FROM FARMERS TO MERCHANTS, CONVERSIONS AND DIASPORA: HUMAN CAPITAL AND JEWISH HISTORY

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Abstract
From the end of the second century CE, Judaism enforced a religious norm requiring fathers to educate their sons. We present evidence supporting our thesis that this change had a major influence on Jewish economic and demographic history. First, the high individual and community cost of educating children in subsistence farming economies (2nd to 7th centuries) prompted voluntary conversions of Jews that account for a share of the reduction from 4.5 to 1.2 million. Second, the Jewish farmers who invested in education gained the comparative advantage and incentive to enter skilled occupations during the urbanization in the Abbasid empire in the Near East (8th and 9th centuries) and they did select themselves into these occupations. Third, as merchants the Jews invested even more in education—a precondition for the mailing network and common court system that endowed them with trading skills demanded all over the world. Fourth, the Jews generated a voluntary diaspora within the Muslim Empire and later to Western Europe. Fifth, the majority of world Jewry lived in the Near East when the Mongol invasions in the 1250s brought this region back to a subsistence farming economy in which many Jews found it difficult to enforce the religious norm, and hence converted, as it had happened centuries earlier. (JEL: J1, J2, N3, O1, Z12, Z13)

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1. Introduction

Do changes in religious and social norms have long-term effects on economic and demographic outcomes? We address this question by studying one of the best documented historical examples of a change in religious norms that had a huge impact on long-term economic and demographic patterns. Specifically, we show that the implementation, from the second century CE, of the religious norm requiring Jewish fathers to educate their sons determined three major patterns in Jewish history: (i) a slow process of conversions from Judaism among illiterate Jewish farmers who lived in subsistence economies; (ii) a comparative advantage in urban skilled occupations in which the literate Jews selected themselves when urbanization and the development of a commercial economy provided them with the returns to their investment in education; and (iii) the voluntary diaspora of the Jews in search of worldwide opportunities in crafts, trade, and moneylending.

In Botticini and Eckstein (2005; summarized here in Section 2), we describe the transformation of Judaism (200 BCE–200 CE) from a religion mainly based on sacrifices in the Temple into a religion whose core was the reading of the Torah in the synagogue. Jewish religious leaders further advanced this reform by encouraging the construction of synagogues in many towns and villages all over Palestine, by promoting the status of teachers and scholars, and by downgrading the status of illiterate people (*ammei ha-aretz*).[1] This religious transformation occurred when most of the Jewish population consisted of illiterate farmers in a subsistence rural economy.

We embed the transformation of Judaism into a formal model in order to study the economic and demographic implications of the change in the religious norm. We first model the Jewish farmers' decisions regarding their own religion and their sons' education (Section 3). Allowing for heterogeneity in farmers' incomes, children's opportunity costs of going to school, and levels of attachment to the Jewish religion, we show that in each cohort there is always a proportion of Jews who decide not to educate their sons and to convert. Hence the model predicts that Judaism, with its increased emphasis on education, cannot survive in the long-run in a subsistence farming society.

In Section 4 we show that Jewish population dynamics, as well as literary and archeological sources, support this prediction regarding a slow process of

1. The Jews used the phrase *Eretz Israel* [Land of Israel] to designate the area approximately east of the Mediterranean Sea and west of the Jordan River. It consisted of the three regions of Judaea (south), Samaria (middle), and the Galilee (north). After crushing the Bar Kockba's revolt in 135 CE, the Roman emperors renamed the area *Syria-Palaestina* (from the name of the ancient population, Philistines). Later, the Muslim rulers labeled the region Filastīn or Falastīn, whereas the Jews maintained the name Eretz Israel. Throughout the paper, we use interchangeably the two words—Eretz Israel and Palestine—as they were used by the people in the first millennium.

voluntary conversions.[2] The first key piece of evidence comes from the size of world Jewry, which shrank from 4.5–5 million in the first century to roughly 1.2–1.5 million in the early eighth century. In all areas, the Jewish population decreased more than the total population.

Massacres account for roughly 40% of the reduction of the Jewish population in Palestine, 25% of the decrease in Egyptian Jewry, and an uncertain percentage of the Jewish communities in Syria, Asia Minor, and Western Europe. However, after taking into account massacres, epidemics, and general population decline, an additional 30% to 60% (depending on location) of the reduced Jewish population was the outcome of voluntary conversions, mainly to Christianity.

Christianity emerged as one of the many groups within Judaism in the first century and before becoming a predominantly Gentile religion its main base consisted of Jewish Christians. A key feature of the new religion was that it abolished many requirements of Judaism, including circumcision for men and reading of the Torah.

From a large number of literary, epigraphic, and archeological sources, scholars have established three main patterns regarding the spread of Christianity before the age of Constantine (313–325 CE).[3] First, Christianity deeply penetrated towns, villages, and rural districts where large Jewish communities existed, such as in Palestine, Syria, western Mesopotamia, Armenia, Asia Minor, Egypt, and North Africa. In contrast, Christianity spread slowly or not at all before 325 CE in locations where there were few or no Jewish settlements. Second, many passages in the writings of the early Christian writers and church fathers indicate that most Jewish converts to Christianity were uneducated, low-income Jews. Third, outside Palestine, Christianity grew primarily in locations where there were large Jewish settlements of mixed racial composition, including Hellenistic Jews and pagans or descendants of former pagans who had converted to Judaism in earlier times.

In Section 4, we also document that some Jewish farmers did not convert and invested in their sons' education. The Jewish farmers who invested in education gained a comparative advantage and the incentive to enter urban skilled occupations during the vast urbanization in the newly developed Muslim empire under the Abbasid caliphate in the eighth and ninth centuries. This occupational transition (summarized in Section 5) was an endogenous and voluntary selection

2. Because we are dealing with a long period of time (first to fourteenth centuries CE), space constraints force us simply to summarize the enormous amount of material and secondary sources we have read. One must keep in mind, though, that the secondary sources we read are the works of prominent scholars who studied a huge number of primary and secondary sources. We do our best to organize and summarize the most relevant historical evidence, referring interested readers to the specific historical works for additional information and details.

3. With the Edict of Milan in 313, the Roman emperor Constantine made Christianity a permitted religion. In 325 the Council of Nicaea, attended by many bishops, represented a landmark in the history of the spread of Christianity.

of literate Jewish farmers into skilled occupations when the vast urbanization in the Near East created a large demand for these occupations.

To analyze the implications of the religious transformation on the economic and demographic patterns of Jews in an urban economy, we then extend the model to study the choice of religion and children's education of craftsmen, merchants, and urban dwellers (Section 6). Unlike in farming, education increases craftsmen's and merchants' earnings. The model predicts (i) that Jewish merchants invest more in their sons' education than Jewish farmers and non-Jewish farmers and merchants; and (ii) that, without a large tax penalty or occupational restrictions for being a Jewish individual, Jewish merchants do not convert.

We present historical evidence that is consistent with these predictions (Section 7). Once the Jews became skilled craftsmen, merchants, tax collectors, moneylenders, and doctors, they further invested in their sons' religious and general education, attaining levels of education comparatively higher than the non-Jewish population at that time. Moreover, there were no mass conversions of Jews to Islam, and the size of the Jewish population remained roughly constant from the eighth through the twelfth century.

The main insight of our thesis is that Judaism, with its costly religious norm requiring fathers to educate their sons, cannot survive in the long run in subsistence farming economies where literacy does not increase earnings. It can survive in the long run only if the Jewish people can find occupations—such as crafts, trade, and moneylending—in which their earnings significantly gain from literacy. We present two additional historical facts that support this argument: first, the voluntary diaspora of the Jews to Western Europe during the tenth through thirteenth centuries (Section 8), and second, their voluntary conversions in the Near East after the Mongol invasions of Iraq and Persia in the 1250s (Section 9).

Within the Muslim empire under the Abbasid caliphate, Jewish craftsmen and merchants freely migrated and settled in Egypt, North Africa, and Spain. The rise of Cordoba under Muslim rule as the largest European city before the end of the first millennium coincided with the growth of a small but wealthy and intellectually prominent Jewish community. From the tenth to the thirteenth century, the Jews also migrated to France, Germany, and England upon invitation by kings, bishops, and local rulers. In these countries, they established small but wealthy communities in hundreds of towns and cities where they were locally protected and free to engage in almost any occupation. The numerous early medieval charters and privileges indicate that European cities competed for Jewish skilled intermediaries at a time when literacy rates in the local populations were at most 10%.

The voluntary migrations to Western Europe contributed to the development of three increasingly distinct and separate Jewish communities. Under the intellectual leadership of Maimonides, the Jewish communities in Muslim Spain developed rules and customs that differed from those of the Ashkenazi Jewish

communities in Germany, France, and England that blossomed under the leadership of Rashi. Both communities established new academies that continued the tradition of the Babylonian Talmud, but they each also developed their own intellectual centers independent of the large Jewish center in Iraq.

More than a thousand years after the transformation that had turned Judaism into a religion centered on education, the Mongols invaded Iraq and Persia in 1256–1260 and destroyed the urban economy. Massacres, starvation, and epidemics reduced the total population by about 35% in less than 200 years. The Jewish population in Iraq and Persia shrank much more, partly as the outcome of voluntary conversions. That such conversions occurred when the Near East became again a subsistence farming and pastoral economy is consistent with the main insight of our theory.

The main contribution of our paper is to present a novel economic explanation for the major patterns in Jewish economic and demographic history. Prominent scholars (Baron, H. Ben-Sasson, Gil, Goitein, and Roth, just to mention a few) documented almost all the facts that we report, but they did not highlight the transformation of Judaism as a factor in the occupational transition. In contrast, we link Jewish population dynamics, conversions, occupational choice, and migrations to the same factor: the transformation of the religious norm within Judaism at the beginning of the first millennium.

There are no alternative hypotheses concerning the decline of the Jewish population from the first to the eighth century and after the Mongol shock. By tracking the long-term trends in the size of the Jewish population, we highlight the impact of voluntary conversions on the reduction of the Jewish population.

Our theory is also consistent with the occupational selection of the Jewish people documented in detail in Botticini and Eckstein (2005, pp. 927–930), where we also discuss the main competing theories. The common explanation is the argument based on restrictions (e.g., Roth 1938). According to this view, the Jewish people did not engage in farming in medieval Europe because they were prohibited from owning land. The problem with this view is that—in the Roman Empire, in the Parthian and Sassanian empires (Babylonia), and especially later in the Muslim Empire under the Abbasid caliphate—the Jewish people could own land and engage in any occupation, including farming.

A less-known view, the economics of small minorities, was proposed by Simon Kuznets (1960, 1972), who argued that the Jews (like any other minority) chose to engage in urban occupations in order to maintain their religious and group identity. We show that this theory does not pass the test of historical evidence. In Babylonia, the Jews were a minority when most of them were farmers and also when they became merchants. In Palestine, most Jews were engaged in agriculture regardless of whether they were the majority of the population (up to the end of the third century) or a minority (from the fourth century and in the Byzantine period).

Before Kuznets, Max Weber (1952) had maintained that the Jews voluntarily chose to segregate and to become an urban population in order to observe their ritualistic correctness, dietary prescriptions, and Sabbath rules, which would have been impossible to comply with in rural areas. In contrast, we argue that the Jews continued to observe their dietary restrictions and common prayers for more than five centuries (about 100–750 CE) when most of them were farmers. Furthermore, other groups, such as the Samaritans, had the same (or even stricter) dietary restrictions and common prayers, yet they remained farmers.

