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Historical Origins of Inter-Religion Differences: Evidence from 19th and 20th Century Egypt

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Abstract

The proposed dissertation project contributes to the growing literature on the impact of religion on economic outcomes. It explores the differences across religious groups with respect to educational and occupational outcomes employing census data from Egypt, both individual-level data (1848-1868) and village/quarter-level data (1897-1927). The digitization of the (1848-1868) individual-level census records is currently ongoing at the National Archives of Egypt. The empirical evidence from Egypt (1897-1927) that has been obtained to date suggests that Jews and Copts (Egyptian Christians) outdistanced Muslims in terms of literacy and were relatively more concentrated (than Muslims) in manufacturing and commerce. This phenomenon seems to have deep roots in Egyptian Medieval history since at least the Islamic conquest of the then-Christian (mostly Coptic) Egypt (7th century AD). The project suggests a new interpretation of the shift in the educational and occupational distributions of Copts after the Islamic conquest. The theory emphasizes the role of the Islamic tax system (with its poll-tax on Non-Muslims) in the conversion of the poor and uneducated segments of the Coptic population into Islam to avoid paying the tax. The theory also emphasizes the geographical pattern of Arab immigration and settlement and the role it played in explaining the subsequent spatial variation in the enforcement of the poll-tax. It is argued that such variation in the enforcement of the poll-tax, in turn, might have shaped the currently "observed" spatial distribution of Copts as well as the spatial variation in the Coptic-Muslim educational and occupational differences. This hypothesis is then used to identify the causal impact of being a Copt on literacy and occupation.

JEL Codes: N3, N75

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I. Introduction

The proposed dissertation project explores the differences across religious groups with respect to educational and occupational outcomes employing census data from Egypt: both individual-level data (1848-1868) and village/quarter-level data (1897-1927). This country represents an interesting case-study to examine the relationship between religion and human capital accumulation. Conquered by Muslims/Arabs in the 7th century AD, the then-Christian Egypt (with a small Jewish minority) converted slowly and gradually into a country with very substantial Muslim majority and only a small Christian minority (currently representing about 6% of the population[2]). Jews represented a significant minority during the entire period until the creation of Israel in mid- 20th century. The empirical evidence from (1897-1927), that has been obtained to date, suggests that Jews and Copts (Egyptian Christians) outdistanced Muslims in terms of literacy and were relatively more concentrated (than Muslims) in manufacturing and commerce. This phenomenon seems to have deep roots in Egyptian Medieval history, at least since the Islamic conquest of Egypt. There is strong anecdotal evidence suggesting that Copts had a quasi-monopoly over administrative and fiscal jobs during the entire Middle Ages while Jews were more concentrated in the financial sector. Both sets of occupations require literacy and numeracy.

This project proposes an explanation of the Coptic transition; i.e., the shift in the educational and occupational distributions of Copts after the Islamic conquest. In particular, we emphasize the role of the Islamic tax system (with its poll-tax on Non-Muslims) in the conversion of the poor and uneducated segments of the Coptic population into Islam to avoid paying the tax and the shift of the remaining Copts into higher literacy and into the types of occupations that require literacy. We also assert that the geographical pattern of Arab immigration and settlement also played a role in the subsequent spatial variation in the enforcement of the poll-tax. The hypothesis, which is explained in detail in section V, generates a prediction that can be tested empirically against the available data. It also offers a reasonable exogenous variation in the Copts' rate that can be used to identify the impact of this variable on literacy and economic occupation (See Section VI). The Jewish shift, on the other hand, can probably be explained by the literacy requirement that was introduced under Judaism in the 1st century AD [Botticinni and Eckstein (2002; 2005)]. If so, the source of the Jewish-Muslim differences in literacy would have been pre Islamic conquest.

[2] The number of Christians in Egypt represents a hotly-debated issue in the country. Some authors do not accept the 6% official figure, and argue that Christians represent at least 10% of the population. However, as Courbage and Fargues [CF] (1997) pointed out, the official figures based on the censuses from 1897- 1986 show a somehow similar percentage of Christians (between 6% and 8%), which suggests that if the Egyptian government were faking these figures, it must have been doing so consistently for more than a century; an unlikely hypothesis given the regime changes that Egypt went through during this long period of time. Perhaps, more importantly, CF (1997) state that the historical vital statistics from the Registrar Central (which is an independent data source from the censuses) show a lower birth rate for Christians than Muslims in a way that is coherent over time with the censuses' figures.

By gaining access to the individual-level census data from 1848 and 1868 and employing them besides the later village/quarter- level data (1897-1927), the project should significantly contribute to the growing literature on the impact of religion on economic outcomes. On the one hand, there were a number of papers that introduced cross-country evidence on the impact of religion on economic development [e.g., Barro and McCleary (2003; 2005), La Porta et al. (1997) and Guiso et al. (2003)]. On the other hand, perhaps motivated by the limitations of the cross-country studies, several recent papers have opted to estimate the across-religion differences with respect to various outcomes of interest within the same country/background and to suggest an economic rationale of such differences if any [e.g., Botticinni and Eckstein (2002; 2005); Becker and Woessmann (2007); Boppart et al. (2008); Borooah and Iyer (2005); Chaudhary and Rubin (2009)]. All these studies, however, have employed district-level data. The individual-level data from mid- 19th century Egypt will thus offer a deeper insight into the determinants of the school enrollment decision, which is, at its core, an individual- (or household-) level decision.

We also should contribute to the understanding of the historical origins of the currently observed differences between religious groups by resorting to the historical events that shaped the "membership" in these religious groups. The Muslim-Coptic-Jewish gap in Egypt is not unique. Similar gaps exist in other countries in the Middle East (as well as in other regions of the world including the United States). In Lebanon, for instance, the gap between Maronites (Catholic Christians) and Muslims with respect to education, occupation, and wealth is astonishing (with Maronites having better economic outcomes) [Courbage and Fargues (1998)]. Hence, it is of utmost importance to examine the historical roots of these phenomena.

The project requires the digitization of the aforementioned individual-level data from the period (1848-1868). These data come from two unpublished (and undigitized) historical censuses that were carried out in Egypt in 1848 and 1868 and that are preserved in hand-written registers at the National Archives of Egypt (NAE). The census records include a wealth of information at the individual-level on very important variables including sex, age, the "exact" place of residence, origin, nationality, ethnicity, religion, school enrollment (for boys), and occupation (for males). Also, the 1848 census represents one of the oldest censuses in the Middle East to include information on all segments of society including females, children, and slaves. The planned data collection involves both (1) the digitization of a random sample of the census records from 1848 and (2) the digitization of all Cairo and Alexandria census records from 1868. This will be followed by (3) linking the individuals across the two censuses by name and location (hence creating an individual-level panel dataset).

