be farmers, although the latter results are not always significant.

4.6. Robustness Checks

There are at least three concerns about the OLS estimates. First, there may be measurement error in the poll tax. Second, the OLS estimates may be biased because of *unobserved* district-level characteristics. Third, there was likely poll-tax-induced cross-district movement in 641-1868. I address each of these issues below.

4.6.1. Measurement Error in the Poll Tax

I conducted a number of robustness checks in order to address the measurement error in observing the poll tax in the papyri poll tax documents in 641-1100 (see Tables (A.2) and (A.3) in the online appendix). (1) Instead of using the "average"

poll tax, I re-estimated the regressions using an indicator =1 if the *median* poll tax was "high." (2) I dropped two *kuras* where the number of observations in the papyri is less than ten. (3) Instead of using an indicator, I used the actual average and median poll taxes in dinars. (4) I dropped the *kura* of *Qahqawa*, where the papyri are from an earlier date, using the median tax indicator. (5) I clustered the standard errors at the *kura* level (the downside is that there are only 4 *kuras*). (6) I argue that controlling for urbanization in 300 and for geographic fixed effects mitigates the concern that I only observe the *nominal* poll tax and not the real tax or the poll tax *rate*.

As a proxy variable, the Arab settlement indicator admits of alternative interpretations, but a valid interpretation must predict that Copts in Arab-settlement districts are relatively fewer *and* differentially better off. This seems unlikely. (1) Settlement captures a *mechanical* negative effect on Copts' population share, because Arabs were Muslims. This effect is negligible though because settlement was small (section 3.2.2) and it does not explain why Copts of those districts are *differentially* better off. (2) Arabs may have forced *poorer* Copts to convert in the districts they settled in. Coerced conversions were rare though in 700-969. (3) Arabs may have promised *poorer* Copts with non-pecuniary benefits of conversion (e.g. salvation). However, settlement is positively correlated with the Holy Family path indicator, suggesting that Arabs settled in *more* religious districts. (4) As Arab settlers replaced Coptic elites, it would mechanically reduce Copts' average SES. But this would predict that Copts of those districts are differentially *worse* off. (5) Settlement may reflect a district's income *only*, as Arabs chose richer districts. But there is no reason in this case to observe a correlation between settlement and conversions or SES.

4.6.2. Instrumental Variable (IV) Strategy

I employ an instrumental variable (IV) strategy in order to address the potential endogeneity of the tax that stems from omitted *unobserved* characteristics of districts. As an IV for the poll tax (and Arab settlement) in equation 4, I use a district's distance to Arish, a town close to Egypt's North Eastern borders that was the first to

be captured by Arabs in 639 because of its proximity to the Arab peninsula. Also, I use "Copt * Distance to Arish" as an IV for the interaction term in equation 5.

Is the distance to Arish a *relevant* and *exogenous* IV? First, Table (A.4) in the appendix suggests that the poll tax was higher and Arabs were more likely to settle in the districts that are closer to Arish (that were conquered first). Second, the distance to Arish arguably satisfies the exclusion restriction, because the proximity to Arish, a small border town, was likely uncorrelated with the pre-641 characteristics of districts. Indeed, Table (A.4) indicates that pre-641 urbanization, religiosity, power of Coptic elites, and military resistance in a district are all uncorrelated with the district's distance to Arish. The only exception is that a district's share of villages with a Coptic monastery in 1200 is positively correlated with the distance to Arish.

The IV estimation results on religious affiliation are shown in Table (A.5). First-stage regressions indicate that the distance to Arish is a strong IV, except in column 6, where I use a smaller sample. Second-stage estimates of the effects of the poll tax (Arab settlement) on the Coptic indicator are negative, statistically significant, and larger in absolute value than the OLS estimates, except in column 6.

The results on occupational outcomes are in Table (A.6). The first-stage regression in Panel (A), which uses the poll tax variable, shows that "Copt * Distance to Arish" is a strong IV. The second-stage regression indicates that Copts in high-tax districts are differentially more likely to be white-collar workers and artisans and differentially less likely to be farmers than Copts in low-tax districts. Panel (B), which uses the Arab settlement indicator, produces stronger results than the OLS.

4.6.3. The Poll-Tax-Induced Movement across Districts in 641-1868

Another source of endogeneity is the possibility of cross-district movement in 641-1868 (via migration or Coptic-Muslim differences in birth and death rates) that was induced by differences in the poll tax. There are two counter-arguments here. First, using the share of villages with at least one Coptic church or monastery in 1200 and 1500 in each district as a proxy of the district's medieval Copts' population share

in equation 4, yields qualitatively similar results to Table (VII) [see Table (A.7)]. This indicates that the impact of the tax on Copts' population share held in 1200 and 1500. Second, historical evidence suggests that the state controlled spatial mobility in rural Egypt in 641-1868, because the assignment of land, taxes, conscription, and corvée in public works were all based on an individual's village of residence. Morimoto (1981, pp. 113-24) describes the problem of fugitives in 641-969, those who fled their villages in order to escape taxation, and the state's measures to identify and send fugitives back to their villages. This problem persisted in 1517-1868 (Mahmoud, 2009, pp. 159-60; Cuno, 1992, pp. 121-124). In the nineteenth century, the state issued travel permits in order to control migration across villages.

5. Explaining the Persistence of the Poll Tax Effects

5.1. Mechanisms of Persistence

The econometric evidence in section 4 suggests that the initial selection-on-SES of converts that was triggered by the poll tax in 641-1100 persisted at the district level for over twelve centuries until 1848-1868. There are, I argue, two mechanisms that may account for this somehow puzzling long-term persistence. But, in the absence of district-level data on religion and occupational outcomes before 1848, the evidence is only at the national level and essentially rests on theory and history.

The first mechanism is based on two historical facts: (1) the poll tax was *not* a one-time policy but rather a long-standing institution that persisted from 641 to 1856, and (2) three Islamic laws made conversion an "absorbing state," (a) the death penalty of apostates, (b) the offspring of a Muslim father is automatically Muslim, and (c) Muslim females may only marry Muslim males. Adding to these facts the observation that in every period some Copts may experience downward mobility due to a negative income shock, Copts' population share would likely decrease to zero quite rapidly, because in every period some poor Copts may convert to Islam (the fall in the tax rate in 1250-1517 may explain the slowdown in conversions after 1200). More important though, once I allow for a continuous process of *endogenous group*

formation via *new* conversions to Islam among Copts, there is no reason to expect that the Coptic-Muslim SES gap would disappear over time. In fact, the gap may even *increase* as *poorer* Copts convert in every period, leaving behind a rapidly shrinking Coptic minority that is growing *differentially* richer over time.

The second mechanism of persistence is that there were "group effects" on occupational status, because each religious group imposed barriers to entry into the skilled occupations in which it was over-represented after the initial wave of selected conversions took place. Conceptually, adding a group effect is similar to Borjas' (1992) concept of "ethnic capital," in which child's human capital depends on both parental human capital and the average human capital of the group. But unlike Borjas' model that treats the inter-group human capital differences as exogenous, the Coptic-Muslim SES gap is *endogenously* altered via new conversions in every period. Because the group effect partially offsets the tax incentive to convert, it slows down the decline in Copts' population share, hence protecting Copts from "extinction." It also slows down any trends in the SES gap making it more likely to persist over time.

There are two pieces of evidence on the existence of religious group effects. First, the guild system restricted access to apprenticeship that was required in most artisanal and white-collar occupations (Raymond, 1973, pp. 544-51). Copts restricted access to the guilds of mid-low bureaucrats, carpenters, jewelers, and tailors. In the words of Lord Cromer, the British consul of Egypt in 1883-1908, the Coptic accounting system was "*archaic*" and "*incomprehensible to anyone but themselves*" (Tagher, 1998 [1951], p. 213). This was not a nineteenth-century phenomenon, because in 969-1171, "*the persistence of Coptic administrative personnel* [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," (Samir, 1996, p. 190).[14] In addition, Coptic schools that, unlike Muslim schools, taught arithmetic and geometry in order to train Coptic children for jobs in the mid-low bureaucracy were not open to Muslims, because schools were religiously segregated (Heyworth-Dunne, 1938, pp. 2-7, 84-92).

Second, I used the 1848-1868 census samples to estimate the impact of religious affiliation on son's occupational outcome, controlling for father's occupation. One caveat though is that I only observe son's and father's occupations if the son resided with his father. Specifically, I estimate the following OLS regressions:

$$(6)\ y_{ih}^{o} = \beta_{3}^{o} + \beta_{31}^{o} fatherocc_{ih} + \beta_{32}^{o} occsharegroup_{ih} + \varepsilon_{3ih}^{o}; o = 1, \dots, 12$$

where y_{ih}^{o} =1 if a son i in household h has occupation o; $fatherocc$ =1 if the father has the same occupation as his son; $occsharegroup$ is the population share of occupation o in the son's religious group computed within the father's generation.

The results are in Table (A.8) in the appendix. (1) Intergenerational correlations of occupational outcomes (β_{31}^{o}) are positive for the white-collar, artisan, farmer, and unskilled indicators. (2) Group effects (β_{32}^{o}) are positive for the white-collar, artisan, and farmer indicators, but are not statistically significant for the unskilled indicator, where imposing entry barriers is likely difficult due to the low skill level of the job.

A final remark on the group effects is important here. One may interpret the group effect, and, in particular, teaching secular subjects in Coptic schools, as evidence on Copts' higher taste for education that induced Copts with lower educational taste to convert out of Christianity. I argue that this interpretation, which is inspired by Botticini and Eckstein (2005), is not consistent with the historical evidence because (a) there is no literacy requirement under Coptic Christianity (illiteracy among adult male Copts was 34 percent in 1986) and (b) Coptic schools were purely religious before 641 (Nasim, 1991) and, in fact, the earliest evidence on

[14] One may wonder how Copts succeeded in hiding their wealth from Muslim rulers who often taxed wealth opportunistically. A possible reason is that Copts' economic advantage did not stem from wealth but from wages, which were less taxed by Muslim rulers.

teaching secular subjects is from 1693, long after Copts shrank into a minority.[15] Hence, I interpret Copts' higher investment in secular education in 1693-1868 as an example of the barriers to entry into skilled jobs; specifically, a mechanism to preserve Copts' advantage in the mid-low bureaucracy in which they were over-represented, but it did not itself serve as a *selection* mechanism. Moreover, this mechanism does not account by itself for Copts' persistent over-representation in artisanal jobs, which is perhaps explained by other barriers to entry (apprenticeship).

5.2. Alternative Explanations

I argue that the alternative explanations of the Coptic-Muslim SES gap are not consistent with the historical evidence. Weber explained Protestants' economic advantage by their work ethic. Yet, both the Coptic and Egyptian Muslim cultures were mystical, and, moreover, Copts' advantage stemmed from bureaucracy and *not* from commerce, indicating that Coptic Christianity was not more conducive to Capitalism than Islam.[16] Using a different rationale, Kuznets (1960) explained Jews' advantage by a minority's attempt to preserve its identity via specializing in occupations in which it built a tradition. But this does not explain why Copts, who were initially the majority, shrank into a minority. Jews' economic advantage is also explained by the ban on Jews from practicing certain occupations such as farming. Yet, Copts were not banned from farming (one third of adult active male Copts in 1848-1868 were farmers). If anything, Copts were mostly banned from political and religious white-collar jobs, which may have mitigated the gap.

Within the Middle East, Issawi (1981) and Kuran (2004) argued that the privilege of non-Muslim minorities emerged in the nineteenth century because Europeans favored non-Muslims or because non-Muslims adopted European legal structures.

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[15] The earliest account is 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*," Heyworth-Dunne (1938, p. 85).

[16] Copts and Egyptian Muslims (traditionally, Sufis) shared beliefs in saints, martyrs, miracles, and apparitions that often attributed materialistic success to metaphysical factors rather than to hard work.

However, this theory does not explain why the Coptic-Muslim SES gap emerged in 641-969, long before the rise of Europe. Moreover, Copts' privilege did *not* originate from commerce where European influence was important but from bureaucracy and artisanship, where Europeans had less of an influence. For those reasons, Issawi's and Kuran's theories do not seem applicable to Copts, although they may still explain the privilege of the other non-Muslim minorities who excelled in commerce.

Finally, one may argue that rulers favored Copts in the bureaucracy for political reasons, because as a minority, Copts lacked a support base. This theory is not complete though because it does not explain (a) why Copts are over-represented among artisans, (b) why Copts shrank into a minority, and, (c) why Copts are over-represented in the bureaucracy in 641-969 although they are in the majority (56 percent).[17] Hence, I argue that the persistence of Copts in the bureaucracy was not only for political reasons, but also because (a) the population share of skilled converts was small, and (b) human capital was occupation-specific, and so, for example, a literate convert could not work as a scribe without apprenticeship.

6. Conclusion

Drawing on novel primary data sources, I traced the origins of the superior SES of the Coptic Christian minority in Egypt to the Islamic tax system that was imposed upon the Arab Conquest of the then-Coptic Christian Egypt in 639-641. In particular, I hypothesized that the poll tax, a regressive tax removed upon conversion to Islam, led to the shrinkage of Copts into a better-off minority. I first drew suggestive evidence on the hypothesis from the long-term trends of the poll tax, Copts' population share, and the Coptic-Muslim SES gap. Then, using the 1848-1868 population censuses, I documented that districts with a higher tax in 641-1100 had relatively fewer, but differentially richer, Copts in 1848-1868. Finally, I argued that the persistence of the initial selection is explained by Copts' continuous conversions, as the tax persisted until 1856, and by group effects in access to skilled jobs.

[17] Most of the APD sample is from the Nile Valley where there were relatively more Copts.