The third main pattern described by historians is the Jewish migrations within the Muslim Empire and to Western Europe. In our theory these migrations are the endogenous outcome of the occupational selection of the Jewish people. The distinctive engine of the Jewish migrations to the West was the incentive to maximize the returns to their investment in religious literacy, which had spillover effects on their general literacy and education. Because there were only a few high-skill occupations in each town, Jewish craftsmen, traders, and moneylenders moved in search of these urban occupations; in so doing, they created a voluntary worldwide diaspora and became a minority in all locations they settled. In contrast, in Kuznets's theory the minority status of the Jews is taken as given and thus, left unexplained.

Our work also adds to several strands of literature in economics. First, it contributes to the literature on the long-term impact of institutions by illustrating that some contemporary economic patterns (in our case, the selection of Jewish people into high-skill jobs) have been influenced by institutions and social norms that emerged centuries ago.[4]

We also contribute to the literature that studies the interactions between cultural values and economic outcomes.[5] Greif (1994), for example, has shown how different cultural beliefs among Jewish (Maghribi) traders and Genoese traders brought a divergence in their societal organizations in the early Middle Ages. We argue that the network externality among Jewish traders highlighted by Greif could not exist without a common written language (Hebrew), high literacy levels, and a common law (Talmud).

Finally, we contribute to the growing literature on the nexus between religion and economics.[6] Works by Guiso, Sapienza, and Zingales (2003) and Barro and McCleary (2006) are cross-section analyses of the correlation between religious values and economic performance. The Jewish case enables us to study the long-term economic outcomes of a change in religious norms.

4. See, for example, North (1990), Acemoglu, Johnson, and Robinson (2002), Kuran (2003), and Tabellini (2006).

5. See, for example, Mokyr (2002), Fernández and Fogli (2006), Guiso, Sapienza, and Zingales (2006), and Tabellini (2006).

6. Works on the economics of religion related to our research are Iannaccone (1992), Berman (2000), Carlton and Weiss (2001), Chiswick (2006), and Rapoport and Weiss (forthcoming).

2. Jewish Religious Reform, 200 BCE–200 CE: A Summary

In Botticini and Eckstein (2005, pp. 932–937) we present a detailed description of the transformation of Judaism at the beginning of the first millennium as established and widely accepted by scholars of Jewish history. Here we briefly summarize the main features of this religious transformation, which is the main assumption of our model.

At the beginning of the first millennium in Eretz Israel, there were many religious groups, including pagans. Even within Judaism, the religion of the majority of the population, there were numerous groups such as the Sadducees, the Pharisees, the Samaritans, the Essenes, and the Zealots. Christianity, too, grew within Judaism in the first century CE. Despite being similar and interrelated in their daily lives, people belonging to different groups were becoming increasingly differentiated by their religious rules and norms.

Before the destruction of the Temple in Jerusalem in 70 CE by the Roman army that crushed the rebellion in Judaea, the two main groups were the Sadducees, who accepted only the Written Torah and adopted the Hellenistic culture, and the Pharisees, who aimed to expand the study of both the Written and the Oral Torah among all Jews and opposed the expansion of Greek language and culture (Cohen 2002).[7] In order to reach this goal, some Pharisees prompted a major change in the educational institutions: first (around the first century BCE) by encouraging the establishment of free secondary schools throughout Eretz Israel and later (in the first century CE) by issuing a religious ordinance asking parents to send their 6- or 7-year-old sons to school to read and learn the Torah.

When the Temple was destroyed, the Pharisees who did not participate in the rebellion became the dominant group and gave a major push to the religious and educational reform that they had started in the second–first centuries BCE. They replaced sacrifices, which could only be performed in the Temple, with the study of the Torah in the synagogue, whose main function was to provide religious instruction to both children and adults.

After 70 CE, the religious leadership became vested in the rabbis and scholars in the academy who interpreted the Torah, discussed religious norms as well as social and economic matters pertaining to daily life, and organized the vast body of Jewish Oral Law accumulated through the centuries. Rabbi Judah ha-Nassi completed their work by redacting the Mishna in about 200 CE.[8] Under his

7. The *Written Torah* refers to the first five books of the Bible; the *Oral Torah* consists of the rulings of scholars and rabbis regarding the implementation of the Written Torah. The existence of an Oral Torah indicates that literacy was not widespread in ancient Eretz Israel. If most people could not read, then there was little point in writing down the religious rules.

8. The Mishna consists of six volumes of rules regarding farming, religious holidays and ritualistic issues, marriage and divorce, and financial matters. One entire volume (*Zeraim*) is devoted to the rules of farming, which constitutes evidence that Eretz Israel was mainly a farming society at that time (Neusner 1998).

influence, the term *ammei ha-aretz* (literally: people of the land) acquired the new meaning of "someone who does not know or/and does not teach his sons the Torah" (Oppenheimer 1977). This transformation of the religion created the need for devoted Jews to be literate and, more important, to make their children literate. To be an *am ha-aretz letorah* in a Jewish community was to be considered an outcast, which involved a social penalty.

In the first half of the millennium, no religion except Judaism required fathers to educate their sons. In contrast, many religions required sacrifices or ceremonies in temples (e.g., Greek and Roman pagan religions, Zoroastrianism), faith and prayers (e.g., Christianity), initiation into mysteries and magic (e.g., Eleusinian mysteries, Dionysiac and Orpheic cults, Mithraism), or prayers and fasting (e.g., Manicheism).

We view the transformation of Judaism as a change in religious preferences that was not motivated by economic incentives and thus, can be taken as given from the point of view of the Jewish population at the beginning of the first millennium. Before the destruction of the Temple, the struggle between the Sadducees and the Pharisees was mainly over such religious matters as what should be the core of the Jewish religion: sacrifices in the Temple performed by the high priests, or reading of the Torah by any adult male Jewish individual. The competition between the two groups was ended by an external event (the destruction of the Temple by the Roman army) whose result was that the Pharisees became the religious leaders. As the new leaders, the Pharisees had to decide what should be the core of the religion. Because some of them were scholars and teachers, it was natural to rule out sacrifices—given that there was no longer the Temple in which to perform them—and to replace sacrifices with the reading of the Torah.

The Pharisees were not merchants, and their goal was not to make any Jewish individual an educated and wealthy merchant. Rather, their goal was ensuring that all male Jewish children and adults could read the Torah (in Hebrew) in front of the Jewish community in the synagogue. The emphasis on Hebrew—when the spoken languages of the Jewish communities in Eretz Israel and in the Diaspora were Aramaic, Greek, and Latin—is one more indication that the educational reform within Judaism was not prompted by economic gains for Jewish farmers.

Finally, Palestine and Babylonia were not urban or commercial economies in the first half of the millennium. Most of the Jewish population consisted of illiterate farmers for whom investing in their children's religious education was a sacrifice with no economic returns (Section 4.1). In Section 3 we model the economic and demographic implications of this religious sacrifice.

3. A Model of Education and Conversion of Farmers

In the previous section (see also Botticini and Eckstein 2005), we presented historical evidence on the transformation of Judaism from 200 BCE to 200 CE. In

this section we present a model—based on that historical evidence—for studying the economic and demographic consequences of the change in religious norms and preferences. Because almost all Jews were farmers in the period 200 BCE–200 CE, we first model the choices of farmers; here "farming" includes all occupations in which literacy does not increase an individual's productivity and earnings.

Before the educational reform within Judaism (up to 200 CE), both Jews and non-Jews are assumed to derive utility only from consumption, because no religion required literacy. We also assume that, before 200 CE, Jews and non-Jews have the same level of education and income.

After the educational reform within Judaism (after 200 CE), Jewish and non-Jewish individuals are identical from the production point of view but are different in terms of their religious preferences. Specifically, we model the transformation of Judaism by assuming that Jewish farmers derive utility from their children's and their own Hebrew literacy (education). Therefore, a Jewish individual (after 200 CE) receives an exogenous taste parameter (an attachment index) $x > 0$, which weights the value of belonging to the Jewish ("reformed") religion in the utility function, interacted with the family education level. The taste parameter is set equal to 0 for an individual whose father is non-Jewish (either because born non-Jewish or because he had converted). This assumption models the well-established fact that no religion in the first millennium (except Judaism) had a norm that placed a positive value on literacy.

The basic setup is a two-period overlapping generations model with no population growth.[9] An individual is assumed to live for two periods. In the first period, he is a child (son) living with (and perhaps working for) his family and receiving religion-related education e_s. In the second period, the child becomes an adult with education level e who decides (a) whether to keep or change his religion r (j = Jewish, n = non-Jewish) and (b) the education level of his children.

Like Iannaccone (1992), we assume that utility comes from consumption and religious participation.[10] The utility of an adult individual has the

9. The hypothesis of no population growth fits the well-known fact that the world population did not grow significantly during the first millennium. Also, it would be straightforward to include fertility as an endogenous variable: The increased cost of raising children due to the religious requirement regarding education would make Jewish farmers less inclined to have children. This prediction would complement the one explored here regarding the decrease in Jewish population as a result of conversions. The main reason we do not make fertility an endogenous variable is that there is no historical evidence showing that Jews had lower fertility rates after the religious transformation (see the discussion later).

10. The model can be modified to be like Iannaccone's model of religion as a "club" whose size is endogenously determined. Once the utility is specified as a general concave function, in equilibrium the utility and the cost of education can depend on the Jewish population size.

following simple structure:

$$u^j(c, e_s; e, x) = \log c + x(e+1)e_s - \varepsilon h, \tag{1}$$

$$u^{jn}(c, e_s; e, x) = \log c - \pi x, \tag{2}$$

$$u^n(c, e_s; e, x) = \log c. \tag{3}$$

Here c is family consumption, u^j is the utility of a Jewish individual, u^{jn} is the utility of a Jewish individual who converts, and u^n is the utility of a non-Jewish individual.

In (1), the utility from belonging to the Jewish religion is increasing with the individual's education and his son's education.[11] This interaction of the preference parameter x with the level of education in the family is our way of modeling the transformation of Judaism from a religion based on sacrifices to a religion whose core became centered on literacy and education around 200 CE.

The term εh models the subsequent development within Judaism (third century onward) that, under the leadership of rabbis and scholars, imposed a social penalty on illiterate individuals (*ammei ha-aretz*), as documented by the large number of quotations directed against the *ammei ha-aretz* in the Mishna and the Talmud. We set $h = 1$ if a Jewish father chooses not to invest in his son's education ($e_s = 0$) and $h = 0$ otherwise. The community penalty for an illiterate Jewish individual is equal to $\varepsilon > 0$.[12]

In contrast, education does not enter the utility function of either Jewish individuals who convert (equation (2)), or of non-Jewish individuals (equation (3)). This assumption models the well-established fact that no religion in the first millennium (except Judaism) assigned a positive value to the education of its followers. The term πx represents the disutility from conversion ($\pi \geq 0$).[13] In contrast, the conversion of a non-Jewish individual to Judaism is assumed to have zero cost.[14]

11. Our specification implies that if $e_s = 0$, then the individual derives no utility from belonging to the Jewish religion. This is an extreme version of the model, but it captures the paramount importance of educating children in Judaism after the educational reform.

12. We could make ε an increasing function of the proportion of educated Jews in the community. This assumption would enhance the conversion result that we derive; it would also make the model closer to Iannaccone's (1992) model if one solves for the size of the Jewish community in the static model. An alternative way to endogenize the social penalty for illiterate people is to have the Jewish religious leaders set the level of ε that maximizes the size of the Jewish educated community in the static model. These extensions affect the proportion of educated individuals in the Jewish rural population in the static framework but not the dynamic implications on the reduction of the Jewish population in the long run, which is the main focus of our model.

13. The inclusion of the disutility from conversion is not essential for our main result, but it helps us interpret the data in view of the model.

14. We can also model a positive cost for non-Jewish individuals of converting to Judaism, but the results would not change. Even without this cost, there are no conversions to Judaism.