The importance of this data collection project stems, on the one hand, from its importance in studying the relationship between religion, school enrollment, and occupation at a finer level of analysis and at an earlier historical period than the village-level data from the later censuses (1897-1927) that are currently employed in the study. This finer level of analysis will allow one to control for a wider range of covariates; hence, making the econometric analysis far more convincing. On the other hand, this project allows the creation of a unique historical dataset that can be used in various fields to address a wide range of questions. Specific examples on the sort of "economic" questions that can be addressed are discussed later in this project description [Section VI].

The rest of this project description is organized as follows: Section II reviews the relevant literature on the impact of religion on economic outcomes. Section III provides the necessary historical background on the Egyptian inter-religion differences. Section IV presents the empirical evidence that has been obtained to date based on the village/quarter- level data (1897-1927). Section V discusses the proposed theoretical framework that can explain the observed empirical evidence. Finally, section VI discusses the next steps in the project regarding (i) the extension of the empirical analysis in order to "link" it to the theoretical framework, and (ii) the digitization of the individual-level census data (1848-1868).

II. Literature Review

There is a growing economic literature on the relationship between religion and economic outcomes. One line of literature has focused on the cross-country evidence. For instance, Barro and McCleary (2003) studied the impact of church attendance and religiosity on economic performance, to find a positive effect of the latter and a negative effect of the former. In another study (2005), the same authors examined the determinants of having a state religion. Such determinants include the adherence rate to the main religion, population, and GDP per capita. Also, La Porta et al. (1997) evaluated Putnam's premise that hierarchical organization reduces the horizontal ties between people and hence the formation of trust using a cross-section of countries. They found a negative association between hierarchical organization and trust. To avoid the problems of using a single cross section, Guiso et al. (2003) used a panel of countries from the World Values Survey in order to study the impact of religion on shaping economic attitudes (such as trust). They find that religious beliefs are in general conducive to economic growth with variations across religions.

Another line of literature that is more relevant to the current project studied the relationship between religion and economic outcomes within a specific country/religion. As noted before, Botticinni and Eckstein (2002 and 2005) argued that the literacy requirement introduced under Judaism in the first century AD, with pure religious motives, led to a shift in the educational distribution of Jews from illiteracy to literacy as well as a shift in their occupational distribution from farming to the sort of urban occupations that require literacy. Becker and Woessmann (2009) employed county-level data from late 19th century Prussia, to argue that the higher literacy of Protestants (and not the work ethic as claimed by Max Weber) led to their better economic performance compared to Catholics. Boppart et al. (2008) employed district-level data from late 19th century Switzerland to evaluate the difference between Protestants and Catholics with respect to educational outcomes. They suggested that the role of religion has to be qualified by accounting for liberal and conservative values; such that, in more "liberal" districts the impact of religion may be mitigated.

The aforementioned studies focused on developed countries. A few studies, however, examined the differences across religious groups in developing countries. For example, Boorooah and Iyer (2005) used current micro-level data from India to study the impact of religion (Muslim or Hindu) and caste on school enrollment. They conclude that the impact of religion is mitigated when one accounts for household characteristics. A more recent study by Chaudhary and Rubin (2009) investigated the historical roots of the differences between Hindus and Muslims with respect to literacy using district-level data from early 20th century India. They argued that the

spatial variation in the institutional history might have played a role in determining the district's observed literacy. In particular, districts which fell under Muslim rule for many years experienced interdependence between political and religious authorities which emphasized the memorization of Qur'an in the schools rather than literacy. This may have resulted in lower literacy among Muslims in these districts.

The proposed project should extend and contribute to this line of literature in several ways. First, it explores the differences across multiple religious groups living in the same country (Muslims, Coptic Christians, non-Coptic Christians, Jews) instead of only two groups. Second, it makes use of individual-level data (with information on school enrollment) instead of only the village/quarter-level data (with information on literacy) as in the previous literature. In particular, the individual-level data will allow us to control for individual-level covariates that affect the school enrollment decisions or literacy (which is of course an "individual" or household decision rather than one made by the district or community as a whole). Third, it studies the inter-religion differences at an earlier period (1848 and 1868) than the aforementioned studies, and hence is able to track these differences in a pre-modern society in which there were few if any public schools available and hence the educational services were mainly provided through religious institutions. This provides a more precise measure of the impact of religion on literacy (or school enrollment) and occupation.

III. Historical Background

At that time a Roman province, Egypt was Christianized in the period (1^{st} – 4^{th} century AD). Christian Egyptians suffered persecution and suppression under the pagan Roman emperors. Even after the Roman Empire converted to Christianity, the theological conflict on the nature of the Christ that was raised at the Council of Chalcedon (451 AD) led to the separation of most of Egyptian Christians from the Roman Church. These Egyptian Christians later became known as the Copts. A small minority of the Egyptian Christians, mainly those belonging to the Hellenized elite, chose to remain loyal to the Roman Church and became known as the Melkites. The separation of the Copts from the Roman Church resulted in the persecution of the Copts by the Byzantine authorities for their different doctrine, and in their being treated as heretics. Hence, on the eve of the Islamic conquest of Egypt in 641 AD, Egypt was a Christian-Majority country (with the "marginalized" Copts representing most of the Christians in Egypt), and with Jews representing a small minority (mainly located in Alexandria, the urban center).

Over the centuries to follow Egypt was gradually Islamized. Unfortunately, there is no definite answer as to when Egypt shifted from a Christian-majority to a Muslim-majority country [Wilfong (1998)]. Two forces, however, were in action: (1) Arab immigration and settlement in Egypt and (2) the conversion of the local population to Islam. Arabs first settled in military barracks in the new capital, Al-Fustat (in current-day Cairo). They started to settle in the countryside gradually in the 7^{th} and 8^{th} centuries, but remained a largely aristocratic ruling class. In the 9^{th} century, however, a royal decree resulted in depriving Arabs of the traditional military pensions they used to receive from the Islamic state. This led to their loss of privilege against the local population and resulted in an expansion of the numbers who settled as farmers in the countryside [El-Barry (1992); El-Shayyal (2000)]. Arab immigration remained an important force in the Islamization of Egypt until the non-Arab Mamluks came to power (13^{th} century).

Under Mamluk rule (1250-1517) and Ottoman rule (1517-1805) the flow of Arab immigration slowed down or was even reversed with many Arabs emigrating back to the Arab peninsula, as the non-Arab rulers discouraged Arab settlement in Egypt [El-Sherif (1965)].

Nevertheless, Arab immigration and settlement alone cannot account for the Islamization of Egypt. The size of the immigration waves was small compared to the size of the local population in Egypt, and historical sources emphasize the conversion of the local population to Islam as a decisive factor in the Islamization process [e.g., Courbage and Fargues (1997); El-Shayyal (2000)]. The conversion of Copts to Islam started right after the Islamic conquest, but no statistics exist on the rate of conversion over the years. The best available evidence on conversion comes from the "total receipts" of the poll-tax, which show a rapid decline in the first two centuries after the conquest [Courbage and Fargues (1997)], hence suggesting a rapid rate of conversion to Islam.