The findings raise intriguing questions that open two future areas of research. First, and foremost, there is the issue of the political economy of Islamic taxation. Why did Arabs choose a "soft" policy, taxation, instead of coercing Copts into conversion? Why did they choose a *regressive* tax that triggered the masses, but not the elites, to convert? In doing so, why did they risk creating hostile elites? Why did not they raise the poll tax over time in order to induce the remaining Copts to convert as they were likely shrinking into an increasingly richer minority? Historical evidence offers some clues to these questions. (1) Taxation was preferable to coerced conversions, because it created a (potential) support base without running into the risk of rebellions. Interestingly, Romans followed an earlier similar policy of exempting Roman citizens from the poll tax. (2) Arabs wanted, besides winning converts, a stable stream of poll tax revenues, and imposing a regressive tax likely allowed them to achieve the two contradicting objectives. (3) Islamic law ensured in fact that the political elite was Muslim (not necessarily, Egyptian), while leaving the politically powerless mid-low bureaucracy and artisanship in Copts' hands. (4) Poll tax revenues became negligible as Copts shrank into a minority, and given the cost of tax collection, rulers shifted their efforts since 750 from the poll tax to the land tax (*kharaj*), which became a universal tax on both Copts and Muslims.[18]

The second area of research relates to the external validity of the selection hypothesis to other parts of the Middle East and beyond. At this stage, we know little about the formation processes of non-Muslim minorities in the region and so I could only speculate on the answer. (1) Selection-on-SES of converts (not necessarily caused by taxation) is perhaps generalizable to other contexts. (2) There were cross-country differences in Arab settlement in the post-Conquest period due to differences in land confiscation policies. (3) Copts restricted entry to the bureaucracy partially because of Egypt's complex agricultural system, but group effects were

[18] Even on pure theoretical grounds, it may not be optimal to increase the poll tax over time because the elasticity of demand for Coptic Christianity is in fact unchanged in the case of the *positive* selection of Copts (Tirole, forthcoming).

perhaps less important in other countries. (4) Egypt's non-Coptic Christians and Jews, who excelled in commerce, may be more comparable than Copts to other non-Muslims in the region. Fortunately, there are unexplored data sources that could be used to extend this research including papyri documents (98 percent of which are unpublished), sixteenth-century Ottoman tax registers, and Ottoman population censuses in 1891-1914. These sources may reshape our understanding, not only of the non-Muslim minorities, but also of the history of the region more generally.

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TABLE I
The Coptic-Muslim Differences in Net Taxes in 641-1856

Tax/Benefit	Copts	Converts (Muslims)		Coptic-Muslim Difference in Net Taxes	
		641-750	750-1856	641-750	750-1856
1. Poll tax?	Yes	No (?)	No	Yes (?)	Yes
2. Land tax (*kharaj*)?	Yes	Reduced land tax (*ushur*) (?)	Yes	*Kharaj* - *ushur* (?)	No
3. Miscellaneous taxes?	Yes	No (?)	Yes	Yes (?)	No
4. Intra-group transfers?	Yes	Yes (?)	Yes	No (?)	No (?)
5. Military conscription?	No	Yes (compensated for by state pensions and war booty (*'ata'*) in 641-833 and by wages in 1822-1856); No in 833-1822		No (?)	No (?)

Sources: See section A1.5 in the online appendix. Also, see the discussion in section A1.5 on how the actual taxation in 641-750 may have differed from that in the table. A question mark in parentheses in the third column indicates that there is uncertainty regarding the actual enforcement on converts of the tax/benefit under consideration. A question mark in the last two columns indicates that there is uncertainty if the tax/benefit differed or not in practice across Copts and converts. The specific components of the miscellaneous taxes changed over time. In 641-661, they provided funds for the "entertainment" of Muslims (military expenses and lodging for officials) and for the village overhead expenses. In 661-750, they supplied maintenance for the governor and officials and funds for public projects. In 750-1171, they expanded to include pasture tax, weir tax, and taxes on various crops and products. In 1171-1856, they included taxes on pasturage, industry, mines, fisheries, trade and transactions, property, maintenance of public services, war taxes, and taxes on vice.

TABLE II
Landholding Farmers' Poll Tax Rate and Total Land Tax in 700

Dependent Variable: Poll Tax Rate = Annual Poll Tax (Dinars)/Annual Total Land Tax (Dinars)

	(1)	(2)
Annual total land tax (dinars)	-0.041***	-0.036***
	(0.015)	(0.013)
Sub-district FE?	No	Yes
Observations	230	230
Adjusted R^2	0.014	0.112

Source: The Greek papyri poll tax registers of three sub-districts in the *kura* of *Qahqawa* (pre-641, *Aphrodito*) in 703-733 (Morimoto 1981, pp. 67-79, 85-87). The sample is restricted to landholding farmers, i.e. individuals who paid a positive land tax. See section A1.7 in the online appendix for more details on the data source. Robust standard errors are in parentheses. * p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01. A constant term is included in the first regression.

TABLE III
The Coptic-Muslim Occupational Differences in 641-1868

	641-969			1848-1868			Change between 641-969 and 1848-1868		
	(1) Copts	(2) Muslims	(3) Diff	(4) Copts	(5) Muslims	(6) Diff	(7) = (4) - (1) Copts	(8) = (5) - (2) Muslims	(9) = (6) - (3) Diff
White-Collar1	0.18	0.09	0.09***	0.18	0.02	0.16***	0.00	-0.07***	0.07**
= 1 if:	(0.39)	(0.28)	[0.03]	(0.39)	(0.13)	[0.01]	[0.03]	[0.02]	[0.04]
= 1 if Professional	0.03	0.01	0.02	0.00	0.00	-0.00***	-0.03**	-0.01	-0.02
	(0.16)	(0.11)	[0.01]	(0.03)	(0.06)	[0.00]	[0.01]	[0.01]	[0.01]
= 1 if High	0.02	0.01	0.02	0.00	0.00	-0.00***	-0.02**	-0.00	-0.02*
Bureaucracy	(0.15)	(0.08)	[0.01]	(0.00)	(0.06)	[0.00]	[0.01]	[0.01]	[0.01]
= 1 if Mid-Low	0.13	0.07	0.06**	0.18	0.01	0.17***	0.05*	-0.06***	0.11***
Bureaucracy	(0.34)	(0.25)	[0.03]	(0.38)	(0.10)	[0.01]	[0.03]	[0.02]	[0.03]
White-Collar2	0.22	0.13	0.09**	0.20	0.07	0.13***	-0.01	-0.05**	0.04
= 1 if White-Collar1 = 1 or:	(0.41)	(0.33)	[0.04]	(0.40)	(0.26)	[0.01]	[0.03]	[0.03]	[0.04]
=1 if Judiciary,	0.01	0.02	-0.01	0.01	0.03	-0.02***	-0.00	0.01	-0.01
Military, Police	(0.09)	(0.15)	[0.01]	(0.08)	(0.17)	[0.00]	[0.01]	[0.01]	[0.01]
= 1 if Clergy,	0.03	0.02	0.01	0.02	0.03	-0.01***	-0.01	0.01	-0.02
Rural Elite	(0.16)	(0.13)	[0.01]	(0.12)	(0.16)	[0.00]	[0.01]	[0.01]	[0.01]
White-Collar3	0.22	0.15	0.07*	0.22	0.10	0.13***	0.00	-0.06**	0.06
= 1 if White-Collar2 = 1 or:	(0.42)	(0.36)	[0.04]	(0.42)	(0.30)	[0.01]	[0.03]	[0.03]	[0.04]
= 1 if Merchant	0.01	0.03	-0.02	0.02	0.02	-0.00	0.01*	-0.00	0.02
	(0.09)	(0.17)	[0.01]	(0.14)	(0.15)	[0.00]	[0.01]	[0.01]	[0.01]
=1 if Artisan	0.19	0.14	0.06	0.27	0.11	0.16***	0.08***	-0.03	0.11***
	(0.40)	(0.34)	[0.04]	(0.44)	(0.31)	[0.01]	[0.03]	[0.03]	[0.04]
= 1 if Farmer	0.34	0.44	-0.10**	0.34	0.50	-0.15***	0.00	0.06	-0.05
	(0.47)	(0.50)	[0.05]	(0.47)	(0.50)	[0.01]	[0.03]	[0.04]	[0.05]
= 1 if Unskilled	0.24	0.27	-0.03	0.16	0.30	-0.14***	-0.08***	0.03	-0.11**
	(0.43)	(0.44)	[0.04]	(0.37)	(0.46)	[0.01]	[0.03]	[0.03]	[0.05]
% Copts		56.47%			6.7%				
Observations	227	175		1121	15520				

Source: The APD sample on occupations and religion in 641-969 and the 1848-1868 census samples (see text and sections A1.1 and A1.3 in the online appendix for details). Standard deviations are in parentheses. Robust standard errors are in brackets. * P-value < 0.10, ** P-value < 0.05, and *** P-value < 0.01. Differences in columns (3), (6), (7), (8), and (9) are estimated from the regressions: $y_{it} = \sum_{l=1}^{2} \beta_{1l} d_l + \sum_{l=1}^{2} \beta_{2l} (copt_{it} \times d_l) + \varepsilon_{it}$, where y_{it} is a dummy variable indicating the occupational outcome of individual i in period t (= 641-969 or 1848-1868); d_l are period fixed effects; $copt$ is an indicator for being Coptic Christian; ε_{it} is an error term.

TABLE IV
Individual-Level Annual Poll Tax Payments (Dinars) in 641-1100

Panel (A): Descriptive Statistics by *Kura*

Name	Period	N	% No Tax	Median	Mean	Std. Dev.	Min	Max
Ihnas	701-900	10	0	1.38	1.35	0.50	0.88	2.25
Ashmunayn	731-1100	77	0	0.96	1.36	1.18	0.17	6.71
Fayum	641-1005	7	0	0.99	1.34	0.81	0.25	2.67
Qahqawa	703-733	314	46.5	1	1.07	1.27	0.00	5.00

Panel (B): Determinants of Individual-Level Poll Tax Payments in 641-1100

Dependent Variable: Individual-Level Annual Nominal Poll Tax Payment in Dinars

	(1)	(2)	(3)	(4)	(5)
=1 if Arab settlement in *kura* in 700-969	0.290**			0.203	0.214
	(0.133)			(0.985)	(0.960)
Log (urban population) in 300		0.131**		0.040	0.032
		(0.062)		(0.468)	(0.515)
=1 if *kura* on Holy Family route in 400			0.285**		0.007
			(0.139)		(0.346)
Observations	408	408	408	408	408
Adjusted R^2	0.007	0.005	0.007	0.007	0.002

Source: Papyri poll tax registers and receipts in 641-1100 combined with multiple data sources. See sections A1.7, A1.8, and A1.9 in the online appendix for details. Robust standard errors are in parentheses. A constant term is included in all regressions of panel (B).

TABLE V
Summary Statistics - The 1848-1868 Population Census Samples

	Individual-Level			District-Level
	Copts	Muslims	Total	Total
District's Share of Copts in 1848-1868	0.17	0.06	0.07	0.06
	(0.10)	(0.08)	(0.08)	(0.08)
=1 if average poll tax high in district in 641-	0.42	0.71	0.67	0.73
1100 (11 districts; 2682 individuals)	(0.49)	(0.45)	(0.47)	(0.47)
=1 if Arab settlement in district in 700-969	0.46	0.71	0.69	0.64
	(0.50)	(0.46)	(0.46)	(0.48)
Log (urban population) in 300	9.87	9.92	9.91	9.96
	(0.92)	(0.68)	(0.70)	(0.71)
=1 if district on Holy Family route in 400	0.29	0.32	0.32	0.28
	(0.45)	(0.47)	(0.46)	(0.45)
Percentage of Villages with at least one	0.06	0.04	0.04	0.04
Coptic monastery in 1200	(0.10)	(0.08)	(0.08)	(0.08)
=1 if an *Autopract* estate in district in 600 (35	0.68	0.67	0.67	0.66
districts; 6792 individuals)	(0.47)	(0.47)	(0.47)	(0.48)
=1 if Byzantine garrison in district in 600	0.24	0.30	0.29	0.30
	(0.43)	(0.46)	(0.45)	(0.46)
Observations	1121	15520	16641	76

Source: The 1848-1868 census samples combined with other data sources. See sections A1.1, A1.4, A1.7, A1.8, A1.9, and A1.10 in the online appendix for details. Standard deviations are in parentheses.

TABLE VI
Poll Tax, Arab Settlement, and Copts' Population Share in 1848-1868 - OLS Estimates

Dependent Variable =1 if Coptic Christian

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
=1 if average poll tax high in district in 641-1100	-0.163***	-0.281**	-0.551*	-0.176***	-0.617*					
	(0.043)	(0.099)	(0.275)	(0.030)	(0.320)					
=1 if Arab settlement in district in 700-969						-0.071**	-0.074***	-0.079**	-0.057***	-0.091***
						(0.029)	(0.028)	(0.036)	(0.020)	(0.026)
Controls for urbanization and religiosity?	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes
Other controls?	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Province of origin FE?	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Number of districts	11	11	11	11	11	76	76	35	76	35
Observations	2682	2682	2682	2682	2682	16641	16641	6792	16641	6792
Adjusted R^2	0.047	0.058	0.060	0.057	0.075	0.017	0.017	0.020	0.078	0.053

Source: The 1848-1868 population census samples combined with multiple data sources. See sections A1.1, A1.4, A1.7, A1.8, A1.9, and A1.10 in the online appendix for details. Standard errors clustered at district level are in parentheses. * p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01. A constant is included in all regressions.

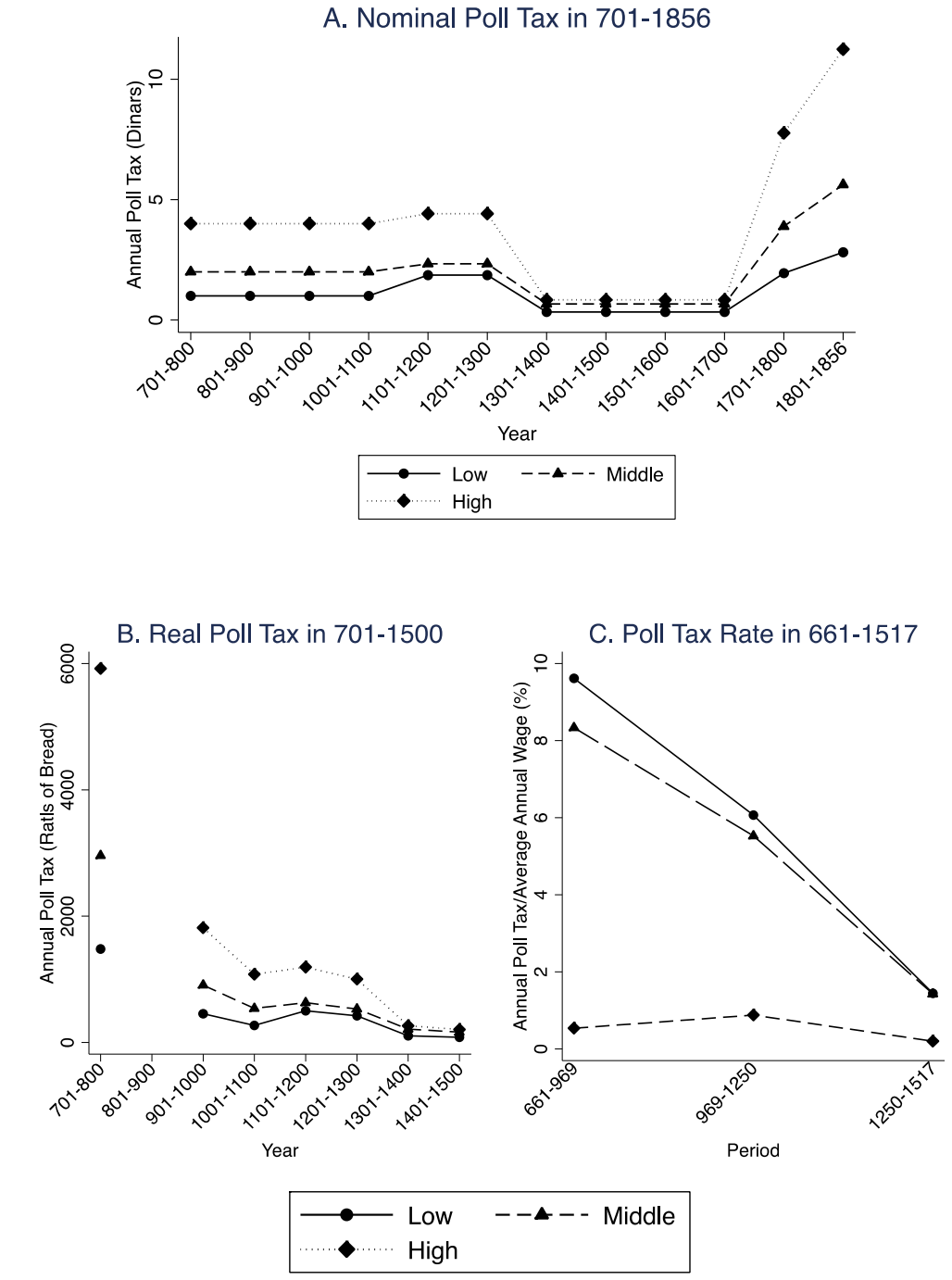
TABLE VII
Poll Tax, Arab Settlement, and the Coptic-Muslim Occupational Differences in 1848-1868 - OLS Estimates