An individual who follows the Jewish religious norm regarding children's education must provide at least a minimum level $e^{\min} > 0$ to his son; otherwise, if $0 < e < e^{\min}$, then it is as if the education level is equal to 0. This minimum level represents the ability to read the Torah. Without loss of generality, we normalize $e^{\min} = 1$.

The cost of investing in the son's (religious) education is given by $\gamma(e_s)^{\theta}$, where $\gamma > 0$ and $\theta > 1$. The cost of providing the minimum level of education is then equal to γ, which can be interpreted as the teacher's salary and the cost of the books. It is possible that γ is decreasing with the size of the Jewish community in a given location; for example, in larger Jewish communities, each family will pay a smaller share of the teacher's salary. From the viewpoint of the child, γ can be interpreted as the child's intellectual ability (with γ being lower for high-ability children), and/or the opportunity cost of the time the child spends in school instead of working on his family's farm, and/or the cost of hiring a private teacher.[15]

A farmer's budget constraint is

$$c + \gamma(e_s)^{\theta} + \tau^{rF} \leq w^F, \tag{4}$$

where τ^{rF} is the tax a farmer pays according to his religion and w^F is the farmer's income. Given the way agriculture was practiced in the first millennium (and even for most of the second millennium), literacy did not increase a farmer's productivity and earnings. This is why, for both Jewish and non-Jewish farmers, education does not affect the farmer's income; the model captures this feature of agriculture in the first millennium by making w^F exogenous.

Education. From (3) and (4), the optimal choice for non-Jewish farmers is not to educate their sons ($e_s^* = 0$) given that the son's education provides no benefit (either in utility or in production).

To solve for the optimal level of sons' education for Jewish farmers, let the budget constraint in (4) hold with equality. Then the optimal level of e_s is given by $e_s^* = 0$ if

$$x(e+1) < \frac{\gamma\theta}{w^F - \gamma - \tau^{jF}} \quad \text{and} \quad x(e+1) < \log\left(\frac{w^F - \tau^{jF}}{w^F - \gamma - \tau^{jF}}\right) - \varepsilon. \tag{5}$$

Otherwise, the optimal level of e_s is given by $e_s^* \geq 1$ and is the solution to

$$x(e+1) = \frac{\gamma\theta(e_s)^{\theta-1}}{w^F - \gamma(e_s)^{\theta} - \tau^{jF}}. \tag{6}$$

15. By making γ a decreasing function and ε an increasing function of the number of Jewish children in school, in the static framework one can analyze the implications on the incentives to live in large and/or wealthy Jewish communities and also solve for the optimal community penalty that maximizes the proportion of educated Jewish individuals—the goal of the religious leaders in Talmudic times.

The first inequality in (5) is a result of the corner solution at $e_s = 1$. The second inequality in (5) follows from the condition that the utility of a Jewish individual with $e_s = 0$ must be larger than that with $e_s = 1$.[16]

The two conditions yield testable implications on children's education. Jewish fathers do not invest in their sons' education (i) if the marginal cost of providing basic Jewish education ($\gamma\theta$) is large and/or (ii) if the level of family consumption ($w^F - \gamma - \tau^{rF}$) when the minimum level of education ($e_s = 1$) is provided is low. When do (i) and (ii) occur?

At the community level, γ is large in small Jewish communities. It is also large when the aggregate economic conditions in a given community are bad. At the same time, negative aggregate shocks will drive agricultural incomes (w^F) down, which in turn will bring family consumption so low that it would be almost impossible to invest in children's education.

At the individual level, families with low-ability sons (large γ), or families whose opportunity costs of sending their sons to school instead of having them work on the farms are high (again, large γ), will be less likely to invest in children's education. Also, fathers with low levels of attachment to Judaism (low x) or who are themselves less educated (low e) will be less likely to educate their children.

Conversion. Conversion to another religion can be prompted by several factors, which we model as follows. A Jewish farmer converts if his utility as a Jewish individual is lower than his utility as a converted individual—that is, if

$$u^j(c, e_s^*; e, x) < u^{jn}(c, e_s^*; e, x), \tag{7}$$

or

$$\log\left(w^F - \gamma\left(e_s^*\right)^\theta - \tau^{jF}\right) + x(e+1)e_s^* - \varepsilon h < \log(w^F - \tau^{nF}) - \pi x,$$

where a Jewish farmer's utility is evaluated at the optimal level of his child's education e_s^* as discussed before. Suppose that $\tau^{jF} = \tau^{nF}$.

There are three cases.

(i) Jewish farmers whose parameters (w^F, γ, θ, x) are such that they do educate their sons ($e_s^* \geq 1$) do not convert even if $\pi = 0$, since $u^j(c, e_s^* \geq 1; e, x) > u^{jn}(c, e_s^* = 0; e, x)$.

(ii) Jewish farmers whose parameters (w^F, γ, θ, x) are such that they do not educate their sons ($e_s^* = 0$) convert if $0 \leq \pi x \leq \varepsilon$.

16. It should be noted that the model could be simplified by assuming that education for farmers is a discrete choice of either 0 or 1. Then the optimal level of e_s is given by $e_s^* = 0$ if the second inequality in (5) holds. It follows that all the previously discussed implications hold. We prefer modeling education as a continuous variable mainly for the sake of equivalence with the model for Jewish merchants presented later.

(iii) Jewish farmers whose parameters (w^F, γ, θ, x) are such that they do not educate their sons $(e_s^* = 0)$ do not convert if $\pi x > \varepsilon$.

Thus, heterogeneity across individuals (different x, e, and γ) in each cohort as well as changes in aggregate economic conditions over time (a change in w^F, τ^{rF}, or γ) provide testable implications on conversions.

First, at a given point in time, because of the heterogeneity across individuals, there is a proportion of Jewish farmers who educate their sons and do not convert, a proportion of Jewish farmers who do not educate their children but do not convert, and a proportion of Jewish farmers who do not educate their children and convert. This in itself reduces the Jewish rural population in any period. Also, conversions are more numerous when aggregate economic conditions are bad (low w^F, high τ^{rF}) and in small communities (high γ).[17]

Second, in the long run Judaism cannot survive in a subsistence farming society because the Jewish rural population shrinks each generation as a result of conversions. This process can be halted in two ways: (i) if Jewish farmers can migrate to locations with better economic conditions and/or larger Jewish communities where the cost of educating the children is lower; and (ii) if increased urbanization and the expansion of trade make available to the literate Jewish farmers skilled occupations with positive returns to education.

4. Jewish Farmers Before the 8th Century

We now show that the historical evidence is consistent with our model's assumptions and predictions.

4.1. Education

At the beginning of the first millennium, the vast majority of world Jewry was engaged in farming exactly as the non-Jewish population (Botticini and Eckstein 2005, Table 1). Illiteracy was the common feature of all rural populations, Jewish and non-Jewish alike (Hezser 2001).

In a predominantly rural economy, the investment in children's education (as Judaism required after the religious reform) should be viewed as a religious sacrifice without any economic return. To the farmers it provided no benefit in terms of higher productivity or earnings. It was costly at the community level, because the entire community had to bear some expenses (e.g., the construction of a synagogue in a village), and also at the individual level.

Safrai (1994, p. 125) has estimated that, in Roman Palestine, food amounted to 40–50% of a family's total expenses. With taxes taking an additional 30%, little

17. If cognitive skills are inherited from fathers to sons, then our work would share some of the features of Galor and Moav (2002) model of natural selection.

TABLE 1. Cost of living (in denarii), 1st–3rd centuries CE.

Items in a household budget	Palestine	Egypt	Babylonia
Monthly wage of an agricultural worker	24–48	4–32	72–96
Monthly wage of an urban skilled worker	48–72	6–40	—
Monthy wage of a boy on farm work	—	2–10	—
Monthly bread expenses (family of 4 people)	10–20	5–10	—
Cattle (ox or cow)	100–200	15–100	—
Suit/cloak	30	—	—
Monthly rent of a house	4	—	—
Book	200	—	80–120

Note: The range of values encompasses (i) the different figures mentioned in primary sources as well as (ii) the increase in wages and prices from the first to the third century.
Source: Botticini and Eckstein (2006, Table 1).

was left to buy other items such as clothing, books, and paying for the teacher's salary. Table 1 presents some data on the cost of living that are consistent with Safrai's estimates.

Some clear patterns emerge from these data. First, farmers' incomes were close to subsistence levels and lower than those of urban skilled workers. Second, food exhausted a substantial part of a farmer's income. Third, the investment in children's education was costly. The opportunity cost of sending a boy to school was large (in first-century Egypt, a boy earned more than 2 denarii per month on farm work—half the cost of providing bread for a family of four people for a month). Moreover, books were expensive. In fact, books remained prohibitively expensive until the invention of printing via movable type in the fifteenth century.[18]

Despite Jewish education being costly and "useless" in production for farmers, three independent sources show that religious instruction and primary education became increasingly common among the Jewish communities in Palestine and Babylonia from the end of the second century. See Botticini and Eckstein (2005, pp. 934–937) for a more detailed discussion.[19]

First, there are the myriad discussions and rulings in both Talmuds (the Talmud of the Land of Israel and the Babylonian Talmud) regarding schools, synagogues, and teachers.[20] These discussions among scholars were not merely academic debates, as they addressed specific questions raised within the Jewish communities. For example, one ruling established a communal tax to provide

18. In 1450 a printed Bible cost the equivalent of a laborer's annual wage, whereas in 1780 the cheapest Bible cost only the equivalent of a carpenter's daily wage (van Zanden 2004, Figures 4 and 5).

19. Data on standards of living and the archeological findings on synagogues presented here are new and in addition to the evidence discussed in Botticini and Eckstein (2005).

20. From the third to the sixth century, the scholars (*Amoraim*) in the academies in Palestine and Babylon discussed the Oral Torah and clarified the rulings in the Mishna. Their work became codified in the *Talmud Yerushalmi* (the Talmud of the Land of Israel), redacted in the late fourth century, and in the *Talmud Bavli* (the Babylonian Talmud), redacted in the early sixth century.

TABLE 2. Sample of synagogues in Palestine, 200–550 CE.

Century	Locations	Region
3rd	Bar'am, Gush Halav, Horvat Shema, Kefar Kana, Nevoraya	Galilee
3rd–4th	Chorazin, Gush Halav, Hammat Gader, Hammath Tiberias, Khirbet Shema, Maoz Hayyim, Meiron, Nabratein, Rehov	
4th	Arbel, Capernaum, Horvat ha-Amudim, Meroth	
5th	Huseifa, Hirbet Amudim, Yiafia, Sepphoris	
3rd	En-Gedi, Eshtemoa	Judaea
4th	Gaza, Horvat Rimmon, Horvat Susiya, Naaran	
5th	Beth Alpha, Beth Shean, Maoz Hayim	Beth-Shean Valley
3rd–5th	Anim, Aphik, Dabbura, Kefar Hananiah	Golan
4th–5th	Assalieh, En Neshut, Horvat Kanef, Katzrin, Zumimra	Lower Golan
6th	Dabiya, Horvat Dikke, Umm el-Kanatir	

Source: Botticini and Eckstein (2006, Table 2).

for the wages of teachers of the Torah and the Mishna. Another ruling settled the issue of whether unmarried residents with no children had to pay for the wages of teachers. Another ruling discussed the possibility that the community as a whole could fire a teacher who did not follow the parents' instructions.[21] No other religion at this time had a similar body of discussions and rulings devoted to religious instruction. Even so, the quotations directed against the *ammei ha-aretz* in the Talmud also indicate that some Jews chose not to educate their sons, which is consistent with another prediction of our model.