The occupational distribution of non-Muslims in medieval Egypt was more skewed than that of Muslims towards the occupations that require literacy. Right after the Islamic conquest, the conquering Arabs chose to leave the administration in the hands of the local population [Morimoto (1981); Amer (2000)]. Moreover, they seemed to have favored the Copts over the Melkites since the latter represented in general a Hellenized minority attached to the Byzantine Empire [Amer (2000)]. It is interesting to observe how the historical sources agree on the continuous role played by the Copts in public administration. There was a tradition of Copts working in the administration as tax collectors, land surveyors, accountants, scribes, and secretaries, a tradition that is strongly attested to by contemporary sources [Heyworth-Dunne (1938); henceforth HD]. Although this role seems "natural" in the first years after the Islamic conquest since Egypt was a Coptic-majority country, the continuity of this role over the centuries until the 19th century might seem to beg explanation since Egypt at least in the later periods became a Muslim-majority country. Jews, on the other hand, managed to remain a significant minority during the entire period. They also held a tradition of working in the administration but not to the same extent as the Copts. Their significant role in the financial sector and their concentration in urban areas are well documented. They worked mainly as goldsmiths, silversmiths, bankers and money lenders [HD (1938)].

This relative occupational concentration of non-Muslims in the jobs that require literacy seems to have been transmitted from one generation to the next through education (which was provided by religious institutions). Coptic schools in the Middle Ages were distinct from the Islamic ones by their emphasis on arithmetic and geometry, besides teaching Arabic and the Bible, in order to prepare the Coptic students to work in the administrative and fiscal sectors[3]. Islamic schools, on the other hand, lacked such training. Historical evidence states that Muslim children who wanted to work as accountants or tax collectors had to join the Coptic schools to learn these subjects [Qasim (1977)]. It is also important to notice that Copts learned Arabic through a "secular"

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

approach in order to use the language in their future job careers unlike Muslims who learned Arabic mainly to memorize Quran and hence did not emphasize literacy per se. This might suggest that literacy might have been more emphasized in Coptic schools than in Muslim ones. In comparison, little evidence exists on the curriculum of Jewish schools. It seems that the curriculum was generally religious in nature (like the Coptic and Islamic schools) [Qasim (1977)], but also contained practical elements to prepare the Jewish children for their future careers in the financial sector [HD (1938)].

Education continued to be provided solely by the religious institutions (these schools were known as kuttabs) until the 19th century. When Muhammad Ali (1805-1849) came to power in Egypt, he introduced modern European-style educational institutions but these were accessible to only a very small percentage of the population and hence did not manage to replace the religious education system. Moreover, such modern schools were providing "higher" education, while the elementary education continued to be supplied by the Kuttabs. On the other hand, starting from the mid- 19th century European missionaries began to introduce a significant number of European-style schools that became increasingly popular especially among the non-Muslim elites. However, the kuttab system remained in wide use until mid- 20th century.

IV. Empirical Evidence

At present, the empirical evidence I am able to offer is based on the village/quarter-level data from the published Egyptian census reports (1882-1996) that were digitized by a French center in Egypt, Centre d'Etudes et de Documentation Economiques, Juridiques, et Sociales [CEDEJ (2003)]. The next step of the project will employ individual-level data from (1848-1868). Religion and literacy were recorded in these reports for the sub-period (1897-1986). The specific data collected differed from one census year to another on an ad hoc basis. I focus on the early censuses (1897-1927) since it would seem likely that inter-religion differences would be likely to decrease after public education had become widespread. Hence, to examine the possible role of religion on literacy, it is advantageous to concentrate on the "pre-modern" period and pre-modern society. Compared to the aforementioned studies, Egypt in this period was a "pre-modern" society where religious institutions still played a large and almost exclusive role in education, and only around 5% (of total population) was literate.

These censuses were checked for internal consistency before being used in my analysis and minor data cleaning was involved. From the summary statistics shown in table (1), one can observe the relative concentration of Copts[4] in Middle Upper Egypt. Their relative concentration decreases if one goes to Northern Upper Egypt or Southern Upper Egypt. It decreases even further in Lower Egypt (in the north). In Urban Provinces (Cairo, Alexandria, and Suez Canal provinces), although the Christians' rate is relatively high, most of these Christians are non-Copts. Jews, on the other hand, are an "urbanized" group, mostly concentrated in the urban

[4] Christians in Egypt represent a heterogeneous group. Copts (ethnically- Egyptian Christians) are the large majority. Copts are further sub- divided into Orthodox (which is different from the Greek Orthodox Church), Catholic, and Protestant sects. Among these Coptic sects, the Orthodox Copts are the majority. Beside Copts, there are *non-Coptic* sects (Greek Orthodox, Catholic, Protestant, and Oriental Christian Churches) who are basically either direct immigrants or descendants of foreign immigrants [CEDEJ (2003); Atiya (2005)].

provinces. As for average male literacy rate, it is highest in urban provinces followed by Lower Egypt, and then by Upper Egypt. Therefore, it seems that average literacy decreases as one goes south in the country (up the Nile). Similar patterns exist for average male employment rate and the average percentage of males working in manufacturing and commerce.

Table (2) shows the summary statistics for the key variables by year. The religious composition of the population of Egypt seems to have been stable over the period 1897-1927. There was, however, some increase in the male literacy rate over the period [See Figures 1-2].

The basic empirical strategy I employed at this stage is to treat the religious composition at the village/quarter level as exogenous and examine its impact (by OLS) on two main outcomes of interest: literacy and (male) occupational distribution (as measured by the male employment rate and the percentage of males working in manufacturing and commerce). In these regressions, the censuses are pooled, with both year dummies and year dummies interacted with each of the regressors included in the specification. Controls include log (population), the percent female, and population per housing unit (as a measure of density). In some years I am able to control for the percentage of people under 10 years old, the percentage of blind people, and the percentage of foreigners. In occupational distribution regressions (which are only possible in the case of the 1927 census), I also control for the percentage of people who are 60 years old and above.

In particular, the relationship between religion and the literacy rate is examined by two sets of regressions: First, pooled OLS regression of literacy rate on religious composition at the village/ quarter level; and second, pooled OLS regressions for male and female literacy rates separately. As a further check, the villages/quarters are matched across censuses based on their 1996 mapping, and a panel dataset is constructed. For those villages/quarters that do not have a mapping in 1996, they were matched across the censuses (1897-1927) by name, district, and province. Fixed Effects and Random Effects estimates are employed, in which variation is attributable to changes in religious composition in the same village/quarter over time.