	(1) =1 if White-Collar1	(2) =1 if White-Collar2	(3) =1 if White-Collar3	(4) =1 if Professi-onal	(5) =1 if High Bureau-cracy	(6) =1 if Mid Bureau-cracy	(7) =1 if Judiciary, Military	(8) =1 if Clergy, Rural Elite	(9) =1 if Merchant	(10) =1 if Artisan	(11) =1 if Farmer	(12) =1 if Unskilled
Panel (A): Average Poll Tax High in District in 641-1100 Indicator - No Controls												
=1 if Copt	0.087***	0.003	0.010	-0.005**	0.000	0.092***	-0.029***	-0.055***	0.007	0.151**	-0.061	-0.100*
	(0.014)	(0.015)	(0.024)	(0.002)	(0.000)	(0.015)	(0.001)	(0.014)	(0.010)	(0.049)	(0.039)	(0.048)
Copt * Poll tax	0.074*	0.129***	0.097*	0.003	-0.003*	0.074*	-0.018***	0.073**	-0.032*	0.110	-0.143	-0.063
	(0.039)	(0.034)	(0.044)	(0.002)	(0.002)	(0.040)	(0.004)	(0.024)	(0.015)	(0.137)	(0.166)	(0.057)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Districts	11	11	11	11	11	11	11	11	11	11	11	11
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.072	0.026	0.016	-0.002	0.001	0.097	0.036	0.018	0.009	0.065	0.056	0.035

Panel (B): Average Poll Tax High in District in 641-1100 Indicator - With Controls												
=1 if Copt	0.875	-1.278	0.928	0.052	-0.007	0.830	-0.294*	-1.859***	2.206***	6.541**	-7.618***	0.150
	(0.606)	(0.973)	(1.019)	(0.044)	(0.029)	(0.564)	(0.153)	(0.351)	(0.055)	(2.723)	(0.272)	(1.882)
Copt * Poll tax	0.349**	0.032	0.439*	0.011	-0.001	0.339**	-0.050	-0.267***	0.406***	1.701***	-2.268***	0.129
	(0.155)	(0.221)	(0.233)	(0.009)	(0.006)	(0.148)	(0.033)	(0.070)	(0.015)	(0.533)	(0.155)	(0.391)
Copt * Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Districts	11	11	11	11	11	11	11	11	11	11	11	11
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.081	0.026	0.018	-0.003	-0.001	0.111	0.034	0.019	0.011	0.089	0.077	0.037
Panel (C): Arab Settlement in District in 700-969 Indicator - No Controls												
=1 if Copt	0.104***	0.038	0.056*	-0.001	-0.002*	0.107***	-0.022***	-0.045***	0.018	0.212***	-0.158***	-0.110***
	(0.021)	(0.023)	(0.032)	(0.002)	(0.001)	(0.022)	(0.005)	(0.008)	(0.012)	(0.033)	(0.049)	(0.040)
Copt * Arab settlement	0.153***	0.183***	0.151**	-0.002	-0.002	0.157***	-0.004	0.035**	-0.032**	-0.059	-0.037	-0.055
	(0.055)	(0.064)	(0.070)	(0.002)	(0.002)	(0.055)	(0.008)	(0.016)	(0.015)	(0.058)	(0.093)	(0.046)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Districts	76	76	76	76	76	76	76	76	76	76	76	76
Observations	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641
Adjusted R^2	0.087	0.035	0.028	0.002	0.004	0.116	0.035	0.011	0.017	0.039	0.105	0.060
Panel (D): Arab Settlement in District in 700-969 Indicator - With Controls												
=1 if Copt	0.051	-0.166	-0.060	-0.006	0.026	0.031	-0.092***	-0.125	0.106*	-0.438*	0.157	0.342*
	(0.213)	(0.280)	(0.297)	(0.016)	(0.019)	(0.218)	(0.026)	(0.087)	(0.058)	(0.239)	(0.423)	(0.173)
Copt * Arab settlement	0.098	0.082	0.080	-0.001	-0.003	0.101	-0.018***	0.002	-0.002	-0.122*	0.102	-0.060
	(0.069)	(0.087)	(0.089)	(0.002)	(0.002)	(0.071)	(0.006)	(0.022)	(0.011)	(0.061)	(0.124)	(0.045)
Copt * Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Districts	35	35	35	35	35	35	35	35	35	35	35	35
Observations	6792	6792	6792	6792	6792	6792	6792	6792	6792	6792	6792	6792
Adjusted R^2	0.062	0.024	0.024	0.001	0.006	0.083	0.047	0.015	0.015	0.063	0.109	0.068

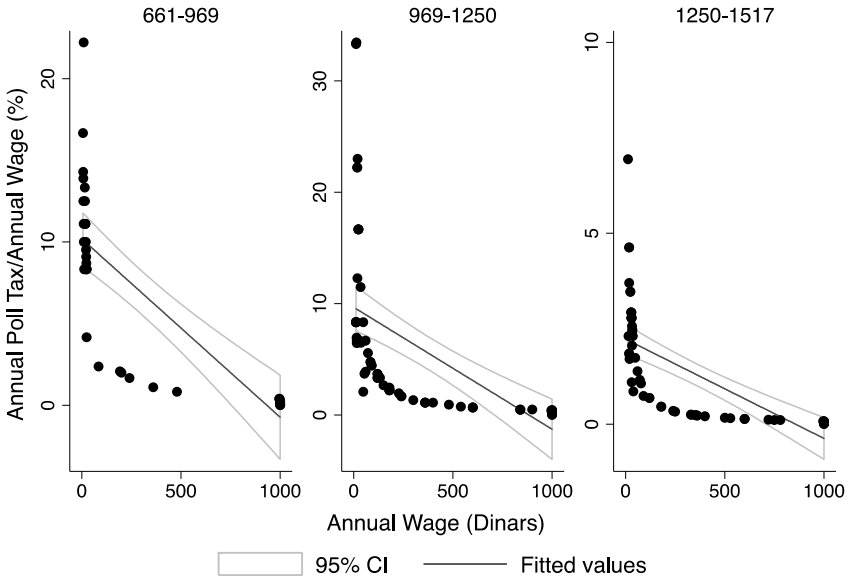
Source: The 1848-1868 population census samples combined with multiple data sources. See sections A1.1, A1.4, A1.7, A1.8, A1.9, and A1.10 in the online appendix for details. Standard errors clustered at the district of origin level are in parentheses. * p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01.

FIGURE I
De Jure Poll Tax in 701-1856



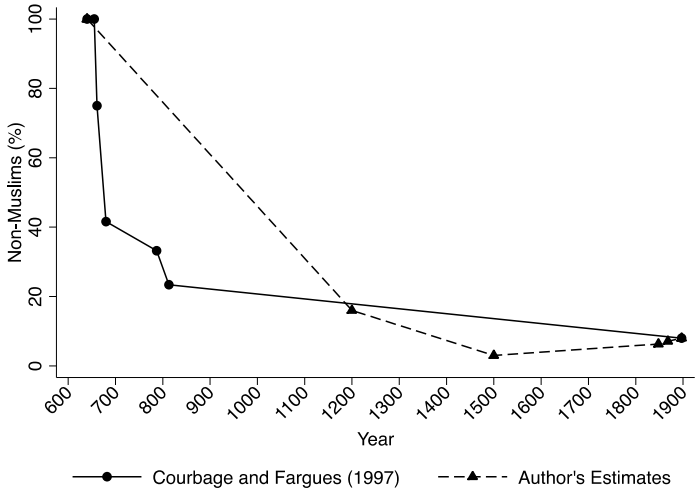
Source: See section A1.6 in the online appendix.

FIGURE II
De Jure Poll Tax Rate and Wages in 661-1517



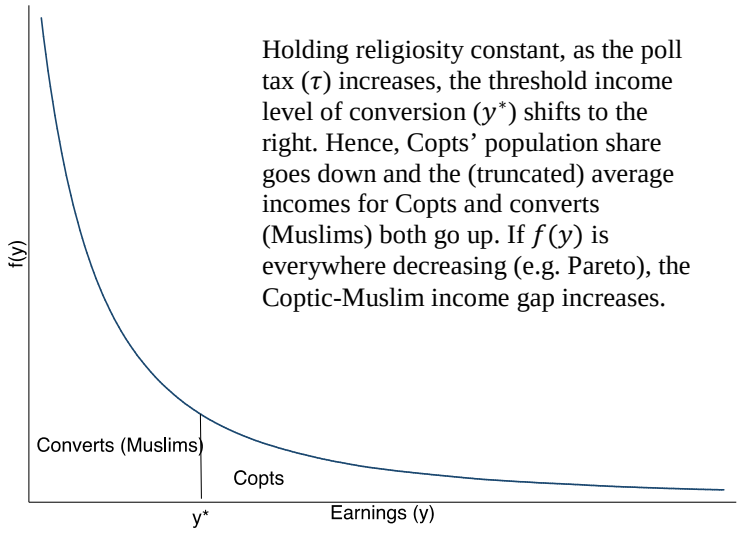
Source: See section A1.6 in the online appendix. Fitted regression lines are as follows (robust standard errors are in parentheses): (1) 661-969: y = - 0.011 (0.001) + 10.187 (0.911) x [N = 35; R^2 = 0.59]; (2) 969-1250: y = - 0.011 (0.002) + 9.666 (1.310) x [N = 77; R^2 = 0.32]; (3) 1250-1517: y = - 0.003 (0.000) + 2.228 (0.235) x [N = 60; R^2 = 0.47].

FIGURE III
Islamization of Egypt in 641-1868



Source: See text and section A1.4 in the online appendix.

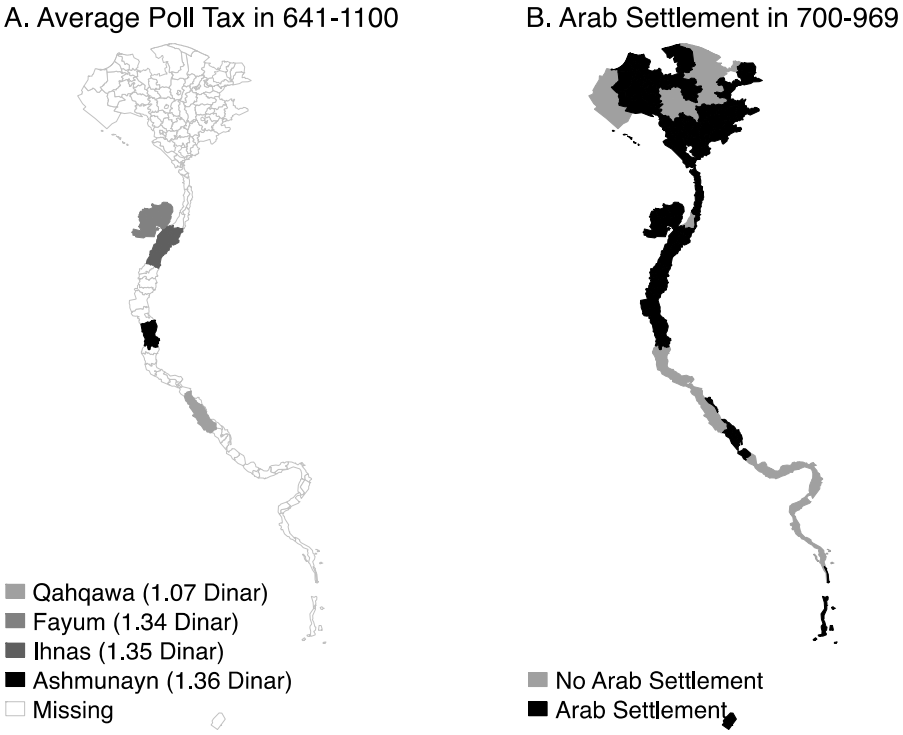
FIGURE IV
The Marginal Effects of the Poll Tax in a Static Environment

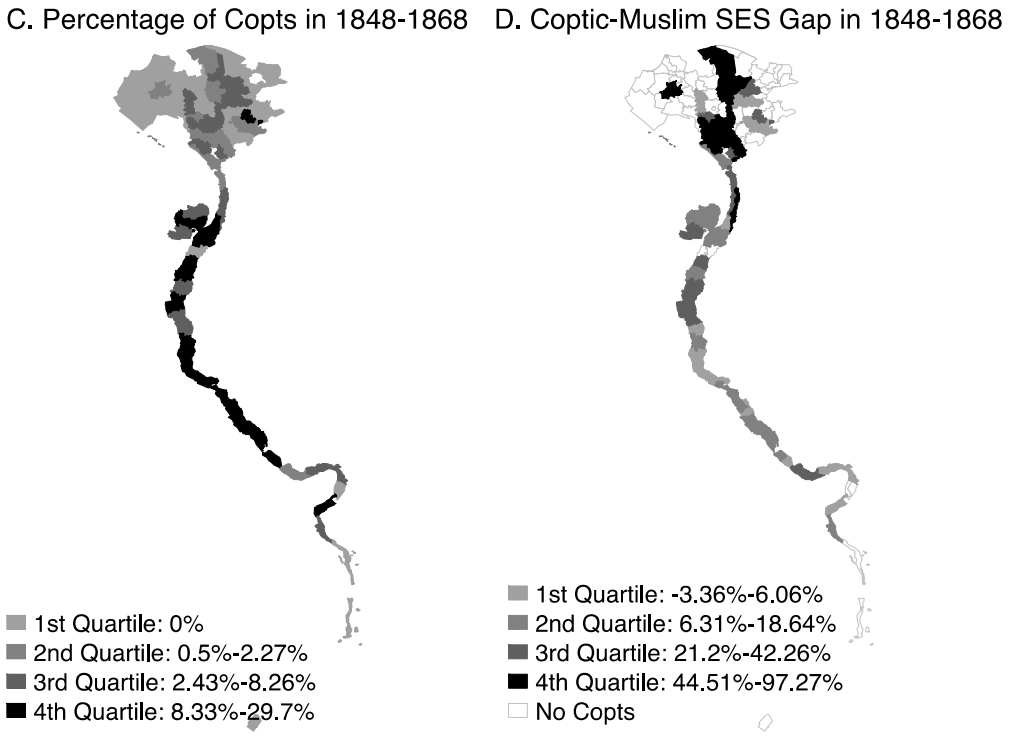


Holding religiosity constant, as the poll tax (τ) increases, the threshold income level of conversion (y^*) shifts to the right. Hence, Copts' population share goes down and the (truncated) average incomes for Copts and converts (Muslims) both go up. If $f(y)$ is everywhere decreasing (e.g. Pareto), the Coptic-Muslim income gap increases.