Second, there is the wealth of archeological discoveries that document the timing of the construction of synagogues. Table 2 presents a sample of the archeological findings. Of the hundred or so synagogues that have been excavated in Palestine, most were built from the third to the fifth century in villages and rural communities in Judaea, Galilee, and the Golan. For the locations in the diaspora (Syria, Asia Minor, Egypt, North Africa, and Western Europe), there are archeological findings on more than 200 synagogues. The archeological evidence of synagogues is important because many discussions and rulings in the Talmud document that synagogues were primarily a place where children and adults read and learned the Torah (S. Safrai 1976; Z. Safrai 1987; Schiffman 1999).

Third, the growth of the academies in Babylonia indirectly show that more students must have received some primary education, a prerequisite for entering the academies. Similarly, the institution of the *kallah* (apparently begun in Babylon in the third century) indicates that literacy was spreading among the Jewish rural population from the fourth century. There were two months of kallah each year (March and August), during which there were no agricultural activities and Jews from everywhere visited the academy, where a specific section of the

21. Safrai (1987, pp. 77–78) and Gafni (1990, pp. 107–109).

Talmud was read and discussed by scholars. This important event of Jewish life was scheduled at a time of the year when (literate) farmers could attend it.[22]

During the kallah in spring, questions sent from all the Jewish communities to scholars in the academies in Babylon were read and discussed. The written answers (*teshuvot* in Hebrew, *Responsa* in Latin) to these questions were then sent back through the Jewish merchants.

From the early sixth century, this Responsa literature is the source of information about the spread of literacy in the Jewish communities (Alon 1984; Brody 1998). Letters indicate that there were teachers who taught small children everywhere, even in villages (Assaf 1925–1942, vol. 2). These teachers were among the community officials (together with rabbis, judges, and heads of synagogues) listed at the end of letters of excommunication that the *Geonim* (the heads of the academies) sent to the many Jewish communities in the world.

The discussions and rulings in the Talmud (200–500 CE), the archeological evidence of synagogues (200–550 CE), and the information from the early Gaonic Responsa (550–800 CE) all indicate that more Jews educated their children in the period before the urbanization occurring in the Muslim Empire—that is, before the transition from agriculture into crafts and trade.

The spread of literacy among the Jewish rural population is even more impressive when compared to the literacy rates of the non-Jewish rural population. In Babylonia and the Persian Empire under Sassanian rule, primary education was mainly a private enterprise carried on in the home and in court schools for children of the upper classes (Bowen 1972).

As for the Roman Empire, Baron (1952, vol. 2, p. 279) points out that "in the Talmudic period Jewish learning penetrated still deeper into the masses. This happened at a time when illiteracy was widespread throughout the Mediterranean world and when the Imperial City itself had only begun to establish public schools for the wealthy and the middle class." In the Roman Empire, primary schools existed in the cities although primary education was neither compulsory nor universal. The lower socioeconomic groups in the cities and the rural population were illiterate (Marrou 1982, chs. 4 and 7).

When the Roman Empire collapsed, illiteracy became the distinctive mark of the population of Western Europe, with the exception of monks and clerics (Bowen 1972, ch. 13).

4.2. Evidence of Conversions from Jewish Population Dynamics, 1–750 CE

The main prediction of the model is that some Jewish farmers convert to other religions in response to the costly educational reform in Judaism.

22. Neusner (1965–1970, vol. 4, pp. 384–385).

The first key piece of evidence supporting this implication comes from the size of the Jewish population, which shrank from about 4.5–5 million in the first century (the four main centers were in Eretz Israel, Babylonia, Egypt, Syria, and Asia Minor) to about 1.2–1.5 million in the early eighth century (Table 3).[23]

As we show in detail below by going through each region, there is a common trend across the areas from the Near East to Western Europe: From the first to the early eighth century, the Jewish population shrank more than the total population. This implies that—after taking into account massacres, wars, famines, diseases, and epidemics, which took a toll on both the Jewish and the non-Jewish populations—another factor must account for the larger decrease of the Jewish population.

To the best of our knowledge, there is no historical evidence showing that Jewish households reduced their fertility following the transformation of Judaism. The Mishna and the Talmud—which contain many detailed discussions and rulings regarding marriage, sexual behavior among spouses, pregnancy, abortion, infertility, divorce, and the Biblical requirement that the purpose of marriage is to fulfill the commandment to "be fruitful and multiply" [*peru urevu*]—do not mention reducing the number of children in order to fulfill the religious duty of educating them. Had this been a major problem in the Jewish communities, then surely it would have been brought to the attention of the academies' scholars and rabbis, and, after discussion, would have found its way into the Talmud.[24]

Excluding a decrease in fertility, voluntary conversions remain the only other factor that can explain the comparatively larger reduction of the Jewish population with respect to the total population before the eighth century.

Palestine. As Table 3 shows (left-hand side), the Jewish population decreased by roughly 90% in the first half of the millennium: from about 2.5 million (including 300,000 Samaritans) before the Great Revolt (66–70 CE) to only 200,000 by the sixth century and even less by the eighth century.

The death toll of the Great Revolt against the Roman Empire amounted to about 600,000 Jews, and the Bar Kokhba revolt in 135 caused the death of about 500,000 Jews.[25] Massacres account for roughly 40% of the decrease of the Jewish

23. For population data in the first millennium we rely on the works of leading historians and demographers; we also greatly benefited from a helpful discussion with Sergio DellaPergola. There is disagreement among scholars on specific numbers, but there is a general consensus on the trends and the relative size of the populations in selected locations at given times. The numbers should be considered as ranges of values, not as exact figures. We agree with DellaPergola's estimate of 4.5 million Jews in the first century, which is an intermediate value between the 2–3 million estimate suggested by some scholars (e.g., Hamel 1990) and the 8 million estimate proposed by Baron (1971).

24. Sergio DellaPergola (2001) shows that the Jewish population experienced the demographic transition one century earlier than the rest of the European population. This means that the Jewish birth rate did not begin to decline until about the late eighteenth century.

25. Baron (1971, pp. 870–875); Herr and Oppenheimer (1990, p. 109). The Samaritans sided with the Romans and so the crushing of the rebellion did not affect them.

TABLE 3. Population (millions), ca. 1–750 CE.

	Jewish Population in						Total Population in					
	65[b]	100[c]	150	300[d]	550	750	65	100	150	300	550	750
Palestine	2.5	1.8	1.2	0.5	0.2	few	3	2.25	1.75	1.1	1.5	1–1.5
Babylonia[a]	1	1	1–1.2	1–1.2	0.8–1	0.7–0.9	7	7.25	7.5	8.75	10.5	11.75
Egypt[a]	1	0.8–1	0.5	0.1	few	0.004	8.15	8.4	8.8	8.2	6.2	7.8
Syria[a]	many	many	some	few	few	few	2.25	2.25	2.25	2	1.5	2
Asia Minor[a]	many	many	some	few	few	few	10.25	11	11.5	11	8.5	8.75
E. Europe[a]	few	few	few	few	few	few	3.1	3.25	3.25	3.3	2.7	3.05
W. Europe[a]	some	some	some	few	few	few	21.1	22.6	22.95	22.05	16.95	16.95
All locations	4.5–5	3.8–4	2.8–3	1.8–2	1.2–1.5	1–1.2	54.85	57	58	56.4	47.85	50.8
Jewish/Total	8.6%	6.8%	5.0%	3.3%	2.8%	2.1%	—	—	—	—	—	—

Notes: [a] Babylonia includes Iraq, Persia, and the Arabian peninsula. Egypt includes North Africa. Syria includes Lebanon. Asia Minor includes Anatolia, Turkey, and the Balkans (Albania, Bulgaria, Greece, and Yugoslavia). Eastern Europe includes Hungary, Romania, Poland, and Czechoslovakia. Western Europe includes Italy, Portugal, Spain, France, the Low Countries, Germany, and England.
[b] The Great Revolt in Palestine (66–70 CE) was crushed by emperor Titus; the Temple in Jerusalem was demolished.
[c] The rebellion in Egypt and Cyrenaica (115–117) was put down by Emperor Trajan. The Bar Kokhba revolt in Palestine (132–135) was ended by Emperor Hadrian.
[d] The Edict of Milan (313 CE) by Emperor Constantine made Christianity a permitted religion.
Source: Botticini and Eckstein (2006, Table 3).

population in Palestine. Moreover, some Jews migrated to Babylon after these revolts because of bad economic conditions. Yet 30% to 40% of the decrease in the Jewish population in Palestine (about 1–1.3 million Jews) still remains to be explained.

In contrast, looking at the right-hand side of Table 3, the non-Jewish population (equal to total population minus the Jewish population) went from roughly 500,000 Greeks, pagans, and some Christians in the first century to about 1.3 million people (mainly Christians) in the sixth century. These opposite trends in the Jewish and Christian populations support our hypothesis that a certain proportion of Jews converted to Christianity.

Egypt and North Africa. As one can see in Table 3, the total population in Egypt decreased by slightly more than 4% from the first to the early eighth century. In contrast, Egyptian Jewry, consisting almost entirely of Hellenistic Jews who spoke Greek, almost disappeared—from about 1 million in the first century to about four thousand before the Arab-Muslim expansion.

Of this decrease, about 25% is explained by the massacre of the Jews in Alexandria (about 150,000–200,000) when the Roman emperor Trajan put down the rebellion of the Jewish communities in Egypt and Cyrenaica in 115–117. Some Egyptian Jews also migrated to Babylon.

However, there remains 60% to 70% of the decrease in Egyptian Jewry that neither massacres nor migrations can explain. Observe that this is the time during which Christianity spread in Egypt and laid the foundation of the Egyptian Coptic church. Many of the early Hellenistic Christians were Jews by birth.

Babylonia and Persia. Total population in Babylonia, Persia, and the Arabian peninsula (including Yemen) increased by more than 60% from the first to the eighth century (Table 3).

Babylonian Jewry increased by roughly 20% from the second to the early fourth century as the outcome of the migrations of Jews from Palestine and Egypt. However, in the subsequent four centuries, Babylonian Jewry decreased despite the absence of any major massacres. At the same time, the Christian population became as numerous as the Jewish one.

Syria, Asia Minor, Balkans, and Western Europe. Table 3 indicates that, from the first to the eighth century, the total population decreased by roughly 11% (Syria), 12% (Asia Minor and Balkans), and 20% (Western Europe), respectively.

The Jewish population in these regions also decreased, although it is not possible to ascertain by how much. In 600 CE the Jews in Western Europe numbered only a few thousand, but for the period 600–800 there is no information at all on the Jewish communities there (Toch 2005). Some persecutions and forced conversions of Jews occurred in Syria, Asia Minor, and the Balkans in the early

Byzantine period (sixth to early seventh centuries) and in Visigothic Spain (fifth–seventh centuries). However, the decline of the Jewish population in these areas had started much earlier: in the second–fifth centuries.

4.3. Evidence of Conversions from Literary and Epigraphic Sources, 1–325 CE

The two main competitors of Judaism in the first three centuries were the Greek-Hellenistic pagan religion and Christianity.[26]

Christianity emerged as one of the many groups within Judaism in the first century; before becoming a predominantly Gentile religion, its main base consisted of Jewish Christians (Schiffman 1985). The early Christian community in Jerusalem consisted entirely of Jews and proselytes to Judaism.

Under the influence of Paul (a Jew by birth), Christianity abolished many requirements imposed by Judaism, including circumcision for men and the reading of the Torah. From the very beginning, Christianity aimed to make the lower socioeconomic groups feel welcome. "Faith, hope, and charity" became the three main requirements for being a devoted Christian (Nock 1969; Stark 1996).