On the other hand, the relationship between religion, employment and occupational distribution is examined by OLS using the cross-sectional data from the 1927 census, the first census to include information on occupational distribution at the village/quarter level. The dependent variables of interest are the percentage of males with occupation and the percent of males working in manufacturing and commerce.

The main results are shown in Tables (3) - (7). Table (3) shows the Pooled OLS regression of literacy rate on religious composition. The different regressions stem from the fact that there are different "religious groups" identified in each census. Control variables include percent female, log (population), and population per housing unit[5]. For each regression, the first column represents the regression without provincial fixed effects, while the second one controls for these. Hence, if one wants to use the entire period (1897-1927), the only available measure is "Non-Muslims' Rate". The coefficient on this variable is positive and significant. By limiting the number of censuses employed in the analysis one can break down this measure further. For

[5] As a robustness check, other controls such as the percentage of population under 10 years old, the percentage of foreigners, and the percentage of blind people were also tried where available without a qualitative change in the results.

example, the coefficient on Christians' rate is positive and significant in the pooled censuses (1897, 1907, and 1917). Jews' rate has a much stronger impact but is less precisely estimated, probably because of the much stronger spatial concentration of Jews in urban provinces (i.e. the little variation of the Jews' rate across villages/quarters), unlike Christians who are relatively evenly distributed over the entire country. Finally, the coefficient on the Copts' rate (1897, 1907, and 1927) is positive but much smaller in magnitude than that of the Christians' rate. When I break down Christians into Copts and Non-Coptic Christians in 1897 and 1907, the effect of the latter seems to be much stronger.

The same analysis was repeated for the male literacy rate and female literacy rate separately [Tables (4) and (5)]. As one may expect, the effects are found to be much stronger for males than for females. The Copts' rate, for example, seems to have no significant impact on the female literacy rate.

The panel estimation results from both Fixed Effects and Random Effects models are shown in Table (6). Overall, RE estimates seem to be comparable in magnitude to those from Pooled OLS, but the FE estimates are in general larger. The larger standard errors of the FE estimates (compared to the RE estimates) are due to the fact that there is relatively little variation in the religious composition over time.

Hence, it seems that non-Muslim minorities enjoyed higher literacy rates compared to Muslims. Table (7) shows the OLS estimates of the relationship between male employment rate (and the percentage of males working in manufacturing and commerce) and religious composition. This analysis is based on the 1927 census which is the first census to have such information available at the village/ quarter level[6]. The relationship between the Copts' rate and male employment rate is negative but switches sign once provincial fixed effects are controlled for. Its relationship with the percentage of males working in manufacturing and commerce is positive and significant with and without provincial fixed effects. The coefficient on the percentage of other religions (which include Jews) shows a much stronger relationship.

V. Theoretical Framework: An Interpretation of Coptic Economic History

The aforementioned empirical evidence suggests that Christians and Jews outdistanced Muslims with respect to literacy and were relatively more concentrated in manufacturing and commercial occupations. My theoretical framework is developed to explain the Coptic-Muslim gap. On the one hand, as mentioned before, the Jewish-Muslim gap can be probably explained by the literacy requirement introduced under Judaism in the first century AD. On the other hand, the gap between non-Coptic Christians and Muslims in Egypt may be due to the different backgrounds of the two groups. Non-Coptic Christians in Egypt were mainly immigrants or descendants of "recent" immigrants to Egypt and hence may be affected by a different historical background from that of Egyptian Muslims. Thus, the focus on the Coptic-Muslim gap can be defended on the grounds that both Muslims and Copts in Egypt were subject to the same background during most of the middle ages, and so the observed gap can be more informative in the sense that it is a more "controlled" experiment, with the historical backgrounds of both groups held constant. It

[6] Previous censuses' reports have such information available at the district level.

also should be noted that Copts represent the vast majority of the non-Muslims in Egypt [Table (2)].

Unlike Jewish or Protestant economic histories, Coptic economic history seems to be void of literacy requirement reforms. Instead, I believe that the observed Coptic-Muslim gap can be explained by returning to the historical events that shaped the "membership" in these two groups in Egypt. In general, my hypothesis argues that the Islamic tax system with its poll-tax (gizya) on non-Muslims generated an incentive to convert to Islam that was especially strong for the poorer/uneducated segments of the Coptic society. This pattern of conversion to Islam among the Copts led to the creation of a more "bourgeois" Coptic population that is on average better educated and more concentrated in the occupations that require literacy than the Copts who converted to Islam. The little mobility in medieval societies with the hereditary nature of most of the occupations may have resulted in the persistence of this gap over time.

As such this theory doesn't make any statement about the geographic variation in the observed Coptic presence in Egypt. As previously mentioned, Copts seem to be concentrated in Middle Upper Egypt. To explain the observed pattern, it is argued that the spatial variation in Arab immigration and settlement in Egypt which started with the Islamic conquest (7^{th} century AD) led to a change in the structure of land tenure and the composition of the rural local elites at the village-level. While in Lower Egypt (in the north) Coptic rural elites lost their power to the Arab landlords, they managed to retain their authority in many villages in Upper Egypt (in the south) due to the less immigration of Arabs there. This spatial variation in the composition of the village headmen might have led to a spatial variation in the enforcement of the "decentralized" poll-tax. Under the decentralized tax collection system that was adopted in Egypt during most of the Middle Ages the village headmen and local elites were responsible for collecting the tax from their fellowmen. In Lower Egypt, Arab headmen were more likely to enforce the poll-tax on Coptic taxpayers leading to more conversion of the poor/uneducated segments of the society. In contrast, Coptic headmen in Upper Egypt may have colluded with their fellow Copts in the face of the central Arab government to avoid taxes leading to less conversion of the poor/uneducated. To sum up, in a bipolar world of wealthy educated administrators and poor uneducated farmers, the farmers were more likely to convert to avoid paying the poll-tax. This "selection" was more likely to be severe in Lower Egypt (as compared to Upper Egypt) due to the aforementioned mechanism.

Historical facts seem to be consistent with this hypothesis. The poll-tax seems to have been an important factor in the Islamization of Egypt. Contemporary Coptic sources stress the role of the poll-tax (gizya) imposed on non-Muslims in inducing the Copts to convert to Islam at least in the initial period [Severus Ibn-Al-Muqqafa' (11^{th} Century): cited in Amer (2000) and El-Shayyal (2000)]. The suppression of the Coptic tax revolts in the 8^{th} and early 9^{th} centuries also resulted in large waves of conversion. Forced conversion, on the other hand, seems to have been very limited. Two notes are in order: First, the poll-tax seems to have been a significant burden. From the papyri tax registers that survived from the early medieval period in Egypt, one can see that the average poll-tax was around two dinars [Morimoto (1981)], which is comparable to the monthly salary of an artisan [Ashtor (1969)]. Also, the Cairo Geniza documents have preserved

many letters from poor Jews asking for help to pay the poll-tax[7] [Alshech (2003)]. Second, historical evidence suggests that there were also differences in the amount of land tax between Muslims and non-Muslims in Egypt (in specific periods), and hence this may have constituted an additional incentive to convert to Islam [Morimoto (1981)].