Source: See text.

FIGURE V
The Spatial Distribution of the Key Variables





Source: Panel (A) is from the papyri poll tax registers and receipts in 641-1100, Panel (B) is from the data on Arab settlement in 700-969, and Panels (C) and (D) are from the 1848-1868 population census samples. The Coptic-Muslim SES gap is the difference between Copts and Muslims in the population share of professionals and bureaucrats (white-collar1 = 1). See sections A1.1, A1.7, A1.8, and A1.10 in the online appendix for details.

APPENDIX FOR ONLINE PUBLICATION

ON THE ROAD TO HEAVEN: SELF-SELECTION, RELIGION, AND SOCIOECONOMIC STATUS

Mohamed Saleh

December 22, 2015

Abstract

The appendix is divided into three parts. First, I describe the data sources that are employed throughout the paper. Second, I present the results of the robustness checks besides additional results that are omitted from the paper due to space limitations. Third, I present the proofs of the conceptual framework.

A1. Data Sources

A1.1. Egypt's 1848 and 1868 Population Census Samples

The 1848 and 1868 population censuses are among the earliest pre-Colonial individual-level population censuses from any non-Western country to enumerate all household members, including females, children, and slaves. They contain information on a wide range of variables including place of residence, name, gender, age, relationship to household head, nationality, ethnicity, free/slave status, religion, place of origin, occupation, school enrollment (for male children), and dwelling ownership and type (available in cities only). I digitized a nationally representative sample of each census (about 80,000 individuals in each sample) from the original Arabic manuscripts at the National Archives of Egypt. The sampling rate is 8-10 percent in Egypt's two major cities, Cairo and Alexandria, and 1 percent in all the other provinces. More details about the sampling strategy are in Saleh (2013).

I pooled the samples from both years and restricted the analysis to Egyptian local free Coptic and Muslim active men of a rural origin who are at least 15 years of age with non-missing values on age, religion, occupation, and district of origin. The sample restrictions aim at limiting the sample to the likely descendants of Egypt's pre-641 population who either converted to Islam or remained Coptic Christian. (1) I restricted the sample to "Egyptians," or individuals who are listed in the census manuscripts as *dakhil al-hukuma* (under the control of the Egyptian government); this excludes all foreigners such as Turks, Levantines, Armenians, Ottoman Greeks, North Africans, Asians, Americans, and Europeans. (2) I further restricted the sample to "locals," which excludes certain groups of "Egyptians" who are not originally from the Nile Delta or the Nile Valley to the north of Nubia, namely, Arab Bedouins, Nubians, Sudanese, and Abyssinians.[1] (3) I included only individuals of a rural origin. An individual's place of origin in the census manuscripts refers to the origin of the individual's family, i.e. it is not necessarily the place of birth. This restriction excludes individuals whose family origin is in major cities and deserts thus mitigating the potential cross-district movement of an individual's ancestors in 641-1868 under the presumption that most migration was towards cities.[2]

In order to construct the occupational outcomes, I first manually translated and coded all the occupational titles in the census manuscripts following the coding of the Historical International Standard Classification of Occupations (HISCO). I then classified each occupational code into one of nine categories: (1) professionals, (2) high-level bureaucrats, (3) mid-low bureaucrats, (4) the judiciary, (5) the military/police, (6) the clergy and the rural elites, (7) artisans, (8) farmers, and (9) unskilled workers. The first six categories comprise the three white-collar indicators.

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[1] Arab Bedouins (*'orban*) in the 1848-1868 census samples are likely (descendants of) the Arab tribes that immigrated to Egypt during the eighteenth century. That was the second large wave of Arab settlement in Egypt after the first post-Conquest wave in 700-969 that I exploit in the paper.

[2] Specifically, I excluded individuals whose family origin is in major cities (Cairo, Alexandria, Rosetta, and Damietta) and deserts (Al-Arish, Al-Qusayr, and the Western Desert Oases). Children in the 1848 census, but not in the 1868 census, inherit their fathers' place of origin (Saleh, 2013).

A1.2. Estimating the Coptic-Muslim Difference in Adult Mortality (Life Expectancy) from the 1848-1868 Population Census Samples

The handbook of the UN Population Division (2002, pp. 5-20) outlines a methodology for estimating adult mortality from any two consecutive censuses, with an interval of x years, where x is a multiple of 5. The methodology uses the relative sizes of age cohorts, defined in groups of 5-year intervals, in the two censuses in order to estimate the probability of survival to an age y + x, conditional on being of age y in the first census. A slightly different methodology, the synthetic survival ratio, calculates the growth rate of each age cohort in order to make the methodology applicable to any census interval, i.e. not necessarily a multiple of 5. I applied the two methods to the census samples of 1848 and 1868, in order to estimate the adult mortality by religious group. A few caveats arise though: (a) the time interval separating the two Egyptian censuses (20 years) is too long to apply the two methodologies; ideally, the interval should be around 5 or 10 years, (b) I do not have 100-percent samples of the two censuses, and hence, there is a sampling error in estimating the size of the age cohorts, and (c) there is a problem of age misreporting; in particular, age heaping and age exaggeration, which is typical in historical censuses and even in contemporary censuses in developing countries. Age misreporting is likely correlated with the SES and may hence differ in a non-random way across religious groups, where Muslims are more likely to misreport their true age. In order to mitigate age misreporting, I defined age groups in intervals of 10 years instead of 5 years. The estimation results are shown in Table (A.1).

TABLE A.1
Estimating Adult Mortality from the 1848-1868 Census Samples

	Age Group	Estimated Size in 1848	Estimated Size in 1868	Estimated Life Expectancy (Method 1)	Estimated Life Expectancy (Method 2)
Copts	0-9	90,740	117,801	NA	NA
	10-19	32,981	51,600	41.45	42.90
	20-29	33,290	52,466	44.59	44.59
	30-39	40,100	36,657	30.44	32.20
	40-49	27,031	26,187	25.46	24.72
	50-59	15,325	25,345	22.61	21.02
	60-69	11,406	12,595	17.67	16.10
	70-79	7,849	10,899	11.52	9.03
	80+	7,094	5,107	NA	NA
Muslims	0-9	1,148,827	1,458,614	NA	NA
	10-19	377,685	603,264	43.44	44.82
	20-29	406,293	622,071	49.08	48.73
	30-39	457,208	481,535	32.97	32.65
	40-49	348,101	360,926	25.90	23.79
	50-59	243,063	288,588	21.83	19.98
	60-69	171,180	195,387	16.88	13.53
	70-79	99,442	111,561	12.26	8.68
	80+	125,336	78,559	NA	NA

Source: The 1848-1868 population census samples. See sections 3.2 in the main text and sections A1.1 and A1.2 in the online appendix for details on the data source.

A1.3. Data on Religion and Occupations in 641-969 from the Arabic Papyrology Database (APD)

A1.3.1. Data Construction

Arabic papyri documents, most of which were discovered since the late nineteenth century in Egypt's dry-climate Nile Valley, remain a mostly unpublished source of information on the micro-level characteristics of the medieval populations of the Middle East, especially Egypt, during the early Islamic period in 641-969. An ongoing research project entitled the Arabic Papyrology Database (henceforth, APD)

attempts at the digitization of all Arabic papyri that were ever *published*.[3] There are various types of documents in the APD, namely, (1) protocols, (2) legal texts (e.g. marriage and sale contracts), (3) administrative texts (e.g. official letters, lists, and accounts), (4) private texts (e.g. private and business letters), and (5) literary texts.[4]

I used all papyri documents in the APD in order to construct an individual-level dataset on occupational titles and religious affiliation, where I inferred a worker's religion from his name because converts adopted an Arabic name upon conversion to Islam.[5] Basically, I included in the sample *every* male mentioned in any APD document with a non-missing name and occupational title.

A few important notes on the APD sample construction are in order:

(1) Because the occupational title of "landholding farmer" is almost never mentioned in the papyri (a landless farmer, or '*agir*, is explicitly mentioned though), I inferred if a male with a non-missing name is a landholding farmer if he is recorded as paying a positive land tax in the papyri land tax registers and receipts. Notice that the vast majority of farmers in Egypt were landholding farmers who were assigned land plots on which they held usufruct rights and paid a positive land tax.

(2) Because my goal is to compare Copts to Egyptian Muslims (converts), I ideally want to exclude non-Egyptian Muslims (mainly, Arabs and Turks) from the sample. For this purpose, I excluded individuals in top government posts, namely, Caliphs, viceroys, and top government administrators, who were certainly Arab settlers in 641-969. I am unable though to identify all Arab settlers because converts adopted Arabic names upon conversion.

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[3]Out of more than 150,000 Arabic papyri that were ever *discovered*, there are only 2,500 documents (less than 2 percent) that were published since 1900. The APD, which was launched in 2004, has, as of April 2015, digitized 2,068 documents or about 83 percent of the published papyri.

[4] Papyrus is a material of writing that was most prevalent in Egypt until 969. The APD documents are written on various writing materials besides papyrus including paper, ostracon, woodtable, waxtable, stone, parchment, leather, bone, and textile. All those documents are included in the APD sample.

[5] An extant administrative list of new converts in 700-900 reveals that a convert had to adopt an Arabic name upon conversion and to become a client of an Arab patron (Morimoto 1981, p. 131).

(3) Although there are APD documents in 969-1517, I restricted the sample to 641-969 because (a) there are fewer papyri after 969, the year of the Fatimid Conquest of Egypt, as paper increasingly replaced papyrus as the writing material and (b) most Copts' conversions to Islam took place by 680, or, at the latest, by 1200, and thus the early Islamic period is arguably the most important to examine.

(4) I inferred religious affiliation from names *only*. In particular, I chose to *not* use any other contextual information, such as occupation, in the inference of religion in order to mitigate *non-random* measurement error. Moreover, I only included males with names that are certainly Muslim or Christian based on the list of names in the 1848-1868 census samples and on papyrologists' interpretations of the papyri.

These procedures resulted in a final sample of 402 males with religious affiliation and occupational titles in 641-969. This is the sample that I used in Table (III).

A1.3.2. Addressing the Concerns about the APD Sample

There are at least three concerns about the APD sample. First, there is a concern about the national representativeness of the sample, because (a) it may be non-random on location; 65 percent of the sample is from unknown locations inside Egypt, 34 percent from the Nile Valley, and only less than one percent comes from the (more humid) Nile Delta and (b) it may be non-random on SES, because it likely over-represents males of high SES who had a higher chance of appearance in the papyri. Second, I may misidentify Copts, since I cannot tell if a non-Muslim name is Coptic, non-Coptic Christian, or Jewish, and, similarly, I may misidentify converts, since I cannot tell if a Muslim name is a descendant of a Coptic convert or of an Arab/Turkish settler. Third, there is an error in observing occupations as I inferred if an individual is a landholding farmer from the incidence of payment of a land tax.

While I cannot rule out these concerns, there are arguments that mitigate each of them. (1) On the first concern, even if the APD sample is mostly from the Nile Valley (which is not necessarily the case because location is missing in 65 percent of the sample), the 1848-1868 population census samples reveal that the Nile Valley had

a higher Copts' population share and a smaller, yet positive and statistically significant, Coptic-Muslim SES difference than the Nile Delta. Hence, the APD sample would, if anything, *underestimate* the true Coptic-Muslim SES difference. More important, 72 percent of the APD sample is from *administrative* documents, namely, lists (54 percent) and receipts of payment (18 percent). Those are arguably *neutral* documents in which every individual has an equal chance of appearance. And while the remaining 28 percent of the sample is from contracts (sale, lease, marriage, divorce, and written obligation contracts) and private and business letters, where selection-on-SES is more likely, the statistics in Table (III) do not change if I limit the sample to the administrative lists and receipts. Finally, even if the APD sample is not representative of the population share of each occupational outcome within each religious group, it may be still representative of the Coptic-Muslim *difference* in the population share of each occupational outcome if non-random selection is the same within each group.

(2) On the second concern, non-Muslims in the APD sample are almost certainly Copts because those were the vast majority of non-Muslims (about 96 percent of Christians in 1200, based on the dataset on Christian churches and monasteries that I describe in section A1.4) and because non-Coptic Christians and Jews rarely settled in the Nile Valley where 34 percent of the APD sample is from.[6] On the other hand, even if I misidentify Arab/Turkish settlers as Egyptian converts, this would in fact *overestimate* the share of high-SES workers among converts since Arab/Turkish settlers in 641-969 were more likely to be in high-SES occupations as they were the political elite. That would in turn *underestimate* the true Coptic-Muslim SES difference.

(3) On the third concern, the share of males who are assigned as landholding farmers within each religious group in the APD sample is similar to the share of

[6] Jews were mostly urban and Mikhail (2004, p. 134) states that there is neither literary nor documentary evidence on the *Melkites*' (non-Coptic Christians) presence in the Nile Valley in the post-Conquest period. In 1200, 91 percent of the non-Coptic (*Melkite* and Armenian) Christian churches and monasteries were in the Nile Delta and in major cities (Cairo, Alexandria, and Damietta).

landholding farmers within each religious group in the 1848-1868 population census samples, which may lend support to the procedure of inferring the "landholding farmer" occupation from paying a positive land tax.