Among the Jewish Christians there were several subgroups (Neusner 1990). The Ebionites (in Hebrew, *Evionim* literally means "poor people") accepted the Pharisaic form of Judaism (Written and Oral Torah), practiced circumcision, and kept the Sabbath. They rejected Paul's doctrine but recognized Jesus as a Prophet and Messiah. They spoke Jewish Aramaic and had both a Hebrew Bible and a Hebrew version of the Gospel. The Nazarenes were observant Jews who accepted Paul's doctrine like the Gentile Christians and shared feelings of hostility toward the Jewish scholars and the Pharisees. Still other groups, collectively designated as Jewish Christian Gnostics, adhered to the laws of the Torah but rejected some part of the Bible (e.g., that dealing with sacrifices), believed in Jesus as Messiah, and shared gnostic elements together with other non-Jewish sects. To these groups of Jewish Christians was addressed the large body of Jewish Christian literature, which in itself indicates the existence of Jews who were departing from Judaism and moving toward Christianity.

Until the destruction of the Temple, Jewish religious leaders held ambivalent feelings, mostly of tolerance, toward the Jewish Christian sects. However, after the Bar Kokhba revolt in 135, Jewish scholars declared the various sects of Jewish Christians to be outside the Jewish fold. Apostatizing to Christianity was

26. As for conversions of non-Jews to Judaism, there is a debate among scholars on whether or not Jewish religious leaders actively encouraged proselytism (see Feldman 1993, ch. 9; Goodman 1994; Cohen 1999). There were conversions of pagans to Judaism before the revolts in the first century CE (Baron 1952, vol. 1, pp. 173–176). In contrast, after the third century, people converted to Judaism only by coercion—as in the case of slaves owned by Jews.

TABLE 4. The extent of Christianity, 1–325 CE.

Group	Locations	Extent
I	All provinces in Asia Minor (Armenia, Bithynia, Cappadocia, Caria, Diospontus, Galatia, Isauria, Lycaonia, Lycia, Lydia, Mysia, Pamphylia, Paphlagonia, Phrygia, Pisidia, Pontus), Cyprus, Thracia, towns (e.g., Caesarea) and villages in Palestine, Edessa in western Mesopotamia	Nearly half of the population was Christian, and Christianity was the most widely spread religion
II	Villages in Palestine, Syria, Egypt, Cyrenaica, Africa Proconsularis and Numidia, Achaia, Thessaly, Macedonia, central and southern Italy, Iberia, southern Gaul	A large segment of the population was Christian
III	Galilee, Phoenicia, Assyria and Mesopotamia, western Persia, Mauretania and Tripolitana, Epirus, Dardania, Dalmatia, Moesia, Pannonia, northern Italy	Christianity was thinly scattered
IV	Eastern Persia, Philistia, Dacia and northern coast of the Black Sea, eastern Europe, Germany, Raetia, central and northern Gaul, Belgium	A small segment of the population was Christian

Source: Botticini and Eckstein (2006, Table 4).

condemnable, and apostates were regularly cursed in synagogues (this is captured by the cost of conversion, π, in our model).

Based on epigraphic evidence from hundreds of inscriptions, archeological findings on church buildings, and an enormous amount of literary sources, scholars have documented three main patterns regarding the spread of Christianity from the Near East to the West before 325 CE—the year of the Council of Nicaea, the first of the great ecumenical councils, which was a landmark in the history of the expansion of Christianity.[27]

First, as shown in Table 4, before 325 CE Christianity deeply penetrated towns, villages, and rural districts with large Jewish communities, whereas it spread slowly or not at all in areas where there were few or no Jewish settlements.

Second, the model predicts that Jews with a low attachment parameter to Judaism (low x) are more likely to convert. Consistent with this prediction, one finds that, outside Palestine, Christianity grew primarily in locations where the Jewish settlements consisted of Hellenistic Jews and of pagans or descendants of former pagans who had converted to Judaism in earlier times (e.g., Syria, Greece, Egypt and North Africa, Spain, central and southern Italy, and southern Gaul). It is interesting that both Asia Minor and Egypt, which hosted large Jewish communities, never had a Torah academy like the ones established in Palestine and Babylon. Furthermore, no students from Asia Minor are mentioned among those studying at the academies in Palestine and Babylon. The lesser degree of

27. See Harnack (1908, vol. 2, pp. 89–337) and the many references cited in Botticini and Eckstein (2006, footnote 36).

observance of Jewish laws among the large Hellenistic Jewish communities in Egypt, Syria, and Asia Minor—and their close proximity to a society dominated by the Hellenistic religion and culture—favored conversions to the Greek-Hellenistic pagan religion (especially in the first and second centuries) and to Christianity.

Third, the model predicts that Jewish farmers with low earnings w^F, as well as Jewish fathers with higher opportunity costs γ of educating their sons, are more likely to convert. Consistent with this prediction, the historical evidence indicates that most Jewish converts to Christianity were uneducated, low-income Jews. Many passages in the writings of the early Christian writers and Church Fathers support this statement.[28] In addition to this literary evidence, until the fourth century, the majority of the Jewish population consisted of illiterate farmers; this means that most conversions involved illiterate farmers.

Independently of these literary sources, the "puzzle" about the timing of the construction of synagogues in rural Palestine supports the view that conversions of Jews to Christianity occurred among the low-income rural population. The growth in the number of synagogues occurred in the worst economic times for Palestine—between the third and the fifth century—when some Jews were even migrating to Babylonia. This implies that the Jews who funded the construction of synagogues in many villages across Palestine were better off than those who left Judaism and embraced Christianity.

4.4. Evidence of Conversions from Literary Sources, 325–700 CE

The Roman and early Byzantine Empires. Table 3 indicates that, from 300 to 700 CE, the Jewish population in Palestine, Syria and Asia Minor, Egypt, and other locations under Roman rule shrank more than the general population.[29] Thus, after accounting for common factors that explain both the Jewish and total population decline (epidemics, famines, and wars), one is left again with conversions to explain the comparatively larger decline of the Jewish population.

With the Edict of Milan in 313 that made Christianity a religion permitted in the Roman Empire and by summoning the Council of Nicaea in 325, where

28. See the many references in Botticini and Eckstein (2006, footnote 38).

29. The second group who increasingly separated from the Jewish religion in Palestine was the Samaritans, who kept considering sacrifices the core of the religion, refused the Oral Torah developed by the scholars, and never codified their canon law into a Mishna. Some Jewish scholars in the second century still considered the Samaritans as belonging to the Jewish fold, but rabbi Judah ha-Nassi and later scholars equated them to Gentiles. In the Talmudic period, Jewish scholars debated whether the Samaritans were to be considered *haverim* [members of the community] or *ammei ha-aretz* [illiterate Jews]. This implies that the social penalty (ε) imposed by the Jewish community on the Samaritans was greater than zero. Their numbers declined for two main reasons: massacres by Byzantine emperors and forced conversions (Crown, Pummer, and Tal 1993). However, some Samaritans did not convert and from this point of view were identical to illiterate Jewish farmers (*ammei ha-aretz*), who did not educate their children yet did not leave Judaism but still were made outcast by the Jewish religious leaders. This historical fact is consistent with case (iii) in the model.

TABLE 5. Legislation regarding Jewish converts to Christianity, 300–600 CE.

Years	Emperor	Decree
311–337	Constantine	Death penalty for Jews who harm Jewish converts to Christianity
364–375	Valentinian	Jewish parents cannot disinherit children who converted to Christianity
379–395	Theodosius	Death penalty by fire for Jews who harm Jewish converts to Christianity
395–423	Honorius	Jewish converts to Christianity can revert to Judaism
395–408	Arcadius	Jews cannot become Christians for economic motives
527–565	Justinian	Jewish parents cannot disinherit children who converted to Christianity

Note: The years refer to the length of an emperor's tenure.
Source: Botticini and Eckstein (2006, Table 5).

hundreds of bishops gathered from diverse locations and established the main theological tenets of the new religion, the Roman emperor Constantine opened the way for Christianity to spread among pagans and Gentiles all over the Roman Empire.

Neither Constantine nor subsequent emperors, though, forced Jews to convert to Christianity. Each emperor imposed some restrictions on the Jews in the Roman and early Byzantine empires (e.g., the prohibition against buying Christian slaves or the prohibition against building new synagogues), but they never imposed the Christian faith on the Jewish people.

Despite this lack of coercion to convert to Christianity, some Jews voluntarily left Judaism from the fourth to the seventh century. Literary evidence of voluntary conversions comes from legal sources. As Table 5 illustrates, Roman and early Byzantine emperors issued decrees protecting Jewish converts to Christianity. There would be no need to issue such laws unless the possibility that Jews might harm Jewish converts to Christianity was perceived as a major problem.

Babylonia and Mesopotamia. As shown in Table 4, in the first two centuries conversions of Jews to Christianity had occurred in some specific locations, such as Edessa in western Mesopotamia.

Christianity penetrated more widely and deeply among Babylonian Jewry during the fourth and fifth centuries.[30] On the one hand, the Jewish population in Babylonia shrank (Table 3) despite the migrations of Jews from Palestine and Egypt stemming from worsened economic conditions. On the other hand, Christians in Babylonia became as numerous as the Jews there, and a certain proportion of these Christians were converted Jews given that there were no attempts to forcibly convert pagans to Christianity in Babylonia as there had been in the Byzantine Empire (Gil 1997, vol. 1, p. 57).

Also, consistent with the prediction of the model, Christianity spread in those locations (e.g., Edessa and Arbela in western Mesopotamia) where there were large Jewish communities that were not under the influence of rabbinic Judaism

30. Neusner (1965–1970, vol. 2, and vol. 4, p. 435).

(i.e., in communities whose individuals had lower attachment indexes x to rabbinic Judaism). In contrast, Christianity spread slowly in locations (e.g., Nehardea and Nisibis) where rabbinic Judaism was well established (Neusner 1965–1970, vol. 2).

5. Occupational Dynamics: From Farmers to Merchants, 8th–9th Centuries

Given the stagnant economies[31] in the late Roman, early Byzantine, and Sassanian empires in the fourth through seventh centuries, the growing number of educated Jewish farmers could not find skilled occupations in existing cities.[32] But in the eighth and ninth centuries, as Table 6 shows, urbanization greatly expanded in the newly established Muslim Empire under the Abbasid caliphate (Lewis 1984).

New cities were founded in Iraq and Persia. The Umayyad dynasty, based in Damascus, established as main centers the cities of Basra in 636 and Kufa in 638;

TABLE 6. Urbanization in the Near East and Western Europe.

	Total Population	Jewish Population
A sample of cities in Iraq, Persia, and Egypt in the 8th–9th centuries		
Baghdad	600–1,000	200
Samarra	500+	7.5
Basra	200–600	10–50
Kufa	400	35
Nishapur	100–500	?
Isfahan	100	75
Qayrawan	100	?
Cairo	300	10
Western Europe's eight largest cities in the late 12th century		
Palermo	150	7.5
Paris	110	1.5
Seville	80	many
Venice	70	?
Florence	60	0.1
Granada	60	many
Cordoba	60	many
Cologne	50	some

Note: Population in thousands.
Source: Botticini and Eckstein (2006, Table 6).

31. See Neusner (1965–1970) and Avi-Yonah (1976) regarding the stagnant and worsened economic conditions in the Roman, Byzantine, and Persian empires during the fourth through seventh centuries.

32. In this section we summarize the detailed description of the occupational transition presented in Botticini and Eckstein (2005). In Table 6 we present data on urbanization not available in that article.

the Abbasid rulers developed Baghdad in 762 and Samarra in 836. In the eighth and ninth centuries, the population of Baghdad was in the range of 600,000 to 1 million people, whereas even in the late twelfth century the largest European cities had populations in the range of only 60,000 to 150,000 people.