The tax collection system in medieval Egypt passed through several stages [Morimoto (1981)]. Upon the conquest, the system was decentralized with the village headmen holding a great power in the estimation of the taxes and the preparation of the lists of the taxpayers in their villages. In the 8th century, there were several attempts to centralize the system and strengthen the hold of the central government tax collectors on the tax preparation and estimation procedures. These attempts seem to have been the factor that led to several tax revolts during that century. It is interesting here to notice that such revolts did not occur in the decentralized period hence suggesting that there might have been collusion between the tax collectors and the taxpayers in that early period. After these tax revolts, the government adopted the decentralized tax contracting system under which there was bidding for the tax contract for every region. Those who won the bid were responsible for paying the tax amount to the central government in advance before collecting the tax from the taxpayers. This system remained in practice during most of the Middle Ages until Muhammad Ali came to power in the 19th century.

Hence, it seems that the village headmen and the rural local elites played a significant role in collecting taxes over the entire period; be it a poll-tax or a land-tax. Collusion between Coptic rural elites and their fellow Coptic farmers seems to have been taking place. The problem of the "fugitives"; i.e. those who fled from their home villages to avoid paying the tax is well-known, and such phenomenon remained in existence until the 19th century [Dennett (1950); Egyptian 19th Century Census Registers]. Village headmen could have easily facilitated the fleeing of these farmers. Also, tax arrears were not uncommon, and the headmen might have played a role in this phenomenon [Morimoto (1981)]. Finally, documents from the Cairo Geniza suggest that wealthy Jews were helping the poor Jews to pay the tax installments [Alshech (2003)]. Similar cooperation may well have existed within the Coptic community.

Finally, An important assumption in the theoretical framework has to do with the hereditary nature of the educational and occupational outcomes. Historical accounts seem to support this assumption. As Heyworth-Dunne (1938) pointed out, the curriculum in the Coptic schools "provided the students with a special training that would enable them to follow up with apprenticeship to one of those trades or professions allotted to the Copts by tradition". A similar account is made on the Jews.

VI. The Next Steps on Extending the Empirical Analysis

1. Linking the Empirical Analysis to the Theoretical Framework

The theoretical framework described in the previous section seems to have some support from the village-level empirical evidence (1897-1927). In particular, in order to test the validity of the

[7] Although many Islamic sources mention that the "poor" were exempted from the poll-tax, it seems that the definition of the poor included only those who didn't have an occupation and hence lived on charity [Alshech (2003)].

prediction of the theoretical framework, a comparison is made between the Coptic-Muslim gaps with respect to male literacy rate, and the percentage of males working in manufacturing and commerce in the different regions of Egypt (Urban provinces, Lower Egypt, Northern Upper Egypt, Middle Upper Egypt, Southern Upper Egypt, and Border provinces) [See Table (8)]. As expected from the theoretical framework, the gap seems to be relatively smaller in Middle Upper Egypt where less conversion to Islam among the poor/uneducated Copts took place historically.

The empirical evidence presented so far has treated religion (in particular, village-level religious composition) as exogenous. Nonetheless, there are reasons to believe that this assumption might be violated. In particular, there might have been a "two-way" relationship between religion (or village-level religious composition) and education/occupation. In so far as the 19th/20th century generation's education/occupation/religion would reflect ancestors' social status and religion, it could be the case that those ancestors chose their religion (whether to remain a Copt or to convert to Islam) based on their social status (as reflected in their educational level and occupation besides other factors). If so, the effect could well have been going the other way (i.e. from education/occupation to religion instead of from religion to education and occupation) at the time when religious conversions took place. Assuming very little social mobility in the medieval society, the choice of religion may have been transmitted from one generation to another along with the dynasty's social status. Thus, an OLS regression of the later generation's education/occupation on religion might be mistaken in treating the religion as an exogenous variable.

Therefore, the next step of the empirical strategy treats the “Christian Coptic” religion (whether measured at the individual-level in 1848-1868 or at the village/quarter level in 1897-1927) as endogenous. In order to identify the impact of religion on literacy or occupation one needs to find an exogenous variation in Copts’ rate. The theoretical framework described previously suggests that the pattern of Arab immigration and settlement can be used as an instrumental variable to explain the spatial distribution of Copts. But can the pattern of Arab immigration explain the currently observed pattern of Coptic presence across the different regions of Egypt? While Arabs may have penetrated every region in Egypt, the extent of this penetration seems to vary from one region to another. Early Arab immigration was concentrated in Lower Egypt and Northern Upper Egypt since these were closer to the capital (Al-Fustat where the military barracks were) [El-Barry (1992)]. Over the first three centuries after the Islamic conquest (7^{th}-9^{th} centuries), when most of the immigration waves took place, Arab tribes started to penetrate Southern Upper Egypt to make use of the gold mines there, to benefit from its proximity to the Arab peninsula through the trade route that crosses the desert to the Red Sea, and to participate in defending the Southern borders against the then-Christian and independent Nubian kingdom in the far south [El-Sherif (1965), El-Barry (1992)]. However, the fact that Middle Upper Egypt received several waves of Arab immigration as well suggests that measuring the variation in Arab immigration at the “regional” level might be too aggregated to explain the observed spatial distribution of Copts, which seems to vary much “within” the regions. Thus, more suitable and “finer” measures of the pattern of Arab immigration have to be used in order to find a strong explanatory power of this instrument on the Copts’ rate in the first stage. In other words, what is needed is a measure of Arab immigration at the “village” level. One candidate measure- that we are currently investigating- is the “village name”. The rationale for this is that many villages are named after specific Arab tribes and/or may contain words of Bedouin origin. Such villages are

more likely to have received Arab immigration waves than villages with different non-Arab or non-tribal names [Woidich (1996)]. This part of the project is still ongoing.

Another approach to deal with the possible endogeneity of the Coptic religion is to make use of the panel structure of the data; be it the village/quarter- level panel dataset 1897-1927 or the proposed individual-level panel dataset 1848-1868 that will be constructed once the digitization of 1848 and 1868 census records takes place. Such panel structure allows one to control for the unobservable characteristics that may be correlated with religion. Making use of the panel dataset at the village/quarter-level that is available at present is currently ongoing.

2. Digitizing Historical Individual-Level Census Records from Egypt (1848-1868)

The next and already started stage of the project attempts to employ Egyptian individual-level data from two unpublished historical censuses that were carried out in 1848 and 1868. This is extremely important for three reasons:

First, extending the analysis to the individual-level data may be far more informative since it allows one to control for the household background (e.g. father's occupation, type of dwelling, fiscal status of dwelling, and number of servants and slaves owned by the household) when studying the impact of the father's religion on the son's school enrollment and the son's occupation. This would represent quite an advance over the existing literature on religion and economic outcomes that has relied on highly aggregated levels of analysis.