A1.3.3. Historical Evidence on the Findings in Table (III)

The occupational differences that are documented in Table (III) are supported by historical evidence. Copts' over-representation in the mid-low bureaucracy from 641 to, at least, 1900 is well documented in history (Tagher, 1998 [1951]; Sheikho, 1987; Samir, 1996; Amer, 2000). According to Tagher (1998 [1951], p. 142), "*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 his only hope to accumulate wealth*." Circa 1000, Al-Muqaddasi (1877, p. 183) noted 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 [1951], p. 213). Historical evidence also indicates that Copts' advantage over Muslims was *not* limited to the mid-low bureaucracy. Raymond (1973, pp. 456-59) lists the artisanal occupations where Copts were over-represented in eighteenth-century Cairo, namely, carpenters, tailors, and weavers, which is essentially the same set of occupations that I observe among Coptic artisans in 641-969 and in 1848-1868. As for Muslims, the political/religious white-collar jobs were restricted to them by Islamic law, although those were not necessarily accessible to converts. There is also historical evidence that Muslims were over-represented in commerce. Under the *Mamluks* in 1250-1517, for example, all merchants of spices were Muslims (Tsugitaka, 2006).

A1.4. Data on Churches and Monasteries in 1200 and 1500

A1.4.1. Data Construction

I constructed a village-level dataset on the number of Christian (both Coptic and non-Coptic) churches and monasteries in 1200 and 1500 from two independent medieval sources, (1) Abul-Makarim (1984 [1200])'s *History of Churches and Monasteries*,

who provides a comprehensive list of Christian churches and monasteries in Egypt at the end of the twelfth century, and (2) Al-Maqrizi (2002 [1500])'s *Sermons and Considerations in Examining Plans and Monuments*, who lists Christian churches and monasteries in Egypt in the fifteenth century.[7]

Both sources list the location of Christian churches and monasteries at the village level, which is smaller than districts in 1848-1868. I matched the villages in both sources to the villages in 1848-1868 according to the administrative division of the 1897 census, where I either manually searched for those villages in 1897 or referred to Ramzi (1994 [1954]). I was therefore able to calculate the number of Coptic and non-Coptic Christian churches and monasteries in each village in 1200 and 1500.

I used this dataset in order to construct three variables. (1) The share of villages in all Egypt with at least one Christian church or monastery in 1200 and 1500 (both Coptic and non-Coptic), which I used as an estimate of Egypt's non-Muslims' population share in 1200 and 1500 in Figure (III), under the presumption that a village with at least one Christian church/monastery is 100 percent non-Muslim and that a village without any church or monastery is 100 percent Muslim. I supplemented these estimates by the 1848-1868 census samples where non-Muslims were around 7 percent of the population. (2) The share of villages in each district with at least one Coptic church or monastery in 1200 and 1500, which I used as an estimate of the medieval Copts' population share in each district in the robustness checks in section 4.6.3 [Table (A.7)]. (3) The share of villages in each district with at least one Coptic monastery in 1200, which I used as a control variable in the empirical analysis [Tables (VI) and (VII)] in order to control for the pre-641

[7] There are two versions of Abul-Makarim's 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 wrongly attributed to "Abu-Saleh, the Armenian." That version lists Christian churches and monasteries in the Nile Valley only. The second version, which I use in the paper, is by Anba-Samuel, who edited a two-volume version of the book in 1984. The first volume includes the missing part of the book about the Nile Delta, whereas the second volume is a re-publication of Evetts' book on the Nile Valley. The book is now believed to belong to the twelfth-century Coptic chronicler, Abul-Makarim.

generosity of the intra-Coptic transfers. The denominator in all three measures, the total number of villages, whether in all Egypt or in each district, was computed as of 1477 in order to mitigate the concern about the possible emergence of new villages between 1200 (or 1500) and 1848-1868. That was based on Ramzi (1994 [1954])'s list of "old" (i.e. pre-1477) and "new" (i.e. post-1477) villages, which is in turn based on a Mamluk cadastral survey that was published in Ibn Al-Jay'an's (1477) *al-tuhfa al-saniya bi asmaa' al-bilad al-misriya* (List of Names of Egyptian Localities).

A1.4.2. The Data's Contribution to the Historical Literature

The dataset makes two contributions to the historical literature. First, it contributes to a long-standing debate on the timing of Egypt's Islamization. Second, it allows me to trace the composition of Egypt's Christian population among Copts and non-Coptic Christians in 1200-1868, which, when combined with other pieces of evidence, helps to document the evolution of the composition of the entire non-Muslim population in 641-1868. Below, I discuss each of these contributions.

A1.4.2.1. The Historical Debate on Egypt's Islamization

There are no statistics on Egypt's religious composition before 1897, the year of the first *published* population census with information on religious affiliation (this is apart from the 1848 and 1868 *unpublished* population census manuscripts of which I digitized nationally representative samples). Yet, there is a consensus on a number of historical facts. Christianity reached Egypt in the first century and the Church of Alexandria was a major theological center since the second century (Bowman, 1989, pp. 191-202). The last pocket of paganism in Egypt was Christianized in the mid-sixth century (Bowman, 1989, p. 192). The Coptic Christian Church of Alexandria, followed by the Egyptian masses, separated from the Byzantine church because of a theological debate in 451 (Tagher, 1998 [1951], pp. 1-7; Atiya, 2005, pp. 71-76). Yet, Greeks and Hellenized Egyptians remained loyal to the Byzantine church forming a parallel church, the *Melkite* Church of Alexandria. Condemned as heretics by the Byzantines, Copts suffered from persecution until the Arab Conquest in 639-641

(Bowman, 1989, p. 198; Atiya, 2005, pp. 87-99). Hence, on the eve of the Conquest, Coptic Christians constituted the vast majority of Egypt's population, whereas non-Coptic Christians (mostly, *Melkites*) and Jews formed two small minorities (Lane-Poole, 1969, p. 2; Tagher, 1998 [1951], p. 4; Wilfong, 1998, p. 175).[8] During the twelve and a half centuries that followed the Arab Conquest, Non-Muslims shrank from 100 percent of the population in 641 to 7 percent in 1897.

Determining the date at which non-Muslims shrank into a minority is a very old debate in Egyptian history since at least the work of the renowned fifteenth-century Egyptian historian, Al-Maqrizi. There are two viewpoints on this debate. One tradition (Al-Maqrizi, 2002 [1500]; Dennett, 1950; Lane-Poole, 1969; Mikhail, 2004) argued that Egypt was Islamized by the ninth century because of the suppression of the Coptic tax revolts that erupted between 726 and 866. Another tradition (Wiet, 1927; Little, 1976; El-Leithy, 2005; Werthmuller, 2010) argued, to the contrary, that Copts remained in the majority until the fourteenth century, where an unprecedented wave of state persecution triggered mass conversions to Islam among Copts.

Apart from this unresolved debate, there are two quantitative studies on the subject. First, Bulliet (1979) used lineages of a sample of prominent individuals in the medieval narratives in order to identify the date at which an individual's ancestors converted to Islam and adopted an Arabic name. He found that conversions peaked in the ninth century. Second, Courbage and Fargues (1997, pp. 27-28) used total poll and land tax revenues in order to estimate the share of the non-Muslim population in 641-813. My estimates in 1200 and 1500, shown in Figure (III), are consistent with those of Courbage and Fargues and are supportive of the first historical tradition.

A1.4.2.2. The Composition of Egypt's Non-Muslim Population in 641-1868

The dataset on Christian churches and monasteries allows me to trace the composition of the Christian population in 1200 and 1500. The data indicate that in

[8] Non-Coptic Christians before 641 were mostly *Melkites*. There were also other minor non-Coptic and non-*Melkite* Christian factions before 641 that were later assimilated into either the Coptic or the *Melkite* Churches (Mikhail, 2004, pp. 46, 48).

both 1200 and 1500, only 4 percent of those institutions were non-Coptic, mostly, *Melkite* and Armenian. This is equal to the percentage of non-Coptic Christians out of the total Christian population in the 1848-1868 census samples, which indicates that their share relative to Copts persisted in 1200-1868. However, the ethnic composition of non-Coptic Christians expanded in 1848-1868 beyond *Melkites* and Armenians, to include Greeks, Levantines, and Europeans.

Tracing the composition of the *entire* non-Muslim population in 641-1868, however, requires estimating the population shares (out of non-Muslims) of Jews in 641-1868 and of non-Coptic Christians in 641-1200, for which further evidence is needed. First, Jews were a "small" minority in 641 and constituted 2 percent of non-Muslims in 1848-1868, which suggests that their share out of all non-Muslims was stable in 641-1868. Second, historical evidence suggests that non-Coptic Christians' share out of all non-Muslims in 641 was similar to their share in 1200.[9]

Hence, one may conclude that non-Coptic Christians and Jews remained two small minority groups of Egypt's non-Muslim population in 641, 1200, 1500, and in 1848-1868. That indicates that each of the two groups witnessed in 641-1868 a decline in its share out of Egypt's *total* population that was similar to the rate of decline in Copts' population share. However, because in- and out-migration waves among non-Coptic Christians and Jews were more frequent (in contrast to Copts), it is unlikely that the decline in their shares is attributable to conversions alone.

A1.5. Taxes and Benefits in 641-1856 [Table (I)]

The composition of taxes and benefits in Table (I) is based on Morimoto (1981, pp. 51, 140, 257-263), Rabie (1972, pp. 73-132), Ismail (1998, pp. 153-208), and Mahmoud (2009). The actual tax system in 641-750 may have deviated though from that depicted in Table (I) before jurists established the *canonical* form of Islamic taxation around 750. There are three sources of this deviation:

[9] There were only 7 *Melkite* churches in Egypt in 600 (Mikhail 2004, p. 48).

(1) Although converts in 641-750 were in principle exempted from the poll tax and were subject to a reduced land tax (tithe, *ushur*) that was less than half of the *kharaj* tax on Coptic landholders (Frantz-Murphy 1999, p. 238), Muslim rulers, confronted by sharp declines in the tax revenues due to widespread conversions, often did not exempt converts from the poll and *kharaj* taxes during that period, with the reduced *ushur* tax being only applied to Arabs (Morimoto, 1981, pp. 66-91).

(2) It is not certain that the *zakat* tax on rich Muslims was actually enforced in 641-750. Sijpesteijn (2013, pp. 181-99) argues that the institutionalization of the *zakat* as a tax paid to the state rather than an informal transfer paid directly by rich Muslims to poor Muslims might have only occurred around 750. Another viewpoint argues that the *zakat* was first institutionalized under Saladin in 1174-1193.

(3) It is not certain if the poll and *kharaj* land taxes in 641-750 were the *same* or *different* taxes due to the confusion in medieval narratives and papyri tax documents in 641-750 over the usage of the two Arabic terms for the poll and land taxes, *jizya* and *kharaj*. Faced by this confusion, earlier historians such as Wellhausen, Becker, Grohmann, and Bell argued that the two taxes were synonyms where they simply meant a *tribute* collected from the village as a whole, rather than two distinct individual taxes, and that the distinction occurred only later on with the fiscal reform of 720. Dennett (1950, pp. 62-103) argued, to the contrary, that the distinction existed since 641 and that both taxes were individual taxes. Kosei Morimoto attempted to reconcile the two viewpoints by arguing that the individual-level assessment of the poll and land taxes, which is manifested in the papyri tax records, was the basis for estimating each community's tribute. In my view, the papyri tax records provide decisive evidence that both taxes were collected individually and were distinct taxes since 641 [see the discussion in Morimoto (1981, pp. 51-57)].

A1.6. Data on the De Jure Poll Tax and Wages in 641-1517

The de jure annual nominal poll tax amounts in Panel (A) of Figure (I) are based on (1) Muslim jurists' handbooks in 701-1100 [Abu-Youssef (1979, pp. 122-4) for the

Umayyad and Abbasid periods in 701-900 and Al-Qadi Al-Nu'man (1963, pp. 379-381) for the Fatimid period in 900-1100], (2) governmental officials' handbooks of administration in 1101-1700 [Ibn-Mamati (1991, p. 318) for the Ayyubid period in 1101-1300 and Al-Qalqashandi (1914, p. 462) for the Mamluk and the early Ottoman periods in 1301-1700], and (3) Ottoman Egypt's tax tabulations in 1701-1856 [Mahmoud (2009a, pp. 112, 136)].

Two viewpoints prevailed among jurists regarding the poll tax amount. On the one hand, the *Hanafi* Sunni School (official under the Abbasids in 750-969 and the Ottomans in 1517-1856) and the *Ismaili* Shiite School (official under the Fatimids in 969-1171) imposed the tax according to three income-brackets: one dinar on manual or low-income workers, two dinars on the middle-income, and four dinars on the rich (*Hanafi*: Abu-Youssef, 1979, pp. 122-4; *Ismaili*: Al-Qadi Al-Nu'man, 1963, pp. 379-381). On the other hand, the *Shafi'i* Sunni School dictated that the tax was fixed at one dinar per person (Al-Shafi'i, 2001, pp. 423-30). Although the Ayyubids (1171-1250) and the Mamluks (1250-1517) officially endorsed the *Shafi'i* School, they often adhered to the three-bracket formula (Mahmoud, 2009a; pp. 32-37).

Relatedly, Muslim jurists disagreed as to the exemption of the poor from the poll tax. While the *Hanafi* Sunni School dictated that the poor were exempted from the tax, both the *Ismaili* Shiite and the *Shafi'i* Sunni schools did not grant such exemption. Using evidence from the Cairo Geniza on destitute Jews in Egypt who paid the poll tax, Goitein (1963) and Alshech (2003) argued that the Ayyubids applied the *Shafi'i* view. Importantly though, under both viewpoints any *working* adult male is considered non-poor and is thus *not* exempted from the poll tax.

The nominal poll tax amounts in panel (A) of Figure (I) are in Islamic dinars weighing 4.25 grams of gold. Those dinars remained in circulation until they were replaced in 1425 with the *Ashrafi* dinars that weighed 3.45 grams. Since the nominal poll tax is recorded in each source in a different currency, I transformed the amounts into Islamic dinars in Panel (A) of Figure (I) as follows:

1. In 701-1100, I used the exchange rate of 12 Dirhams: 1 Dinar under the Umayyads and Abbasids (661-969) from Ashtor (1969, p. 77).

2. In 1101-1300, I used the following exchange rates:

a) 9 Dirhams: 1 Dinar under Saladin (1171-1193) in Ashtor (1969, p. 122).

b) 24 Kirats: 1 Dinar from Zambaur (2013).

c) 72 Habbas: 1 Dinar from Goitein (1967, p. 371).

3. In 1301-1700, I used the exchange rate of 30 Dirhams: 1 Dinar under Barquq (1382-99) from Ashtor (1969, p. 277).

4. In 1701-1800, I used the exchange rate of 45 Nisfs: 1 Sharifi Dinar in 1608 from Mahmoud (2008, p. 112). The Sharifi Dinar weighed 3.45 grams of gold and is thus equivalent to 0.81 Islamic Dinars.