The growth of new cities, towns, and administrative centers in the Muslim Near East vastly increased the demand for skilled occupations. The literate Jewish rural population in Iraq and later in all Muslim lands moved to urban centers, abandoned agriculture, and became engaged in a wide range of occupations: crafts, trade, moneylending, tax collecting, and the medical profession. This occupational transition took about 150 years and, by 900, almost all Jews in Iraq, Persia, Syria, and Egypt were engaged in urban occupations.[33] In these cities, the Jewish population became so large that roughly 80% of world Jewry lived in hundreds of cities and towns in eighth-century Iraq and Persia, with Baghdad hosting a large Jewish community of about 200,000 people (Gil 1997, vol. 1, p. 458).

The most-educated Jews (the scholars in the academies) had left agriculture and became merchants well before the expanded urbanization in Iraq and Persia, but the remaining literate Jewish rural population left agriculture only when the growth of cities in the Abbasid Empire greatly expanded the demand for skilled occupations, in which the returns to their investment in literacy and education were high.

Because Jews, Christians (as numerous as the Jews), and other non-Muslim minorities could engage in any occupation in the Abbasid Empire, the distinctive characteristic of the Jews—their endogenously determined higher literacy and education—gave them a comparative advantage to switch to the better-paid occupations in the new cities. Most non-Jews remained farmers. This occupational selection into the urban skilled occupations remained the distinguishing characteristic of the Jewish people thereafter.

6. A Model of Education and Conversion of Merchants

Once the occupational transition had reached its full-fledged stage in the eighth and ninth centuries, as just described, most Jews were engaged in urban skilled occupations. We now modify the model to study their choices of education and conversion as merchants. Given that the change in religious preferences after 200 CE occurred for all Jewish individuals, regardless of their occupation, our assumptions concerning the utility functions of Jewish and non-Jewish merchants are the same as those discussed in Section 3 in the model for farmers.

As explained in Botticini and Eckstein (2005, p. 931), Hebrew religious education had spillover effects on general literacy and education, which in turn

33. See Goitein (1967), Ben-Sasson (1976), and Gil (1992; 1997, vol. 1).

increased the productivity of urban skilled occupations. We model this historical fact by having the earnings depend on the adult's and his son's education, independent of religious affiliation; that is,

$$w^M(e, e_s) = w^F\left(1 + Ae_s^{\alpha} e^{1-\alpha}\right). \tag{8}$$

Therefore, a merchant's budget constraint is given by

$$c + \gamma(e_s)^{\theta} + \tau^{rM} \leq w^F\left(1 + Ae_s^{\alpha} e^{1-\alpha}\right), \tag{9}$$

where e and e_s are defined as before, A is an exogenous productivity parameter, and τ^{rM} is the tax paid by a merchant of religion r.

Education. The main prediction is that Jewish merchants invest more than non-Jewish merchants in children's education because the formers' x (their taste parameter for Judaism as a religion centered on education) is positive. The first-order condition that gives the optimal level of a child's education for any merchant (Jewish or non-Jewish) may be written as

$$x(e+1) + \left(-\theta\gamma e_s^{\theta-1} + w^F A\alpha e_s^{\alpha-1} e^{1-\alpha}\right)\frac{1}{w^M - \gamma(e_s)^{\theta} - \tau^{rM}} \leq 0. \tag{10}$$

Consider first the steady-state education level ($e = e_s = e^*$) of non-Jewish merchants whose exogenous taste parameter for Judaism is (by definition) $x = 0$. Then, from equation (10), $e = e_s = e^* = (w^F A\alpha/\theta\gamma)^{1/(\theta-1)}$. In the steady state, non-Jewish merchants educate their sons (i.e., $e^* \geq e^{\min} = 1$) if the parameters satisfy $w^F A\alpha \geq \gamma\theta$, that is, if the marginal product of education is greater than or equal to the marginal cost of education at $e_s = e = e^{\min} = 1$. The better are the aggregate economic conditions, the higher are the earnings of merchants ($w^F A\alpha$) and hence the more likely it is that both non-Jewish and Jewish merchants will invest in their sons' education.

Let us assume that, before the educational reform in Judaism, the education levels of both Jewish and non-Jewish merchants were positive ($e \geq 1$). Education has a positive effect on merchants' productivity and earnings regardless of which religion a merchant belongs to. However, after the religious transformation of Judaism, Jewish merchants will invest in their children's education comparatively more than non-Jewish merchants because they also derive direct utility from children's education at the rate x; see equation (1).

Conversion. The main prediction regarding conversion is that, if there is a small (or no) tax difference between Jewish and non-Jewish merchants, then no Jewish merchant converts. If taxes on Jewish merchants are significantly higher, then Jewish merchants with low levels of attachment to Judaism (low x) convert. Hence, given that some Jewish farmers convert (see Section 3) and Jewish

merchants do not (unless the tax differential is high), the model predicts that the proportion of merchants in the Jewish population will increase over time.

Formally, a literate Jewish merchant ($e^j \geq 1$) converts if the utility of remaining a Jewish individual is lower than the utility of becoming a non-Jewish individual—that is, if

$$u^j(c, e_s; e, x) < u^{jn}(c, e_s; e, x),$$

or

$$\log\left[w^F\left(1 + A\left(e_s^j\right)^\alpha (e^j)^{1-\alpha}\right) - \gamma\left(e_s^j\right)^\theta - \tau^{jM}\right] + x(e^j + 1)e_s^j$$
$$< \log\left[w^F\left(1 + A\left(e_s^n\right)^\alpha (e^n)^{1-\alpha}\right) - \gamma\left(e_s^n\right)^\theta - \tau^{nM}\right] - \pi x. \qquad (11)$$

Assuming that the level of education of Jewish merchants before the religious reform (e^*) is greater than or equal to 1, equation (11) implies that if taxes on Jewish and non-Jewish merchants are the same ($\tau^{nM} = \tau^{jM}$) then a literate Jewish merchant does not convert.

To see this, we start first with the extreme case of $x = 0$, in which the Jewish individual places no value on the educational requirement established by Judaism. Then, by (11), a Jewish merchant will choose to invest in his son's education (e_s^j) exactly as would a non-Jewish merchant (e_s^n), and hence he will be indifferent regarding conversion because he derives the same utility irrespective of his religious affiliation.

As the attachment index to Judaism x increases, the utility from being Jewish is increasing with the education level of the child e_s^j; therefore, a Jewish merchant who educates his children will not convert. Moreover, the higher the attachment index to Judaism x, the greater the cost of conversion (πx). As a result, no Jewish merchant will convert if the tax differential between Jewish and non-Jewish individuals is zero or small.

7. Jewish Education and Conversions, 9th–12th Centuries

In this section we show that the historical evidence regarding the Muslim period is consistent with the model's predictions.

7.1. Education

In the Muslim Near East, primary education was almost universal in the Jewish communities (Goitein 1962).[34] The two main sources of information are the

34. In Botticini and Eckstein (2005, pp. 937–939) we present detailed information to support this claim. Here we only summarize the main facts.

Responsa of the Geonim (described in Section 4.1) and the documents of the Cairo Genizah.

The existence and extent of the Responsa is by itself evidence of the spread of literacy in the Jewish communities. Many Responsa, even from villages, referred to schooling and teachers. Other Responsa indicate that, in synagogues, Jewish children learned the Hebrew and Arabic scripts as well as arithmetic and that even non-Jewish families were interested in sending their children to synagogues to learn non religious topics (Goitein 1962).

The other impressive source consists of thousands of letters, contracts, wills, and written transactions from the documents of the Cairo *Genizah*, which confirm the universality of primary education documented in the Responsa but on a larger scale.[35] The budgets, letters, and contracts of both wealthy and humble households, even from small towns and villages, contain an endless number of references to teachers and school fees. In addition to the school fees for his own children, each household head was required to pay an education tax to finance the primary education of orphan and poor children. Records from Fustat, Jerusalem, Damascus, and Baghdad mention "teachers of the orphans" supported by this communal tax (Goitein 1971, pp. 174–193).

Urbanization affected both the Jewish population and the local population, so other groups also invested in education. The key difference is that all Jews invested in children's education, whereas among non-Jews only some invested in children's education. For example, to spread the new religion, the Muslim rulers promoted the establishment of primary schools (*Maktab* or *Kuttab*), and by the end of the eighth century there was a growing number of primary schools (Nakosteen 1964, pp. 44–47). Unlike in Judaism, though, providing a child with primary education was not a religious law in Islam. Moreover, most of these primary schools were devoted to memorizing the Qur'an, and few of them taught children to read and write. Muslim rulers also founded institutions of higher learning (academies) starting in the eleventh century—more than six centuries after the establishment of Jewish academies in Iraq.

7.2. Conversions

Table 7 indicates that from the eighth to the twelfth century, total population increased. Most of this population growth occurred in Western Europe at the turn of the millennium together with expanding urbanization and the rebirth of a commercial economy.

35. These documents were found in the basement of a synagogue in Fustat (Old Cairo, Egypt), where they had been housed for centuries because the name of God was written at the beginning of each document and hence they could not be thrown away.

TABLE 7. Population (millions), ca. 750–1170.

	Jewish Population in		Total Population in	
	750	1170	750	1170
Palestine	few	0.002	0.5	0.5
Iraq, Persia, Arabia[a]	0.7–0.9	0.7–0.9	11.75	10.75
Egypt, North Africa	0.004	0.07	7.8	8.45
Syria, Lebanon	few	0.015	2	1.5
Balkans, eastern Europe[a]	few	0.047	11.8	16.4
Western Europe[a]	few	0.103	16.95	32.35
All locations	1–1.2	1–1.2[b]	50.8	69.95
Jewish/Total	2.1%	1.6%	—	—

Notes: [a]Arabia refers to the Arabian peninsula including Yemen. Balkans includes Turkey and Anatolia, Albania, Greece, Yugoslavia, and Bulgaria. Eastern Europe includes Austria, Poland, Czechoslovakia, Hungary, and Romania. Western Europe includes Italy, Portugal, Spain, France, the Low Countries, Germany, and England.
[b]The total of 1–1.2 million also includes about 157,000 Jews in Central Asia, India, and East Asia.
Source: Botticini and Eckstein (2006, Table 7).

In contrast, world Jewry remained roughly constant. Natural growth because of the high standards of living of many Jews in the Muslim Empire (the so-called golden age in Jewish history) was offset by the losses caused by massacres and forced conversions. Deaths were caused by the waves of intolerance that swept through seventh-century Visigothic Spain, Merovingian France, and Langobard Italy. Also, the bloodbath of the Crusades in the early twelfth century destroyed or significantly shrank some of the Jewish communities in Germany and elsewhere (Baron 1971).

Episodes of forced conversions also took a toll on some Jewish communities in selected locations at specific times. The most severe persecutions and forced conversions of Jews (and especially Christians) occurred in the early eleventh century in Egypt under the Fatimid caliph al-Hakim. In Muslim Spain and North Africa, the Almohad rulers massacred dissenting Muslims, Christians, and Jews and then instigated forced conversions to Islam among the last two groups.[36]

In contrast, no mass voluntary conversions of Jews to Islam occurred once the Jews became engaged in urban skilled occupations. This observation is supported by the thousands of letters and documents from the Cairo *Genizah* and the Responsa literature, in which episodes of voluntary conversions of Jewish individuals to Islam are mentioned as exceptional cases that mainly involved prominent members of Jewish communities who converted in order to enter prestigious positions in the bureaucracy of the Abbasid caliphate (Goitein 1971, pp. 300–304). Hence, these conversions were quite different from those of Jewish farmers to Christianity in the subsistence economies of Palestine and Babylonia in the first five centuries—conversions that were the outcome of the implementation of the costly religious norm.

36. Baron (1952, vol. 17, pp. 181–183); Goitein (1971, pp. 299–303).

The poll tax levied on non-Muslims was not a significant burden for Jewish craftsmen, merchants, tax collectors, and doctors; it was not certainly enough to prompt mass conversions among them, which is consistent with the prediction of our model that, unless there is a large tax differential between Jews and non-Jews, Jewish merchants will not leave Judaism.[37] In addition, as highlighted by Greif (1993), membership in the same ethnic and religious group created a network externality and the possibility of imposing community sanctions, which made it profitable for Jewish merchants not to leave their religious network.