Second, turning the analysis to a period earlier than the late 19th century may be really beneficial since by the late 19th century Egypt, European missionary schools were widespread in Egypt. Hence the higher literacy outcomes observed for non-Muslims may merely reflect their higher enrollment in these schools as compared to Muslims. By going to an earlier period when there were very few missionary schools and very few secular public schools available so that the religious institutions (mosques, churches, or synagogues) were almost exclusively the ones responsible for providing education, one would be far more perfectly able to identify the role played by religion in shaping economic outcomes.

Third, and what in the long run will be the most important reason, when digitized this data will be available for scholars around the world to make use of for examining any number of issues in which they might be interested[8]. For example, historians specializing in the Middle East will benefit a lot from this dataset in understanding the real living conditions of the people in this period. Demographers will be able to compare the demographic conditions in 19th century Egypt to other countries and regions of the world. Examples for the research questions in economics are: the inter-religion differences with respect to fertility (as measured by the number of children living in the household at the time of the census) and the impact of polygamy on fertility, the long-term impact of slavery on economic development (before and after slavery was banned in Egypt in 1877), the causes and consequences of internal migration, the structure of the Waqf system and its possible consequences, and the impact of Muhammad Ali's policies in the fields of education, industrialization, and military conscription on living conditions of Individuals.

[8] An agreement between the National Archives of Egypt and IPUMS-International is currently being negotiated in order to disseminate the digitized 1848 and 1868 data on the IPUMS website within a year after my graduation.

The 1848 and 1868 census records are preserved in the National Archives of Egypt (NAE). They were discovered and organized in mid- to late 1990s but newly discovered registers were added to the shelves as recent as 2005. The censuses include a number of interesting variables such as name (missing for many females), sex**,** age (except for females in Cairo and Alexandria)**,** location (for Cairo and Alexandria including detailed address within the city)**,** nationality, religion**,** household relationships, origin (not exactly place of birth)**,** legal status (free or slave)**,** detailed economic occupation (missing for most females), school enrollment for boys of school age, and type and ownership of dwelling (both only for dwellings in Cairo and Alexandria). Besides, the censuses also include non-systematic recording of other variables such as polygamy**,** marital status (for widowed and divorced women)**,** infirmities**,** internal migration, and physical description (height and facial description). It also should be noted that the 1848 census is one of the earliest censuses in the Ottoman Empire to include information on women, children, and slaves [Cuno and Reimer (1997)]. The earliest "equivalent" census in Istanbul took place in 1881.

This crucial phase of the project consists of the following phases:

1. Phase (1): Digitizing a 1 percent sample of 1848 census records. The sampling rate is 5 percent in Cairo and Alexandria. The targeted sample size is 60,000. This phase was approved by the NAE administration in late June 2009 and the actual digitization started in August 2009, is currently ongoing, and is expected to be completed by the end of Fall 2009. A similar project was carried out by Centre d'Etudes et de Documentation Economiques, Juridiques, et Sociales "CEDEJ" in 1995-1998 and is described in Alleaume and Fargues (1998) and in Fargues (2003) but their project was never completed and other than some results obtained from a small Cairo sample, neither has the data been made available nor has anything been published.
2. Phase (2): Digitizing all the records from Cairo and Alexandria from 1868 partial census. This phase is expected to take place in 2010.
3. Phase (3): Link the individual records across the two censuses by location, name, and household relationship in order to create a panel dataset. Previous preliminary (manual) work has been done in this direction by some of the researchers at NAE and proved to be successful.

As indicated above, the potential benefits of the census digitization project extend well beyond their use in testing the hypotheses I have posed in this project. The data provided will be available to others to describe changes of the critical Muhammad Ali and subsequent periods in Egypt's history and to help answer a wide range of research questions, examples of which were given above. Having a panel dataset is especially intriguing for this will probably be one of the oldest individual-level panel dataset available from any pre-industrial society.

Table (1): Summary Statistics by Region

Variable	Region	N	Mean	St. Deviation	Min.	Max.
Non-Muslims' Rate	Urban Provinces	1229	0.199	0.256	0	1
	Lower Egypt	8606	0.024	0.087	0	0.96
	Upper Egypt- North	1744	0.043	0.099	0	1
	Upper Egypt- Middle	3166	0.174	0.2	0	1
	Upper Egypt- South	884	0.045	0.073	0	0.664
Christians' Rate	Urban Provinces	913	0.166	0.228	0	1
	Lower Egypt	6482	0.024	0.089	0	0.96
	Upper Egypt- North	1303	0.043	0.102	0	1
	Upper Egypt- Middle	2383	0.174	0.2	0	1
	Upper Egypt- South	664	0.043	0.071	0	0.664
Copts' Rate	Urban Provinces	917	0.042	0.087	0	0.909
	Lower Egypt	6510	0.022	0.089	0	0.96
	Upper Egypt- North	1317	0.042	0.101	0	1
	Upper Egypt- Middle	2397	0.173	0.201	0	1
	Upper Egypt- South	664	0.043	0.071	0	0.664
Jews' Rate	Urban Provinces	913	0.029	0.098	0	0.99
	Lower Egypt	6482	0.0002	0.003	0	0.117
	Upper Egypt- North	1303	0.0002	0.003	0	0.091
	Upper Egypt- Middle	2383	0.0001	0.0004	0	0.011
	Upper Egypt- South	664	0.0001	0.0005	0	0.005
Male Literacy Rate	Urban Provinces	1229	0.294	0.174	0	1
	Lower Egypt	8606	0.104	0.069	0	0.857
	Upper Egypt- North	1744	0.090	0.072	0	0.655
	Upper Egypt- Middle	3166	0.071	0.055	0	0.579
	Upper Egypt- South	884	0.072	0.068	0	0.471
Male Employment Rate	Urban Provinces	678	0.720	0.135	0	1
	Lower Egypt	4378	0.692	0.086	0	1
	Upper Egypt- North	876	0.660	0.11	0	0.964
	Upper Egypt- Middle	1574	0.639	0.094	0.049	1
	Upper Egypt- South	449	0.643	0.125	0	1
% Males in Manufacturing and Commerce	Urban Provinces	316	0.355	0.124	0	0.626
	Lower Egypt	2124	0.061	0.068	0	0.514
	Upper Egypt- North	441	0.082	0.093	0	0.47
	Upper Egypt- Middle	783	0.056	0.065	0	0.399
	Upper Egypt- South	220	0.063	0.079	0	0.501