5. In 1801-1856, I used the exchange rate of 6 Piasters: 1 Mahbub Dinar in 1807 from Mahmoud (2009, p. 123). The Mahbub Dinar weighed 3.45 grams of gold and is thus equivalent to 0.81 Islamic Dinars.

In order to translate the nominal annual poll tax amounts into real values in Panel (B), I adjusted the nominal amounts by the purchasing power of the dinar in *ratls* of bread as recorded in Ashtor (1969, p. 465). The *ratl* in Cairo weighed 450 grams.

Panel (C) of Figure (I) plots the poll tax *rate* in 661-1517. I used Ashtor (1969, pp. 90-4, 223-9, 372-81) in order to collect individual-level data on occupational titles and wages in each of the main periods in medieval Egypt's history, where I classified each occupation into one of the three income-brackets according to the criteria in Abu-Youssef (1979, p. 122-4) and assigned to each occupational title the *de jure* poll tax amount that was in effect in each historical period. The de jure nominal annual poll tax amounts are taken from Abu-Youssef (1979, pp. 122-4) for the Umayyad and Abbasid period (661-969), Al-Qadi Al-Nu'man (1963, pp. 379-381) for the Fatimid period (969-1171), Ibn-Mamati (1991, p. 318) for the Ayyubid period (1171-1250), and Al-Qalqashandi (1914, p. 462) for the Mamluk period (1250-1517). I then computed within each income bracket and period the average de jure annual poll tax

rate defined as the average de jure nominal annual poll tax divided by the average nominal annual wage. Those averages are plotted in Panel (C).

Figure (II) plots the full scatterplot of the de jure poll tax rate (= de jure poll tax divided by wage) and wages in each historical period using the same dataset as above.

A1.7. Data on Actual Poll Tax Payments in 641-1100

I collected all the available information in the Greek and Arabic papyri sources on the individual-level annual nominal poll tax payments (in Islamic dinars) in 641-1100 (N = 552). The location (*kura*) of the papyri document is only available for a smaller sample (N = 408) in four *kuras* in the Nile Valley. The data are from two sources: (1) Fragments of the Greek papyri poll tax registers of the *kura* of *Qahqawa* (pre-641, *Aphrodito*) in 703-733 in Morimoto (1981, pp. 67-79), and (2) Fragments of the Arabic papyri poll tax registers and receipts in the APD for the three *kuras* of *Fayum* (pre-641, *Arsinoe*) in 641-1005, *Ihnas* (pre-641, *Herakleopolis*) in 701-900, and *Al-Ashmunayn* (pre-641, *Hermopolis*) in 731-1100. I depict the full distribution of the poll tax payments by *kura* in Figure (A.1).

I used this dataset for three purposes. (1) I computed the average poll tax payment in each of the four *kura* in 641-1100, which I mapped into 11 districts in 1848-1868, and I used, as the first measure of the poll tax in the empirical analysis, an indicator variable =1 if the average poll tax was "high" in the district (> 1.3 dinars, the cross-district average). (2) Poll tax registers from three sub-districts in the *kura* of *Qahqawa* in 703-733 contain information on both the poll and total land taxes, which is the restricted sample (N = 230) that I used in Table (II). (3) I computed the national-level average poll tax payment using the full sample (N = 552) which I mentioned in section 3.1.2.

A1.8. Data on Arab Settlement in 700-969

Data on Arab settlement are from Al-Barri (1992) who compiled information from the Arabic medieval sources (the most important source is Al-Maqrizi's book on Egypt's Arab tribes) in order to trace the destinations of the Arab tribes that

settled permanently in Egypt between 700 and 969. The destination is recorded at the *kura* level (in a few cases, the district could be identified). I focus on permanent Arab settlers and so I excluded the early seasonal migration (*irtiba'*) in 641-700.[10]

A1.9. Data on the Pre-641 Control Variables

1. Log (urban population) in 300 is from Wilson's (2011, pp. 185-187). These are estimates of the population size of the Greek cities (*metropolis*) and the capital in each *nome* (Egypt's administrative units in the Roman period) around 300. Wilson assigned a fixed population size for the capitals of all the other *nomes* that are not mentioned in his estimates. I used Wilson's estimates at the *nome* level and mapped them into districts in 1848-1868 using the mapping routine that I outline in section A1.10.

2. The legendary route of the Holy Family: I constructed a dummy variable =1 if a district is believed, according to the local Coptic traditions, to have been visited by the Holy Family during its legendary flight to Egypt after Jesus' birth. I constructed this variable from the Holy Family path that is described in Anba-Bishoy (1999) and Gabra (2001). That is in turn based on a book attributed to Theophilus, the Patriarch of Alexandria in 385-412, and so it should reflect in principle the pre-641 local Coptic beliefs. The date of the book is debated though as some scholars believe that it was written in the fifteenth century, and thus it may in fact reflect the post-641 Coptic local beliefs that were likely affected by the conversion process. There are two points that mitigate this concern though: (a) there is evidence that the local beliefs about the journey of the Holy Family, although not the specific path itself, emerged in as early as the Roman period, and (b) I use the Holy Family legendary route indicator as a control variable only and I show the results both with and without it.[11]

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[10] *Irtiba'* is from *rabi'*, the Arabic word for "spring," and refers to the Arabs' policy in 641-700 whereby Arab tribes were encouraged to settle temporarily during the spring season in any Egyptian 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) as part of the "miscellaneous taxes" in Table (I).

[11] The legendary flight of the Holy Family to Egypt is based on Matthew 13: "*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".*" The book which describes the path of the Holy Family journey in Egypt is entitled *Vision of Theophilus*. However,

Both sources record the places on the legendary route of the Holy Family at the village level and I was able to match those villages to the districts in 1848-1868 using Ramzi (1994 [1954]) and manual search in the list of villages of the 1897 census.

3. The share of villages with at least one Coptic monastery in each district in 1200: I described the construction of this variable in section A1.4. Coptic monasteries leased out their landholdings to farmers (Richter, 2009) and provided loans and grants to poor Copts to help pay the poll and land taxes (Markiewicz, 2009).

4. The large *autopract* estates in 600: I constructed this variable based on Hardy (1931), who traced the large agricultural estates in late Byzantine Egypt that were mentioned in the papyri and secondary sources. I restricted the sample to *nomes* in the Nile Valley, as the papyri were less likely to survive in the Delta. I then created an indicator variable at the *nome* level =1 if the *nome* had at least one large agricultural estate, which I then matched to districts in 1848-1868 (see section A1.10).

5. Byzantine military garrisons in 600: I constructed an indicator variable =1 if the district had at least one Byzantine military garrison in 600 based on Maspero (1912). The author compiled information on the location of Byzantine military garrisons from primary sources. Locations are mentioned at a fine geographic level that allowed me to identify the district in 1848-1868 in which each garrison was located.

A1.10. Mapping *Nomes* and *Kuras* into Districts

Nomes were Egypt's administrative units since ancient times until 641, whereby Egypt was divided into about 40 *nomes* (20 in the Nile Valley and 20 in the Nile Delta). After the Arab Conquest of Egypt in 639-641, Egypt was re-divided into a larger number of *kuras* (about 50). In 1848-1868, Egypt was divided into provinces, where each province was divided into districts, and districts were divided into

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Mingana (1931, pp. 3-4) argues that the book was written by Cyriacus, a Coptic bishop in the fifteenth century. Yet, there is evidence on the existence of local Coptic beliefs surrounding the journey of the Holy Family although not the specific path itself. The earliest post-biblical record of the flight of the Holy Family dates back to the third century and the event was recorded by historians and theologians in both the Roman and Byzantine periods. Whether the specific route was totally invented before the Arab Conquest or was rather altered throughout the centuries is impossible to tell though.

villages. *Nomes* and *kuras* were smaller in area than the nineteenth-century provinces but were larger than the districts (76 districts; excluding major cities and deserts).

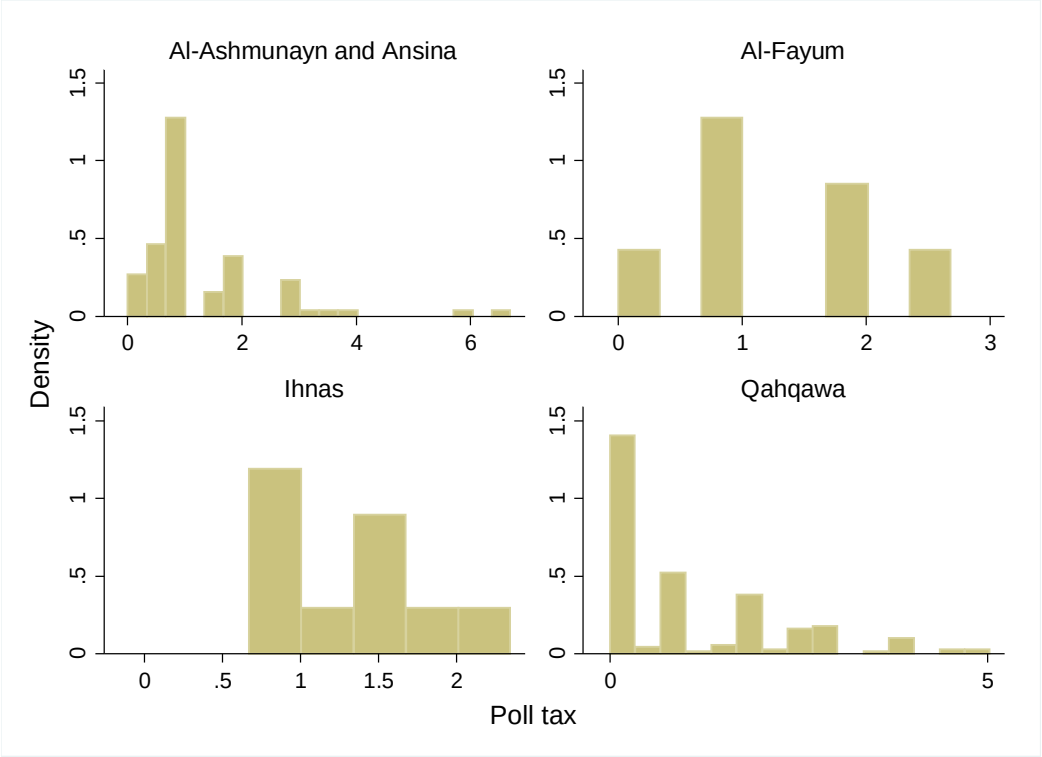
I mapped *Nomes* and *kuras* into districts in the 1848-1868 census samples using the 1897 census administrative division of districts that contains the list of villages under each district. The reason is that the 1848 and 1868 population censuses were never published and hence there is no official list indicating the villages under each district in these censuses. Therefore, I first matched each village in the 1848-1868 census samples into its equivalent village in 1897 and thus assigned each village to a district in 1897.

In the absence of information on the boundaries of *nomes*, the mapping of the pre-641 *nomes* into districts in 1897 was based on the mapping of the capital of each district in 1897 to the *nome* with the closest major town (in terms of distance). In order to carry out this matching, I first compiled the full list of *nomes* from http://www.trismegistos.org/geo/about_egyptiannomes.php; a specialized portal in papyri documents from Egypt in 800 BC - 800 CE. Second, I determined the current location of the major town of each *nome* using the mapping of *nomes* on Google Maps in http://www.trismegistos.org/.[12] Finally, I matched each district in 1897 to the nearest *nome* based on the proximity of the capital of each district to the *nome*'s major town according to Google maps.

Similarly, in the absence of information on the boundaries of the *kuras*, the mapping of the *kuras* into districts in 1897 was conducted using exactly the same routine. I first compiled the full list of *kuras* from Tousson (1926). Second, I determined the current location of the major town of each *kura* using Ramzi (1994 [1954]) and Tousson (1926). Finally, I assigned each district in 1897 to the nearest *kura* based on the proximity of the capital of each district to the *kura*'s major town according to Google maps.

[12]https://www.google.com/maps/d/viewer?hl=en&t=h&msa=0&ie=UTF8&om=1&mid=zX_awZMfxZcs.kyy5P2mblFhs

FIGURE A.1
Distribution of Poll Tax Payments (Dinar) by *Kura*



Source: Greek and Arabic papyri poll tax registers and receipts in 641-1100. See section A1.7 for details.

A2. Robustness Checks and Additional Results

TABLE A.2
Measurement Error in Poll Tax Payments in 641-1100

Panel (A): Poll Tax in 641-1100 and Copts' Population Share in 1848-1868										
Dependent variable = 1 if Coptic Christian										
	Full Sample		Excluding *Kuras* of *Ihnas* and *Fayum*		Excluding *Kura* of *Qahqawa*		Full Sample		Full Sample	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
=1 if median poll tax high in district in 641-1100	-0.128**	-0.096*			-0.069	-0.057				
	(0.051)	(0.045)			(0.046)	(0.033)				
=1 if average poll tax high in district in 641-1100			-0.070	-0.128						
			(0.058)	(0.127)						
District's median poll tax in 641-1100 (dinars)									-0.315**	-0.239*
									(0.127)	(0.110)
District's average poll tax in 641-1100 (dinars)							-0.573***	-2.723**		
							(0.168)	(1.131)		
Control for urbanization?	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Other controls?	No	Yes	No	No	No	No	No	Yes	No	Yes
Number of districts	11	11	5	5	8	8	11	11	11	11
Observations	2682	2682	1300	1300	1790	1790	2682	2682	2682	2682
Adjusted R^2	0.021	0.062	0.005	0.005	0.011	0.032	0.045	0.061	0.019	0.062