8. Voluntary Diaspora, ca. 800–1250

The main insight of our thesis is that the educational requirement established by Judaism could survive in the long run only if the Jews could find occupations that provided high returns to their investment in education. Their migrations within the Muslim Empire in the eighth through tenth centuries and then to Western Europe in the ninth through thirteenth centuries are an important historical development that supports this argument.

The timing, pattern, and characteristics of the Jewish diaspora from the East to the West indicate that the Jewish population had some distinctive features compared to other minorities within the Muslim Empire, who did not migrate to Western Europe even though no prohibitions prevented them from doing so. We argue that the distinctive engine of the Jewish migrations to the West was the incentive to maximize returns to an investment—in religious human capital—that had spillover effects on their general literacy and education.

The ability to read religious texts in Hebrew enabled Jews to read any other document written in Hebrew (e.g., business letters, contracts, loans, sales) even when the local language differed. In addition, the ability to read and write one language (Hebrew) helped Jewish craftsmen, merchants, and moneylenders learn other languages, which heightened mobility and trading opportunities. This enabled the network externality among Jewish merchants described by Greif (1993). Literacy was a prerequisite to effecting community sanctions and accessing the Jewish court system. This is evidenced by (i) the written letters among Jewish merchants, as illustrated by the documents of the Cairo *Genizah*; and (ii) the rulings of scholars in Iraq academies that were dispatched to the various Jewish communities through the mail system of the Jewish merchants, as documented by the huge number of rabbinic Responsa.[38]

37. The poll tax (3.4 dirhems per month, about 5% of a teacher's salary at that time) was a burden for poor households. This is evidenced by some documents of the Cairo *Genizah* in which the entire Jewish community had to help poor families pay the poll tax (Goitein 1971, pp. 300–304).

38. See Goitein (1967), Ben-Sasson (1976, pp. 393–402), and Gil (1997, vol. 1).

Education made mobility less costly because it enabled educated people to stay in touch with each other. This was necessary for maintaining family and business connections when living in different and distant countries, as indicated by the historical evidence presented here.

Migrations within the Muslim Empire. As shown in Table 7, during the eighth–ninth centuries the demographic, economic, and religious center of Jewish communities was the Abbasid Empire in the Near East. Jews there abandoned agriculture and moved to urban centers, where they entered a wide range of urban and skilled occupations.

Within the Muslim Empire, the Jews voluntarily and freely moved from Iraq and Persia to Yemen, the Arabian peninsula, Syria, Palestine, Anatolia, Egypt, and North Africa (Ben-Sasson 1996). When the Muslim rulers overtook southern Spain by establishing the Cordoba caliphate from 711 to 1236, a fairly large number of Jews settled there (Toch 2005).[39] In 756, Cordoba was the largest European city, with a population of about 100,000. About two centuries later it had a total population of about half a million people, housed 70 libraries and 80,000 shops, and was a wealthy commercial economy belonging to a trading network that connected Constantinople, Alexandria, Baghdad, and Damascus all the way to India and China.

The Jews who settled in Muslim Spain specialized in a large set of crafts and skilled occupations, held a dominant role in local trade, and gained almost a monopoly in international trade. They also shared in the lively intellectual life that characterized Muslim Spain at this time. A *yeshiva* (academy) was founded in 929 in Cordoba. The establishment of the academy in Muslim Spain created a gradual separation between the large (about 800,000) Jewish community in Iraq and Persia and the much smaller (about 100,000) but very wealthy and prominent Jewish community in Muslim Spain (Baron 1971).

This period of spectacular intellectual fervor culminated with the contribution of rabbi Moses ben Maimon (called Rambam or Maimonides), who was born in Cordoba in 1131 and later moved to Egypt, where he became a court physician for the ruler Salah al-Din. Maimonides radically reformed Judaism by opening it to other cultures and philosophies. His teachings were accepted by all the Jews living in the Muslim Empire and set the foundations of Sephardic Jewry as a community distinct from the Ashkenazi Jewish communities in France, Germany, and England. Thus, when Jewish economic prominence moved to the West, Jewish religious leadership moved there as well even though most Jews still lived in the Near East.

39. In 1031, the Cordoba caliphate was split into several kingdoms and for two centuries was under the Almoravidi (Berber) rulers. It fell into Christian hands in 1236, ending Muslim rule in this part of Spain.

Migrations to Western Christian Europe. When the Jews settled in locations within the Abbasid Empire, including Muslim Spain, they did not require any charter, permission, or special privilege because non-Muslims could freely settle and engage in any occupation as long as they paid the poll tax.

This is in striking contrast with Jewish migrations to Western Christian Europe from the ninth to the thirteenth centuries (Toch 2005). Their migrations there—exactly as the migrations of other foreign craftsmen, merchants, and moneylenders (e.g., the Venetian or Genoese traders, the Tuscan bankers, and the Flemish merchants)—were regulated through special charters by kings, bishops, and local rulers. Table 8 presents a sample of these early medieval charters to Jewish traders and moneylenders.

Despite the different timing and characteristics of the Jewish diaspora in specific countries, these migrations share three main features. First, until about 1250, the Jewish migrations to western Christian Europe were a voluntary process involving the most skilled and literate individuals. In the early stages, these migrations started with a single Jewish individual or family asking the local ruler or bishop to settle in a given location. For example, the earliest charters in France were issued by the king Louis I the Pious around 820–825 to three Jewish merchants (Pakter 1988, p. 96; Linder 1997).

Second, the early medieval charters clearly indicate that their high human capital and skills led to Jewish craftsmen, traders, moneylenders, tax collectors, court bankers, and royal treasurers being viewed as essential for economic growth and development—so much so that local rulers in Western Europe competed among themselves to have some Jews settle in their towns.[40]

This is nicely illustrated by some particular episodes. In 1066, William the Conqueror brought some Jews with him (when he conquered England) in order to collect taxes and to obtain help with financial matters. In 1084, Bishop Rüdiger of Speyer in Germany explained that, "when I converted the village of Spyres into a city, I believed to increase the dignity of our locality a thousandfold if I assembled there Jews too" (Baron 1952, vol. 4, p. 74). He invited a group of Jewish merchants from Mainz, who were granted complete freedom to carry on their commercial enterprises in exchange for protection and exemption from tolls.

Similarly, King James I of Aragon encouraged Jews from France and North Africa to settle in Aragon around 1250 by offering land and property grants as well as exemptions from taxes. About the same time, King Ferdinand III of Castile—when refusing to implement the Pope's decree that the Jewish people be forced to wear a special badge and clothing—explained that the Jews would

40. The occupational selection of European Jews does not imply that they held a monopoly on local or long-distance trade (Toch 2000, 2005). The local non-Jewish population also included craftsmen and merchants. What is peculiar about the Jewish people is that almost all of them were craftsmen, merchants, and moneylenders whereas most of the non-Jewish population was still engaged in agricultural occupations.

TABLE 8. Sample of Jewish charters in Western Europe, ca. 800–1250.

			Activities allowed and regulated		
Country	City	Year of charter	Own land	Travel/Trade	Moneylending
Spain	Barcelona	1053–1071	yes	yes	yes
	Sepulveda, Najera	1085	yes	yes	yes
	Leon	1090	yes	yes	yes
	Miranda de Ebro	1099	yes	yes	yes
	Tudela	1116	silent	yes	yes
	Catalayud	1134	yes	yes	yes
	Salamanca	1170	yes	yes	yes
	Cuenca	1177	yes	yes	yes
	Zurita	1218	yes	yes	yes
	Toledo	1222	yes	yes	yes
	Valencia	1250	yes	yes	yes
France	—	ca. 820–825	yes	yes	silent
	—	839	yes	yes	yes
	Grenoble	894	silent	yes	silent
	Narbonne	899	yes	silent	silent
	Gironne	922	yes	silent	silent
	—	1190	silent	silent	yes
England	—	ca. 1120, 1170	yes	yes	yes
	—	1190, 1201	yes	yes	yes
	—	1275	yes	yes	no
Germany	Trier	919	yes	silent	silent
	Magdeburg	965, 973, 979	silent	yes	silent
	Speyer	1084, 1090	yes	yes	yes
	Worms	1074	silent	yes	silent
	Worms	1090, 1157	yes	yes	yes
	Ratisbon	1182, 1216, 1230	yes	yes	silent
	—	1236	yes	yes	yes
Austria	Vienna	1238	silent	silent	yes
	—	1244	silent	silent	yes
Italy	Treviso	905, 991, 1014	silent	yes	silent

Note: When no specific cities or towns are listed in the second column, it means that the charter was valid throughout the country. In the last three columns, "yes" (resp., "no") indicates that the Jews were (resp., were not) allowed to engage in that specific activity; "silent" indicates that the charter did not have any clause regarding that specific activity.
Source: Botticini and Eckstein (2006, Table 8).

then flee to Muslim Granada, with disastrous consequences for the revenues of his kingdom.[41]

Third, the early medieval charters established no restrictions or prohibitions on the type of occupations in which the Jews could engage. As Table 8 shows, almost all charters enabled the Jewish people to settle in a town (or country), acquire real estate and land, freely move within the country's geographical boundaries, and trade in goods as they wished. The Latin charters of the ninth through

41. See the references cited in Botticini and Eckstein (2006, footnote 57).

twelfth centuries, actual litigation cases from the Responsa literature, and formula books for Hebrew deeds all indicate that the Jews in Italy, Christian Spain, and southern and east-central France owned, transferred, and mortgaged land holdings. Land ownership did not imply that the Jews were farmers: Their lands, more often vineyards than fields, were worked by non-Jews through sharecropping contracts (Soloveitchik 2003; Toch 2005).

Until the early thirteenth century, the Catholic Church issued legislation regulating Jewish business activities, but the goal was to retain revenues and not to prohibit certain occupations or land ownership. For example, canon 67 of the Fourth Lateran Council in 1215 established that Jews must pay tithes to the Church on any land holdings previously owned by Christians that had become Jewish property through purchase or moneylending (Mansi 1961). This ruling did not prohibit Jews from owning or farming land, it simply ensured that the Church did not lose its steady income from tithes on account of the property owner's religion.

Exactly as occurred in Muslim Spain, most Jewish people reached high standards of living in all Western European countries in which they settled.[42] As early as 770, Pope Stephen IV complained with the bishops of Spain that the Jews had acquired numerous urban and rural estates in which they employed many Christian workers (Baron 1952, vol. 4, p. 42). Similarly, in England between 1239 and 1260, Jews contributed nearly a fifth of the crown revenues despite being a tiny proportion of the population (Elman 1937, p. 146).

The numerous Jewish communities in Christian Spain, France, England, and Germany also blossomed from an intellectual point of view (Agus 1965). European Jewry's most important intellectual movement began to thrive when Rabbenu Gershom ben Judah (960–1028) founded an academy in Mainz that attracted Jews from all over Europe, including the famous Rashi. Study of the Talmud increased, and the German academies in Mainz and Worms came to overshadow those in Iraq. The leadership of Rashi and of his grandson Rabbenu Tam laid the foundations for the Ashkenazi Jewish communities that separated themselves both economically and intellectually from the large Jewish communities in the Near East and that, by refusing the teaching of Maimonides, also separated from the Jewish communities in Muslim Spain (Grossman 1992, 1999; Limor 1993).

In 1170, when Benjamin of Tudela wrote his travel itinerary (see Tudela 1907) listing the Jewish communities that he had seen or heard of, the voluntary

42. The high standards of living did not protect them from persecutions and may actually have been used as an excuse to harm them. For example, in 1096 the Crusaders killed all the 800 Jews in Worms (Germany), and similar persecutions and massacres occurred in other European locations from the twelfth century onward. These persecutions alternated with peaceful periods in which the Jewish communities came back to cities that they had previously abandoned in order to re-establish flourishing communities.