Table (2): Summary Statistics by Year

Variable	Year	N	Mean	St. Deviation	Min.	Max.
Non-Muslims' Rate	1897	4075	0.072	0.162	0	1
	1907	3854	0.068	0.148	0	1
	1917	3872	0.074	0.153	0	1
	1927	3980	0.071	0.150	0	1
Christians' Rate	1897	4075	0.070	0.159	0	1
	1907	3854	0.065	0.143	0	1
	1917	3872	0.070	0.144	0	1
Copts' Rate	1897	4075	0.058	0.141	0	1
	1907	3854	0.057	0.132	0	1
	1927	3980	0.058	0.128	0	0.997
Jews' Rate	1897	4075	0.002	0.022	0	0.882
	1907	3854	0.002	0.028	0	0.990
	1917	3872	0.003	0.034	0	0.911
Male Literacy Rate	1897	4075	0.079	0.085	0	1
	1907	3854	0.081	0.072	0	0.722
	1917	3872	0.105	0.088	0	1
	1927	3980	0.172	0.113	0	1
Male Employment Rate	1897	4075	0.649	0.121	0	1
	1927	3980	0.708	0.068	0.191	1
% Males in Manufacturing and Commerce	1927	3980	0.087	0.115	0	0.977

Figure (1): The Evolution of Non-Muslims' Rate in Egypt (1897-1986)

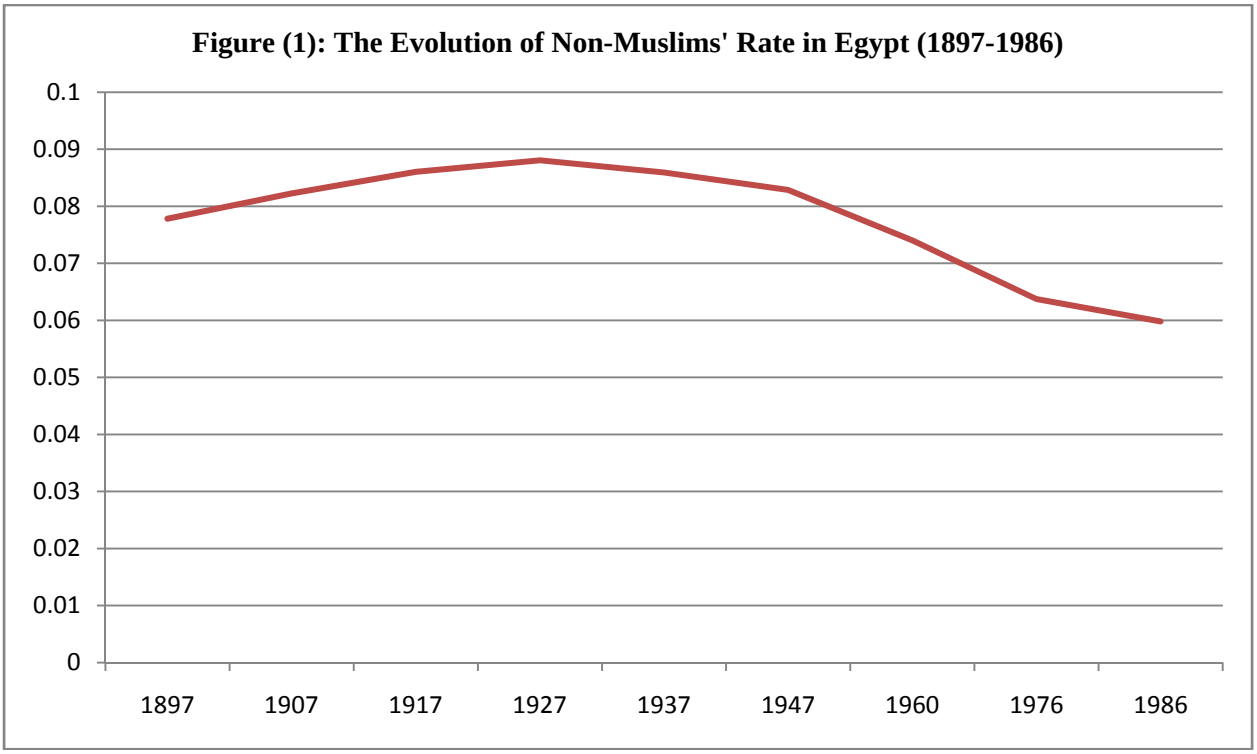

Figure (2): Illiteracy Rate (% of Total Population) (Children under schooling age are counted as illiterate) (1897-1996)

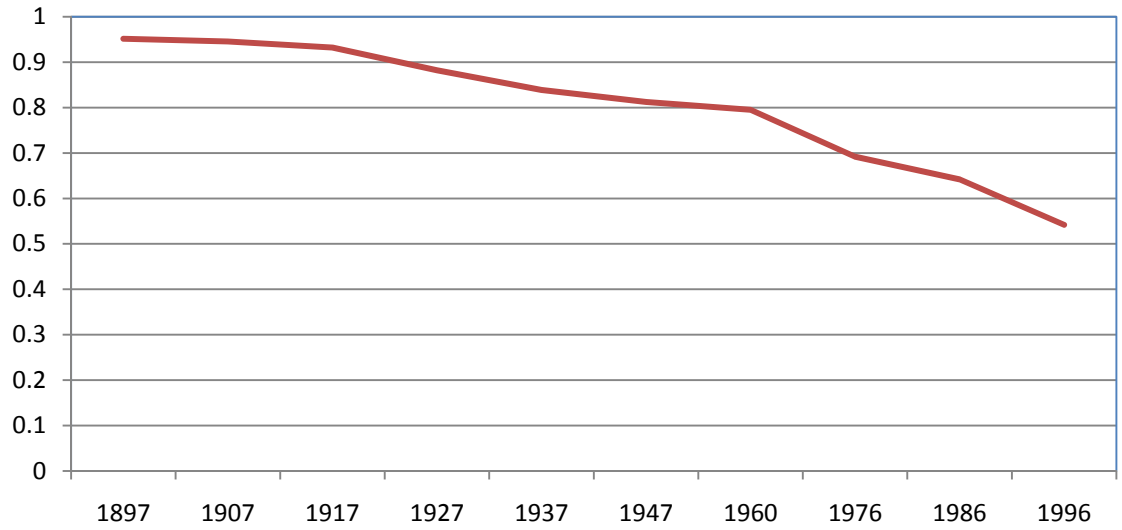

Table (3): Religion and Literacy (Pooled OLS)
[Dependent variable: Literacy rate (% of total population)]

	1897-1927		1897, 1907, and 1917		1897, 1907, and 1927		1897 and 1907	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Non-Muslims' rate	.168 (.027)	.168 (.025)						
Christians' rate			.158 (.032)	.161 (.027)				
Copts' rate					.038 (.009)	.074 (.006)	0.038 (0.009)	0.060 (0.007)
Non-Coptic Christians'' rate							0.708 (0.031)	0.669 (0.040)
Jews' rate			.507 (.281)	.23 (.15)			0.205 (0.058)	0.094 (0.032)
Other religions' rate *(excluding Muslims and Copts)*					.641 (.046)	.556 (.061)		
Provinces' Dummies?	No	Yes	No	Yes	No	Yes	No	Yes
N	15724	15724	11749	11749	11872	11872	7897	7897
R-squared	0.348	0.611	0.343	0.584	0.671	0.753	0.737	0.797

Robust standard errors (clustered at the district level) are in parentheses. Control variables in each regression are: females' rate, log (population), population per housing unit (as a measure of density). Year dummies and interactions of each regressor with year dummies are included in each regression.