Panel (B): Poll Tax in 641-1100 and the Coptic-Muslim Occupational Differences in 1848-1868												
	(1) =1 if White-Collar1	(2) =1 if White-Collar2	(3) =1 if White-Collar3	(4) =1 if Professi-onal	(5) =1 if High Bureau-cracy	(6) =1 if Mid Bureau-cracy	(7) =1 if Judiciary, Military	(8) =1 if Clergy, Rural Elite	(9) =1 if Merchant	(10) =1 if Artisan	(11) =1 if Farmer	(12) =1 if Unskilled
1. Median Poll Tax High in District in 641-1100 Indicator - No Controls												
=1 if Copt	0.112***	0.050	0.040	-0.004**	-0.002	0.118***	-0.037***	-0.025	-0.010	0.207**	-0.110	-0.137***
	(0.018)	(0.030)	(0.025)	(0.002)	(0.001)	(0.018)	(0.005)	(0.026)	(0.012)	(0.067)	(0.079)	(0.033)
Copt * Median poll tax high	0.124	0.167	0.200*	0.004**	0.002	0.118	-0.001	0.044	0.033	-0.074	-0.237	0.111
	(0.086)	(0.122)	(0.106)	(0.002)	(0.001)	(0.086)	(0.013)	(0.034)	(0.019)	(0.093)	(0.131)	(0.074)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of districts	11	11	11	11	11	11	11	11	11	11	11	11
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.070	0.023	0.017	-0.002	0.001	0.095	0.035	0.013	0.008	0.062	0.055	0.035
2. Median Poll Tax High in District in 641-1100 Indicator - With Controls												
Copt	-0.682*	-1.257**	-0.961*	0.006	0.003	-0.692*	-0.041	-0.534**	0.296**	-2.013	3.098***	-0.123
	(0.365)	(0.534)	(0.467)	(0.011)	(0.014)	(0.357)	(0.057)	(0.234)	(0.128)	(1.590)	(0.936)	(0.682)
Copt * Median poll tax high	0.091***	0.100*	0.153***	0.005***	0.003	0.084***	0.004	0.005	0.052**	-0.088	-0.265*	0.200**
	(0.023)	(0.053)	(0.037)	(0.002)	(0.002)	(0.022)	(0.009)	(0.033)	(0.019)	(0.233)	(0.119)	(0.088)
Copt * Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of districts	11	11	11	11	11	11	11	11	11	11	11	11
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.083	0.027	0.019	-0.003	-0.001	0.112	0.034	0.018	0.011	0.085	0.075	0.039
3. Average Poll Tax High in District in 641-1100 Indicator - Excluding Kuras of Ihnas and Fayum - No Controls												
=1 if Copt	0.087***	0.003	0.010	-0.005*	0.000	0.092***	-0.029***	-0.055**	0.007	0.151**	-0.061	-0.100
	(0.014)	(0.016)	(0.026)	(0.002)	(.)	(0.016)	(0.001)	(0.015)	(0.010)	(0.052)	(0.042)	(0.051)
Copt * Average poll tax high	0.004	0.094**	0.042	0.001	-0.001	0.004	-0.016*	0.106***	-0.052**	-0.109	0.177**	-0.110
	(0.019)	(0.026)	(0.030)	(0.002)	(0.001)	(0.020)	(0.006)	(0.021)	(0.012)	(0.052)	(0.055)	(0.054)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of districts	5	5	5	5	5	5	5	5	5	5	5	5
Observations	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300
Adjusted R^2	0.050	0.016	0.009	-0.001	0.006	0.064	0.007	0.017	0.016	0.033	0.058	0.039

4. Median Poll Tax High in District in 641-1100 Indicator - Excluding Kura of Qahqawa- No Controls												
=1 if Copt	0.147***	0.116***	0.082**	-0.003***	-0.004	0.154***	-0.049***	0.017	-0.033***	0.284	-0.178	-0.189***
	(0.037)	(0.025)	(0.030)	(0.001)	(0.002)	(0.038)	(0.003)	(0.023)	(0.009)	(0.158)	(0.189)	(0.027)
Copt * Median poll tax	0.089	0.102	0.158	0.003***	0.004	0.082	0.011	0.002	0.056**	-0.151	-0.169	0.163*
high	(0.093)	(0.123)	(0.109)	(0.001)	(0.002)	(0.093)	(0.013)	(0.033)	(0.018)	(0.171)	(0.217)	(0.072)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of districts	8	8	8	8	8	8	8	8	8	8	8	8
Observations	1790	1790	1790	1790	1790	1790	1790	1790	1790	1790	1790	1790
Adjusted R^2	0.085	0.031	0.022	-0.003	-0.001	0.121	0.039	0.004	0.010	0.077	0.056	0.042
5. Average Poll Tax (Dinars) in District in 641-1100 - No Controls												
=1 if Copt	-0.177	-0.479***	-0.349*	-0.015	0.011	-0.174	0.038**	-0.340***	0.130*	-0.201	-0.177	-0.479***
	(0.156)	(0.135)	(0.183)	(0.011)	(0.007)	(0.160)	(0.014)	(0.099)	(0.065)	(0.536)	(0.156)	(0.135)
Copt * Average poll tax	0.249	0.452***	0.337*	0.009	-0.011	0.250	-0.063***	0.266***	-0.115*	0.335	0.249	0.452***
(dinars)	(0.141)	(0.119)	(0.157)	(0.008)	(0.006)	(0.144)	(0.012)	(0.083)	(0.055)	(0.485)	(0.141)	(0.119)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of districts	11	11	11	11	11	11	11	11	11	11	11	11
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.071	0.026	0.016	-0.002	0.001	0.097	0.036	0.018	0.009	0.064	0.071	0.026
6. Average Poll Tax (Dinars) in District in 641-1100 - With Controls												
=1 if Copt	-0.274	-1.249**	-0.461	0.018	0.001	-0.294	-0.105*	-0.870***	0.789***	0.151	0.338	-0.027
	(0.372)	(0.544)	(0.560)	(0.016)	(0.015)	(0.353)	(0.053)	(0.185)	(0.030)	(1.325)	(0.525)	(0.839)
Copt * Average poll tax	1.856**	0.612	2.515**	0.070**	0.007	1.779**	-0.184	-1.059***	1.903***	6.495***	-10.494***	1.485
(dinars)	(0.599)	(0.801)	(0.815)	(0.029)	(0.025)	(0.580)	(0.129)	(0.262)	(0.035)	(1.740)	(0.586)	(1.216)
Copt * Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of districts	11	11	11	11	11	11	11	11	11	11	11	11
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.082	0.026	0.018	-0.003	-0.001	0.111	0.034	0.018	0.011	0.088	0.077	0.037

7. Median Poll Tax (Dinars) in District in 641-1100 - No Controls												
=1 if Copt	-0.189	-0.307	-0.430	-0.014***	-0.006	-0.168	-0.046	-0.072	-0.123*	0.345	0.565	-0.479**
	(0.216)	(0.316)	(0.270)	(0.004)	(0.004)	(0.217)	(0.037)	(0.134)	(0.064)	(0.332)	(0.429)	(0.201)
Copt * Median poll tax	0.305	0.363	0.477	0.010***	0.005	0.290	0.009	0.050	0.114*	-0.141	-0.681	0.345
(dinars)	(0.215)	(0.310)	(0.266)	(0.003)	(0.003)	(0.215)	(0.036)	(0.115)	(0.057)	(0.280)	(0.377)	(0.191)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of districts	11	11	11	11	11	11	11	11	11	11	11	11
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.070	0.022	0.016	-0.002	0.001	0.095	0.035	0.013	0.008	0.062	0.056	0.035
8. Median Poll Tax (Dinars) in District in 641-1100 - With Controls												
=1 if Copt	-0.937**	-1.535**	-1.386**	-0.008	-0.004	-0.925**	-0.051	-0.547**	0.149	-1.779	3.844***	-0.679
	(0.358)	(0.528)	(0.461)	(0.011)	(0.014)	(0.350)	(0.057)	(0.240)	(0.130)	(1.644)	(0.978)	(0.698)
Copt * Median poll tax	0.224***	0.242*	0.373***	0.013***	0.006	0.206***	0.009	0.009	0.131**	-0.189	-0.669**	0.485*
(dinars)	(0.056)	(0.132)	(0.093)	(0.004)	(0.004)	(0.054)	(0.021)	(0.081)	(0.044)	(0.567)	(0.282)	(0.219)
Copt * Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of districts	11	11	11	11	11	11	11	11	11	11	11	11
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.083	0.027	0.019	-0.003	-0.001	0.112	0.034	0.018	0.011	0.085	0.076	0.038

Source: The 1848-1868 population census samples combined with multiple data sources. See section 4.6.1 in the main text and sections A1.1, A1.4, A1.7, A1.8, A1.9, A1.10 in the online appendix for details. Standard errors clustered at the district of origin level are in parentheses. A constant term is included in all regressions of panel (A). * p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01.

TABLE A.3
OLS Estimates - Standard Errors Clustered at the Kura Level

Panel (A): Poll Tax, Arab Settlement, and Copts' Population Share in 1848-1868

Dependent Variable =1 if Coptic Christian

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
=1 if average poll tax high in district in 641-1100	-0.163**	-0.281**	-0.551	-0.176**	-0.617					
	(0.031)	(0.066)	(0.249)	(0.035)	(0.448)					
=1 if Arab settlement in district in 700-969						-0.071*	-0.074*	-0.079**	-0.057***	-0.091***
						(0.040)	(0.039)	(0.034)	(0.020)	(0.026)
Controls for urbanization and religiosity?	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes
Other controls?	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Province of origin FE?	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Number of districts	11	11	11	11	11	76	76	35	76	35
Observations	2682	2682	2682	2682	2682	16641	16641	6792	16641	6792
Adjusted R^2	0.047	0.058	0.060	0.057	0.075	0.017	0.017	0.020	0.078	0.053

Panel (B): Poll Tax, Arab Settlement, and the Coptic-Muslim Occupational Differences in 1848-1868

	(1) =1 if White-Collar1	(2) =1 if White-Collar2	(3) =1 if White-Collar3	(4) =1 if Professi-onal	(5) =1 if High Bureau-cracy	(6) =1 if Mid Bureau-cracy	(7) =1 if Judiciary, Military	(8) =1 if Clergy, Rural Elite	(9) =1 if Merchant	(10) =1 if Artisan	(11) =1 if Farmer	(12) =1 if Unskilled
1. Average Poll Tax High in District in 641-1100 Indicator - No Controls												
=1 if Copt	0.087***	0.003***	0.010***	-0.005***	0.000	0.092***	-0.029***	-0.055***	0.007	0.151***	-0.061***	-0.100***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(.)	(0.000)	(0.000)	(0.000)
Copt * Poll tax	0.074	0.129**	0.097*	0.003**	-0.003	0.074	-0.018**	0.073**	-0.032*	0.110	-0.143	-0.063
	(0.041)	(0.023)	(0.036)	(0.001)	(0.002)	(0.042)	(0.003)	(0.023)	(0.013)	(0.168)	(0.203)	(0.034)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of *kuras*	4	4	4	4	4	4	4	4	4	4	4	4
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.072	0.026	0.016	-0.002	0.001	0.097	0.036	0.018	0.009	0.065	0.056	0.035

	=1 if White-Collar1	=1 if White-Collar2	=1 if White-Collar3	=1 if Professi-onal	=1 if High Bureau-cracy	=1 if Bureau-cracy	=1 if Judiciary, Military	=1 if Clergy, Rural Elite	=1 if Merchant	=1 if Artisan	=1 if Farmer	=1 if Unskilled
2. Average Poll Tax High in District in 641-1100 Indicator - With Controls												
Copt	0.875**	-1.278**	0.928	0.052	-0.007	0.830**	-0.294*	-1.859***	2.206***	6.541**	-7.618***	0.150
	(0.238)	(0.385)	(0.407)	(0.030)	(0.012)	(0.229)	(0.115)	(0.145)	(0.031)	(1.501)	(0.063)	(1.162)
Copt * Poll tax	0.349*	0.032	0.439	0.011	-0.001	0.339**	-0.050	-0.267**	0.406***	1.701*	-2.268***	0.129
	(0.116)	(0.201)	(0.211)	(0.009)	(0.006)	(0.105)	(0.030)	(0.075)	(0.011)	(0.599)	(0.017)	(0.410)
Copt * Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of *kuras*	4	4	4	4	4	4	4	4	4	4	4	4
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Adjusted R^2	0.081	0.026	0.018	-0.003	-0.001	0.111	0.034	0.019	0.011	0.089	0.077	0.037
3. Arab Settlement in District in 700-969 Indicator - No Controls												
=1 if Copt	0.104***	0.038**	0.056***	-0.001	-0.002**	0.107***	-0.022***	-0.045***	0.018**	0.212***	-0.158***	-0.110***
	(0.017)	(0.018)	(0.019)	(0.002)	(0.001)	(0.017)	(0.005)	(0.004)	(0.008)	(0.037)	(0.041)	(0.013)
Copt * Arab settlement	0.153**	0.183**	0.151*	-0.002	-0.002	0.157**	-0.004	0.035**	-0.032***	-0.059	-0.037	-0.055**
	(0.073)	(0.085)	(0.086)	(0.002)	(0.002)	(0.073)	(0.010)	(0.014)	(0.010)	(0.072)	(0.102)	(0.025)
Copt * Controls?	No	No	No	No	No	No	No	No	No	No	No	No
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of *kuras*	42	42	42	42	42	42	42	42	42	42	42	42
Observations	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641
Adjusted R^2	0.087	0.035	0.028	0.002	0.004	0.116	0.035	0.011	0.017	0.039	0.105	0.060
4. Arab Settlement in District in 700-969 Indicator - With Controls												
Copt	0.051	-0.166	-0.060	-0.006	0.026	0.031	-0.092***	-0.125	0.106	-0.438*	0.157	0.342***
	(0.195)	(0.261)	(0.280)	(0.010)	(0.021)	(0.200)	(0.029)	(0.091)	(0.077)	(0.236)	(0.412)	(0.113)
Copt * Arab settlement	0.098	0.082	0.080	-0.001	-0.003	0.101	-0.018***	0.002	-0.002	-0.122*	0.102	-0.060*
	(0.070)	(0.088)	(0.089)	(0.002)	(0.002)	(0.071)	(0.006)	(0.022)	(0.009)	(0.069)	(0.132)	(0.033)
Copt * Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of *kuras*	17	17	17	17	17	17	17	17	17	17	17	17
Observations	6792	6792	6792	6792	6792	6792	6792	6792	6792	6792	6792	6792
Adjusted R^2	0.062	0.024	0.024	0.001	0.006	0.083	0.047	0.015	0.015	0.063	0.109	0.068

Source: The 1848-1868 population census samples combined with multiple data sources. See section 4.6.1 in the main text and sections A1.1, A1.4, A1.7, A1.8, A1.9, A1.10 in the online appendix for details. Standard errors clustered at the *kura* of origin level are in parentheses. A constant term is included in columns 1-8 of panel (A). * p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01.

TABLE A.4
Relevance and Exogeneity of the Distance to Arish

	(1) =1 if poll tax high in district in 641-1100	(2) =1 if Arab settlement in district in 700-969	(3) Log (urban population) in 300	(4) =1 if district on Holy Family route in 400	(5) % Villages with Coptic monasteries in 1200	(6) =1 if *Autopract* estates in district in 600	(7) =1 if Byzantine garrison in district in 600
District's distance to Arish (km)	-0.0049***	-0.0006*	0.0003	-0.0005	0.0002***	-0.0006	-0.0001
	(0.0011)	(0.0003)	(0.0005)	(0.0003)	(0.0001)	(0.0005)	(0.0003)
Districts	11	76	76	76	76	35	76
Adjusted R^2	0.656	0.032	-0.009	0.015	0.147	0.003	-0.012

Source: Multiple data sources. See section 4.6.2 in the main text and sections A1.4, A1.7, A1.8, A1.9, A1.10 for details. Standard errors are in parentheses. A constant term is included in all regressions.