Jewish diaspora was at its height and world Jewry consisted of three almost independent economic and intellectual centers: (i) the Near East under Muslim rule, where about 80% of world Jewry lived at that time; (ii) Muslim Spain, where tiny but wealthy Jewish communities lived in more than 150 cities and towns; and (iii) France, England, and Germany, where small but equally prominent Ashkenazi Jewish communities lived in more than 160 locations (DellaPergola 2001). Similarly, small Jewish communities could be found in numerous locations all over Italy, Bohemia, Eastern Europe, Turkey, the Middle East, Egypt, North Africa, and all the way to Central Asia, China, and India.[43]

9. The Mongol Shock, 1250–1260

The Mongol invasions in the 1250s, which returned the Near East to a farming and pastoral economy, are an important historical development that provides an excellent test of our theory that Judaism—with its costly social norm regarding children's education—cannot survive in the long run in subsistence rural economies.

The Mongols first entered Iraq in 1220, but their major invasions of Persia and Iraq started in 1256. Their army demolished Baghdad in 1258. From there, they quickly conquered the main cities in Iraq, Persia, Syria, and Palestine—but not Egypt, because they were defeated in 1260 by the Egyptian Mamluks, who later defeated the Crusaders and controlled the area from Egypt to Syria (Gil 1997, vol. 1).

The Mongol conquests were a turning point in the demographic history of the Near East (see Table 9). While the population in Western Europe grew by roughly 56% from 1170 and 1300, the population in Iraq and Persia was almost halved. In Baghdad alone, the population dropped from 800,000 to roughly 60,000.[44] Many other cities and towns almost disappeared. Famines and epidemics greatly added to the death toll.

The economic consequences of the Mongol shock were no less traumatic. The urban and commercial economy that had flourished under the Abbasid rulers in the eighth through tenth centuries almost disappeared, and instead farming and especially nomadic pastoral activities became the source of income for most households. The ravages of the invasions, the devastation of the irrigation system,

43. Studies have shown that contemporary Jewish populations show a closer genetic link to Jews from faraway locations than to their neighboring non-Jewish populations (Hammer et al. 2000). This is especially true for the Ashkenazi Jews of Eastern Europe, who are genetically closer to Jews from the Middle East and North Africa (as well as to other Middle Eastern non-Jewish populations) than to Eastern European non-Jewish populations. This provides additional evidence that there were no significant conversions to Judaism once the Jews became merchants, and it shows that all Jews migrated from the same original location (Mesopotamia).

44. See Baron (1952, vol. 17, pp. 150–151) and Ashtor (1976, pp. 251–257).

TABLE 9. Population (millions), ca. 1170–1490.

	Jewish Population in				Total Populationin			
	1170	1300	1400	1490	1170	1300	1400	1490
Palestine	0.002	few	few	few	0.5	0.5	0.5	0.5
Iraq, Persia, Arabia[a]	0.7–0.9	0.5–0.6	?	0.2–0.3	10.75	?	?	7
Egypt	0.040	few	few	0.005	4	5	3.5	4
North Africa[a]	0.030	few	few	few	4.45	5.2	4.05	4.05
Syria, Lebanon	0.020	few	few	0.007	1.5	1.75	1.25	1.5
Balkans, eastern Europe[a]	0.047	0.065	?	0.090	16.4	23.25	18.25	22.75
Western Europe[a]	0.103	0.385	?	0.510	32.35	49.55	34.9	47.65
All locations	1–1.2[b]	1–1.2	?	0.8–1	69.95	?	?	87.45
Jewish/Total	1.6%	?	?	1.0%	—	—	—	—

Note: The years given as headings in the columns are approximate dates. One should more appropriately consider 1170 as standing for the late 12th century, 1300 for the early 14th century, 1400 for the early 15th century, and 1490 for the late 15th century.

[a] Arabia refers to the Arabian peninsula including Yemen. North Africa includes Morocco, Tunisia, Algeria, and Libya. Balkans include Albania, Bulgaria, Yugoslavia, Greece, Turkey and Anatolia. Eastern Europe includes Austria, Czechoslovakia, Hungary, Poland, and Romania. Western Europe includes Spain, Portugal, France, Italy, Germany, the Low Countries, and England.

[b] The total of 1–1.2 million also includes about 157,000 Jews in Central Asia, India, and East Asia.

Source: Botticini and Eckstein (2006, Table 9).

and harsh taxation left many farmers at subsistence levels. Eighty years after the Mongol invasions, tax revenues from Baghdad were only 10% of what they had been before. For the entire country of Iraq, tax revenues dropped by 80%.[45]

As shown in Table 9, about 770,000 Jews (some 80% of world Jewry) lived in Iraq, Persia, and the Arabian peninsula around 1170. Three centuries later, the Jews in the same locations numbered at most 200,000–300,000. Three factors account for this huge reduction: (i) general population decline, due to massacres during the Mongol invasions, famine, and disease; (ii) migration; and (iii) conversions.

General Population Decline The Jews seem to have been largely spared by the massacres that hit the Muslim population during the Mongol invasions. In fact, in both Jewish and non-Jewish primary sources (travelers' reports, letters, Responsa, and the wealth of documents from the Cairo *Genizah*), there is not one single reference to massacres of Jews under the Mongol rulers (Gil 1997, vol. 1, p. 430).

Epidemics and famines certainly took a toll on the Jewish population, as they did on the non-Jewish population. However, there is no reason to think that the Jews suffered from famines and epidemic diseases more than the local Muslim population or other minorities, especially given the higher hygienic standards dictated by their religious norms.[46]

45. See the references cited in Botticini and Eckstein (2006, footnote 62).

46. See Baron (1952, vol. 17, pp. 161–162) and Ashtor (1959, pp. 66–68).

Migration. During and after the Mongol invasions, many Jews fled to Egypt and Syria, which were ruled by the Mamluks. However, as Table 9 indicates, the Jewish communities in Egypt and Syria also dwindled, although there are no records of mass expulsions or mass forced conversions of Egyptian and Syrian Jewry. Also, the surviving small Jewish communities in Egypt and Syria consisted mostly of poverty-stricken people.[47]

Some Jews who left Iraq and Iran migrated to western Europe, as shown by the increase of the Jewish population in that region (DellaPergola 2001). But one must distinguish two periods of growth: from 1170 to 1300, European Jewry grew as the outcome of both general population growth and the "golden age" of Iberian Jewry, which endowed the Jews with high standards of living, higher fertility, and lower mortality. From 1300 to 1490, European Jewry increased because of an increase in fertility, offsetting the losses caused by the fourteenth-century plagues, and because of the migrations from Iraq and Persia.

However, unlike the amply documented mass migrations of Iberian Jewry out of Spain after the expulsions of 1492, there is no mention of waves of Jewish migration from the Near East to Western Europe after the Mongol invasions—either in the numerous Jewish sources of the time (letters, travel itineraries, and Responsa) or in non-Jewish sources (tax records, censuses, and court records). A large wave of Jewish migration to Western Europe would certainly have been documented in some sources.

As explained in Section 8, Jewish migrations to Christian Western Europe were regulated by kings, bishops, and local rulers, and Jews could not freely move there unless they were invited to settle and obtained charters and special privileges. The Jewish communities themselves strictly regulated the arrival of fellow Jews, because they were potential competitors to their businesses. Thus, Jewish migration to Western Europe after the Mongol shock in the Near East cannot in itself account for the large decline of the Jewish population in the Near East.

Conversions. Based on material from the rabbinic Responsa and chronicles of Arab historians of the late medieval period, Baron (1952, vol. 17, pp. 165, 181–183) and Ashtor (1959, pp. 65–66) maintain that the voluntary conversion and assimilation of many Jews to Islam explain both the large reduction of the Jewish population in Iraq and Persia as well as the shrinking Jewish communities in Egypt and Syria.

The death toll from massacres, famines, and epidemics after the Mongol shock were shared (although in different proportions) by the Jewish population and the local populations in the Near East. However, mass conversions, voluntary or forced, of the local populations to Islam had occurred much earlier (Bulliet

47. See Baron (1952, vol. 17, pp. 160–166, 219) and Ashtor (1959, p. 65; 1976).

1979a,b). The many conversions of Jews to Islam in the two centuries after the Mongol shock were thus not part of a general conversion process in the entire population.[48]

The conversions of Jewish people to Islam in Iraq, Persia, Egypt, and Syria after the Mongol invasions are consistent with our thesis regarding conversions. Once Iraq and Persia after the Mongol conquests (and Egypt and Syria under the Mamluks) reverted to subsistence farming and pastoral economies, Jews who could not migrate to Western Europe had to resort to farming and other low-income work. The investment in children's education, as the Jewish religious norm required, became too costly in the poor farming and pastoral economies of Iraq, Persia, Syria, and Egypt, so many Jews preferred to convert to Islam. Once converted, they were no longer required to pay the poll tax and to invest in their children's religious education, which provided no economic returns in a rural economy.

10. Concluding Remarks

It is a common view that the three main features of Jewish demographic and economic history—the selection into urban and skilled occupations, the reduction in the size of the Jewish population in various periods, and their diaspora all over the world—were the outcome of restrictions, prohibitions, persecutions, and expulsions.

In this paper we built a simple model and then presented historical evidence that supports an alternative argument: The three main patterns were the joint, long-term, and endogenous outcomes of the transformation of Judaism in the first and second centuries CE into a religion focused on literacy and education. This change radically altered the religious beliefs and social norms that defined membership in the Jewish community.

This change in the religious norm at the beginning of the first millennium, which made every male Jewish child learn Hebrew for purely religious purposes, brought long-term economic returns in the form of general education, long-distance communication, and contract writing among Jews all over the world. The Jews moved voluntarily to new locations because their acquired skills enabled them to engage in those occupations with high returns to their human capital. They were a minority wherever they settled, because their comparative advantage was limited to a few skilled occupations.

The comparatively higher educational attainment and the selection into urban skilled occupations remained the distinguishing characteristic of the Jewish people throughout their history. By the early twentieth century, in countries with the

48. Note that the Mongol rulers did not adopt Islam until 80 years after their conquest of Iran and Iraq.

largest Jewish communities (Eastern Europe, Canada, and the United States) more than 95% of the Jews were engaged in urban skilled occupations even though no restrictions prevented them from being farmers (Kuznets 1960, p. 1608, Table 2).

Chiswick (2005) documents the same occupational selection of the Jewish population in the United States as late as the year 2000. For example, about 53% of adult Jewish men are engaged in professions such as law, medicine, and academia, whereas the percentage for white non-Jewish men is about 20%. In contrast, only 6% of adult Jewish men are employed in the construction, transportation, and production sectors, compared with about 39% of adult non-Jewish men.

Cochran, Hardy, and Harpending (2005) maintain that there is evidence of higher-than-average cognitive abilities of Ashkenazi Jews and that this may be the outcome of centuries of prohibitions and restrictions on the occupations that Jewish people could practice. We do not have a strong view in favor of or against this argument. On the one hand, one prediction of our model—that individuals with low cognitive skills were pushed out of Judaism once the religion made literacy and education the main requirement for belonging to the Jewish community—may be consistent with this evidence on cognitive abilities. On the other hand, as we emphasize here and in Botticini and Eckstein (2005), the Jewish people left farming and selected into urban skilled occupations well before any restriction or prohibition was imposed on them.

It is left to future research to establish the true rationale of the late medieval restrictions in Western Europe on Jewish occupations, which were enacted when the Jews had already voluntarily abandoned farming no fewer than five centuries earlier.

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