Table (4): Religion and Literacy for Males (Pooled OLS)
[Dependent variable: Male Literacy rate (% of total male population)]

	1897-1927		1897, 1907, and 1917		1897, 1907, and 1927		1897 and 1907	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Non-Muslims' rate	0.206 (0.034)	0.216 (0.024)						
Christians' rate			0.194 (0.034)	0.208 (0.025)				
Copts' rate					0.077 (0.017)	0.140 (0.012)	0.076 (0.017)	0.122 (0.013)
Non-Coptic Christians' rate							0.734 (0.034)	0.633 (0.050)
Jews' rate			0.614 (0.295)	0.232 (0.127)			0.318 (0.080)	0.121 (0.037)
Other religions' rate *(excluding Muslims and Copts)*					0.679 (0.041)	0.528 (0.060)		
Provinces' Dummies?	No	Yes	No	Yes	No	Yes	No	Yes
N	15724	15724	11749	11749	11872	11872	7897	7897
R-squared	0.320	0.586	0.266	0.539	0.533	0.657	0.514	0.639

Robust standard errors are in parentheses (clustered at the district level). Control variables in each regression are: females' rate, log (population), population per housing unit (as a measure of density). Year dummies and interactions of each regressor with year dummies are included in each regression.

Table (5): Religion and Literacy for Females (Pooled OLS)
[Dependent variable: Female Literacy rate (% of total female population)]

	1897-1927		1897, 1907, and 1917		1897, 1907, and 1927		1897 and 1907	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Non-Muslims' rate	0.107 (0.031)	0.102 (0.025)						
Christians' rate			0.100 (0.030)	0.095 (0.025)				
Copts' rate					0.001 (0.001)	0.008 (0.002)	0.001 (0.001)	-0.001 (0.002)
Non-Coptic Christians' rate							0.636 (0.042)	0.654 (0.041)
Jews' rate			0.371 (0.270)	0.235 (0.187)			0.097 (0.053)	0.082 (0.049)
Other religions' rate *(excluding Muslims and Copts)*					0.556 (0.058)	0.531 (0.065)		
Provinces' Dummies?	No	Yes	No	Yes	No	Yes	No	Yes
N	15701	15701	11737	11737	11850	11850	7886	7886
R-squared	0.256	0.502	0.284	0.462	0.763	0.795	0.860	0.863

Robust standard errors are in parentheses (clustered at the district level). Control variables in each regression are: females' rate, log (population), population per housing unit (as a measure of density). Year dummies and interactions of each regressor with year dummies are included in each regression.

Table (6): Religion and Literacy (FE and RE)
[Dependent variable: Literacy rate (% of total population)]

	1897-1927		1897, 1907, and 1917		1897, 1907, and 1927		1897 and 1907	
	FE	RE	FE	RE	FE	RE	FE	RE
Non-Muslims' rate	0.281 (0.010)	0.271 (0.006)						
Christians' rate			0.274 (0.008)	0.226 (0.005)				
Copts' rate					0.176 (0.014)	0.043 (0.006)	0.125 (0.010)	0.036 (0.003)
Non-Coptic Christians' rate							0.639 (0.020)	0.732 (0.007)
Jews' rate			0.318 (0.029)	0.487 (0.021)			0.333 (0.039)	0.256 (0.016)
Other religions' rate *(excluding Muslims and Copts)*					0.535 (0.023)	0.718 (0.009)		
N	15011	15011	11254	11254	11354	11354	7597	7597
Within R-squared	0.256	0.154	0.215	0.171	0.376	0.150	0.296	0.259
Between R-Squared	0.025	0.246	0.186	0.351	0.058	0.678	0.666	0.811

Standard errors are in parentheses. Control variables in each regression are: females' rate, log (population), and population per housing unit (as a measure of density).

Table (7): Employment, Occupational Distribution, and Religion for Males in 1927

Dependent	% Males with Occupation		% Males in Manufacturing and Commerce	
	(1)	(2)	(1)	(2)
Male Copts' rate	-0.064 (0.012)	0.016 (0.009)	0.063 (0.019)	0.097 (0.016)
Male other religions' rate *(excluding Muslims and Copts)*	0.146 (0.042)	0.087 (0.024)	0.221 (0.145)	0.071 (0.105)
Provinces' Dummies?	No	Yes	No	Yes
N	3975	3975	3975	3975
R-Squared	0.45	0.598	0.36	0.617

Robust standard errors are in parentheses (clustered at the district level). Control variables are: log (population), population per housing unit (as a measure of density), male foreigners' rate, % of males under 10 years old, % of males 60 years old and above, and % of blind males. All the variables are percentages of the male population.

Table (8): Relationship between Literacy, Occupation, and Religion for Males in Upper Egypt, Lower Egypt, and Urban Provinces (Pooled OLS)

Dependent	A. Male Literacy Rate (1897, 1907, and 1927)				
	Urban Provinces	Lower Egypt	Northern Upper Egypt	Middle Upper Egypt	Southern Upper Egypt
Copts' Rate	0.212 (0.088)	0.185 (0.020)	0.203 (0.027)	0.078 (0.011)	0.177 (0.024)
N	894	6502	1317	2396	660
R-Squared	0.644	0.510	0.558	0.456	0.594

Dependent	B. % Males in Manufacturing and Commerce (1927)				
	Urban Provinces	Lower Egypt	Northern Upper Egypt	Middle Upper Egypt	Southern Upper Egypt
Copts' Rate	-0.166 (0.067)	0.110 (0.022)	0.204 (0.101)	0.054 (0.007)	0.562 (0.095)
N	312	2123	441	783	220
R-Squared	0.238	0.378	0.243	0.327	0.586

Robust standard errors are in parentheses (clustered at the district level). Each column represents a separate regression. Controls for literacy regression are females' rate, log (population), population per housing unit, year dummies, and interactions of each of these variables with year dummies. Controls for occupational distribution regression are log population, population per housing unit, foreigners' rate, % of population under 10 years old, % of population 60 years and above, and % of blind people. Regressions for border provinces are not shown to save space.

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