TABLE A.5
Poll Tax, Settlement, and Copts' Population Share in 1848-1868 - IV Estimates

I. Second Stage Regressions - Dependent Variable =1 if Coptic Christian						
	(1)	(2)	(3)	(4)	(5)	(6)
=1 if average poll tax high in district in 641-1100	-0.215***	-0.374**	-0.592**			
	(0.043)	(0.147)	(0.251)			
=1 if Arab settlement in district in 700-969				-0.234***	-0.243***	-0.013
				(0.071)	(0.075)	(0.117)
Controls for urbanization and religiosity?	No	Yes	Yes	No	Yes	Yes
Other controls?	No	No	Yes	No	No	Yes
II. First Stage Regressions						
	Dependent Variable in (1) - (3) =1 if average poll tax high in district in			Dependent Variable in (4) - (6) =1 if Arab settlement in district		
	(1)	(2)	(3)	(4)	(5)	(6)
District's distance to Arish (km)	-0.005***	-0.002***	-0.001***	-0.001***	-0.001***	-0.001
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Controls for urbanization and religiosity?	No	Yes	Yes	No	Yes	Yes
Other controls?	No	No	Yes	No	No	Yes
Observations	2682	2682	2682	16641	16641	6792
Number of districts	11	11	11	76	76	35
Kleibergen-Paap LM (P-value)	0.036	0.075	0.162	0.003	0.003	0.096
Kleibergen-Paap Wald F statistic	30.408	10.230	1264.182	9.972	10.072	1.703
Anderson-Rubin Wald (P-value)	0.000	0.004	0.047	0.001	0.001	0.921

Source: The 1848-1868 census samples combined with multiple data sources. See section 4.6.2 in the main text and sections A1.1, A1.4, A1.7, A1.8, A1.9, A1.10 for details. Standard errors clustered at the district of origin level are in parentheses. A constant term is included in the estimation and is partialled out in both stages.

TABLE A.6
Poll Tax, Arab Settlement, and the Coptic-Muslim Occupational Differences in 1848-1868 - IV Estimates

Panel (A): Average Poll Tax High in District in 641-1100 Indicator - No Controls												
I. Second Stage Regressions - Dependent Variable Indicated on Top of Each Column												
	(1) =1 if White-Collar1	(2) =1 if White-Collar2	(3) =1 if White-Collar3	(4) =1 if Professi-onal	(5) =1 if High Bureau-cracy	(6) =1 if Mid-Low Bureau-cracy	(7) =1 if Judiciary, Military	(8) =1 if Clergy, Rural Elite	(9) =1 if Merchant	(10) =1 if Artisan	(11) =1 if Farmer	(12) =1 if Unskilled
=1 if Copt	0.067**	-0.001	-0.001	-0.005**	0.001	0.071**	-0.028***	-0.040*	0.001	0.057	0.058	-0.114**
	(0.029)	(0.018)	(0.030)	(0.002)	(0.001)	(0.031)	(0.002)	(0.024)	(0.013)	(0.120)	(0.135)	(0.048)
Copt * Poll tax	0.118***	0.138***	0.121**	0.003	-0.005***	0.120***	-0.020***	0.040*	-0.017	0.312*	-0.401**	-0.032
	(0.045)	(0.045)	(0.055)	(0.002)	(0.002)	(0.046)	(0.004)	(0.022)	(0.017)	(0.162)	(0.174)	(0.063)
II. First Stage Regressions - Dependent Variable is Copt * Poll Tax												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
=1 if Copt	3.088***	3.088***	3.088***	3.088***	3.088***	3.088***	3.088***	3.088***	3.088***	3.088***	3.088***	3.088***
	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)
Copt * Dist. to Arish	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682	2682
Districts	11	11	11	11	11	11	11	11	11	11	11	11
Kleibergen-Paap LM test (P-value)	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017
Kleibergen-Paap Wald F statistic	46.740	46.740	46.740	46.740	46.740	46.740	46.740	46.740	46.740	46.740	46.740	46.740
Anderson-Rubin Wald test (P-value)	0.033	0.034	0.085	0.274	0.005	0.031	0.001	0.183	0.358	0.047	0.024	0.645

Panel (B): Arab Settlement in District in 700-969 Indicator - No Controls												
I. Second Stage Regressions - Dependent Variable Indicated on Top of Each Column												
	(1) =1 if White-Collar1	(2) =1 if White-Collar2	(3) =1 if White-Collar3	(4) =1 if Professi-onal	(5) =1 if High Bureau-cracy	(6) =1 if Mid-Low Bureau-cracy	(7) =1 if Judiciary, Military	(8) =1 if Clergy, Rural Elite	(9) =1 if Merchant	(10) =1 if Artisan	(11) =1 if Farmer	(12) =1 if Unskilled
=1 if Copt	-0.044	-0.134	-0.104	-0.001	-0.003	-0.039	-0.032***	-0.058***	0.030*	0.137**	0.036	-0.070
	(0.082)	(0.095)	(0.093)	(0.003)	(0.002)	(0.082)	(0.008)	(0.016)	(0.018)	(0.061)	(0.119)	(0.051)
Copt * Arab settlement	0.452***	0.529***	0.473***	-0.001	0.001	0.453***	0.015	0.061***	-0.056**	0.091	-0.429***	-0.135
	(0.117)	(0.135)	(0.134)	(0.003)	(0.003)	(0.117)	(0.012)	(0.021)	(0.025)	(0.132)	(0.160)	(0.087)
II. First Stage Regressions - Dependent Variable is Copt * Arab settlement												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
=1 if Copt	1.554***	1.554***	1.554***	1.554***	1.554***	1.554***	1.554***	1.554***	1.554***	1.554***	1.554***	1.554***
	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)
Copt * Dist. to Arish	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641
Districts	76	76	76	76	76	76	76	76	76	76	76	76
Kleibergen-Paap LM test (P-value)	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Kleibergen-Paap Wald F statistic	19.707	19.707	19.707	19.707	19.707	19.707	19.707	19.707	19.707	19.707	19.707	19.707
Anderson-Rubin Wald test (P-value)	0.000	0.000	0.000	0.628	0.782	0.000	0.193	0.003	0.014	0.465	0.000	0.090

Source: The 1848-1868 census samples combined with multiple data sources. See section 4.6.2 in the main text and sections A1.1, A1.4, A1.7, A1.8, A1.9, A1.10 for details. Standard errors clustered at the district of origin level are in parentheses. District of origin fixed effects are included in the estimation and are partialled out in both stages. * p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01.

TABLE A.7
Poll Tax, Arab Settlement, and Copts' Population Share in 1200 and 1500

Dependent Variable is the Share of Villages with at Least One Coptic Church or Monastery in Each District

	1200: Columns (1) - (4)				1500: Columns (5) - (8)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
=1 if average poll tax high in district in 641-1100	-0.011	-0.049			-0.164**	0.060		
	(0.056)	(0.159)			(0.058)	(0.182)		
=1 if Arab settlement in district in 700-969			-0.047	-0.043			-0.077***	-0.072***
			(0.045)	(0.051)			(0.027)	(0.024)
Controls for urbanization and religiosity?	No	Yes	No	Yes	No	Yes	No	Yes
Observations (Districts)	11	11	76	76	11	11	76	76
Adjusted R^2	-0.105	-0.410	0.001	-0.025	0.584	0.600	0.147	0.146

Source: Data on medieval churches and monasteries combined with other data sources. See section 4.6.3 in the main text and sections A1.4, A1.7, A1.8, A1.9, and A1.10 in the online appendix for details. Robust standard errors are in parentheses. * p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01. A constant is included in all regressions.

TABLE A.8
Intergenerational Occupational Mobility and Religious Group Effects in 1848-1868

Dependent variable is son's occupational outcome

	(1) =1 if White-Collar1	(2) =1 if White-Collar2	(3) =1 if White-Collar3	(4) =1 if Professi-onal	(5) =1 if High Bureau-cracy	(6) =1 if Mid-Low Bureau-cracy	(7) =1 if Judiciary, Military	(8) =1 if Clergy, Rural Elite	(9) =1 if Merchant	(10) =1 if Artisan	(11) =1 if Farmer	(12) =1 if Unskilled
=1 if father of same occupation	0.340***	0.265***	0.321***	0.333	0.199	0.477***	0.136**	0.380***	0.444***	0.577***	0.602***	0.626***
	(0.101)	(0.056)	(0.049)	(0.315)	(0.175)	(0.120)	(0.069)	(0.137)	(0.103)	(0.040)	(0.022)	(0.027)
Share of occupation in religious group	1.461***	1.647**	1.563**	0.000	0.134	1.120***	1.362***	2.109	0.398	0.653***	1.011***	0.195
	(0.417)	(0.690)	(0.685)	(0.000)	(0.095)	(0.350)	(0.195)	(2.981)	(6.364)	(0.178)	(0.242)	(0.304)
N	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168

Source: The 1848-1868 census samples. Sample is restricted to Egyptian free local Coptic and Muslim adult sons for whom I observe father's occupation, with non-missing religion, age, nationality, ethnicity, occupation, and district of origin. See section 5.1 in the main text and section A1.1 in the online appendix for details. A constant is included in all regressions. Standard errors clustered at the household level are in parentheses.

TABLE A.9
Copts' Tax Revolts in 726-768

Year	Region	Reasons 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

Sources: Morimoto (1981, pp. 145-72) and Mikhail (2004, pp. 195-211). See section 4.4 in the main text. I excluded ten tax revolts that erupted in 783-866 (nine of which were in the Nile Delta) because both Arabs and Copts participated in those revolts and, thus, they may have been motivated by other reasons.

TABLE A.10
Copts' Population Share and the Coptic-Muslim Occupational Differences in 1848-1868

	Dependent Variable Indicated on Top of Each Column											
	(1) =1 if White-Collar1	(2) =1 if White-Collar2	(3) =1 if White-Collar3	(4) =1 if Professi-onal	(5) =1 if High Bureau-cracy	(6) =1 if Mid-Low Bureau-cracy	(7) =1 if Judiciary, Military	(8) =1 if Clergy, Rural Elite	(9) =1 if Merchant	(10) =1 if Artisan	(11) =1 if Farmer	(12) =1 if Unskilled
Copt	0.367***	0.346***	0.337***	-0.004**	-0.004***	0.375***	-0.020***	-0.001	-0.008	0.261***	-0.401***	-0.198***
	(0.053)	(0.060)	(0.062)	(0.002)	(0.001)	(0.053)	(0.007)	(0.009)	(0.011)	(0.069)	(0.063)	(0.039)
Copt * Percent Copts in district	-1.199***	-1.391***	-1.326***	0.009	0.009	-1.216***	-0.024	-0.168**	0.065	-0.506	1.440***	0.393
	(0.256)	(0.279)	(0.291)	(0.017)	(0.006)	(0.260)	(0.037)	(0.079)	(0.057)	(0.327)	(0.467)	(0.258)
District of origin FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641	16641
Adjusted R^2	0.102	0.042	0.034	0.002	0.004	0.136	0.035	0.011	0.017	0.040	0.109	0.061

Source: The 1848-1868 census samples. See footnote 10 in the paper and section A1.1 in the online appendix for details. Standard errors clustered at the district of origin level are in parentheses. * p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01.

A3. Proofs of the Conceptual Framework

PROOF OF PROPOSITION (1): Let y^* denote the threshold level of income at which a Copt is indifferent about conversion to Islam at a given level of religiosity. Copts' population share is given by $M_c = \int_{y^*}^{\infty} f(y)dy = 1 - F(y^*)$. It directly follows that:

$$\frac{\partial M_c}{\partial \tau} = -f(y^*) \times \frac{\partial y^*}{\partial \tau} = -f(y^*) \times \frac{-u'(y^* - \tau)}{u'(y^*) - u'(y^* - \tau)} < 0$$

Because $u'(.) > 0$ and $u''(.) < 0$■

PROOF OF PROPOSITION (2):

$$\frac{\partial}{\partial \tau} E(y|Copt) = \frac{\partial}{\partial \tau} E(y|y > y^*) = \frac{\partial}{\partial \tau}\left[\frac{\int_{y^*}^{\infty} yf(y)dy}{1 - F(y^*)}\right]$$

$$= \frac{1}{\left(1 - F(y^*)\right)^2}\left[-y^* f(y^*)\frac{\partial y^*}{\partial \tau}\left(1 - F(y^*)\right)\right.$$

$$\left. + f(y^*)\frac{\partial y^*}{\partial \tau}\int_{y^*}^{\infty} yf(y)dy\right] = \frac{f(y^*)\frac{\partial y^*}{\partial \tau}}{1 - F(y^*)}\left[-w^* + \frac{\int_{y^*}^{\infty} yf(y)dy}{1 - F(y^*)}\right]$$

$$= \frac{f(y^*)\frac{\partial y^*}{\partial \tau}}{1 - F(y^*)}[E(y|y > y^*) - y^*] > 0$$

$$\frac{\partial}{\partial \tau} E(y|Muslim) = \frac{\partial}{\partial \tau} E(y|y \le y^*) = \frac{\partial}{\partial \tau}\left[\frac{\int_0^{y^*} yf(y)dy}{F(y^*)}\right]$$

$$= \frac{1}{\left(F(y^*)\right)^2}\left[y^* f(y^*)\frac{\partial y^*}{\partial \tau}\left(F(y^*)\right) - f(y^*)\frac{\partial y^*}{\partial \tau}\int_0^{y^*} yf(y)dy\right]$$

$$= \frac{f(y^*)\frac{\partial y^*}{\partial \tau}}{F(y^*)}\left[y^* - \frac{\int_0^{y^*} yf(y)dy}{F(y^*)}\right] = \frac{f(y^*)\frac{\partial y^*}{\partial \tau}}{F(y^*)}[y^* - E(y|y \le y^*)]$$

$$> 0$$

Define the Coptic-Muslim income gap as $\Delta \equiv E(y|Copt) - E(y|Muslim) = E(y|y > y^*) - E(y|y \le y^*)$. It follows that the derivative of Δ with respect to the poll tax is:

$$\frac{\partial \Delta}{\partial \tau} = f(y^*)\frac{\partial y^*}{\partial \tau}\left[\frac{1}{1 - F(y^*)}(E(y|y > y^*) - y^*) - \frac{1}{F(y^*)}\left(y^* - E(y|y \le y^*)\right)\right]$$

This could be either positive or negative depending on the income distribution ■

PROOF OF PROPOSITION (3): It follows from Jewitt (2004) and $\frac{\partial y^*}{\partial \tau} > 0$.

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