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A Human Capital Interpretation of Jewish History<sup>1</sup>

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## Abstract

From the end of the second century C.E., Judaism enforced a religious norm requiring any Jewish father to educate his children. We present evidence supporting our thesis that this exogenous change in the religious and social norm 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, which account for a large share of the reduction in the size of the Jewish population from about 4.5 million to 1.2 million. Second, the Jewish farmers who invested in education, gained the comparative advantage and incentive to enter skilled occupations during the vast urbanization in the newly developed Muslim Empire (7th and 8th centuries) and they actually did select themselves into these occupations. Third, as merchants the Jews invested even more in education—a pre-condition for the extensive mailing network and common court system that endowed them with trading skills demanded all over the world. Fourth, the Jews generated a voluntary diaspora by migrating within the Muslim Empire, and later to western Europe where they were invited to settle as high skill intermediaries by local rulers. By 1200, the Jews were living in hundreds of towns from England and Spain in the West to China and India in the East. Fifth, the majority of world Jewry (about one million) 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 regarding education, and hence, voluntarily converted, exactly as it had happened centuries earlier.

JEL Classification: J1, J2, N3, O1, Z12, Z13

Keywords: social norms, religion, human capital, Jewish economic and demographic history, occupational choice, migration.

# 1 Introduction

Do changes in religious and social norms have long-term effects on economic and demographic outcomes?<sup>1</sup> We address this question by studying one of the best documented historical examples of an exogenous 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 C.E. of the religious norm requiring Jewish fathers to educate their sons determined three major patterns in Jewish history: *(i)* a comparative advantage in urban, skilled occupations in which the Jews selected themselves when urbanization and the development of a commercial economy provided them with the returns to their investment in education, *(ii)* a slow process of conversions out of Judaism among Jews who lived in subsistence economies, and *(iii)* the voluntary diaspora of the Jews in search of worldwide opportunities in crafts, trade, moneylending, and other skilled occupations.

In Botticini and Eckstein (2005), which we briefly summarize in Section 2, we describe in detail the implementation of the religious reform from the second to the sixth centuries C.E., which radically transformed Judaism from a religion mainly based on sacrifices in the Temple into a religion whose core was the reading of the Torah in the synagogue. The transformation was further advanced by the Jewish religious leaders who encouraged the building of synagogues in many towns and villages all over Eretz Israel, promoted the status of teachers and scholars and downgraded the status of illiterate people (*ammei ha-aretz*) by making them outcast in the Jewish community. Since the religious reform was initiated and first implemented in Eretz Israel and later in Babylon where almost all Jews were farmers and illiterate, it could not have been prompted by economic incentives. Thus, we take the change in the social and religious norm as exogenous.

Based on these facts, we formally present our thesis on the implications of the religious transformation for Jewish history by constructing a simple model of farmers' decisions regarding their own religion and their sons' education (Section 3). The goal of the model is to provide a simple framework from which we precisely identify the assumptions and implications that we can bring to the historical evidence. Allowing for heterogeneity in farmers' incomes, children's learning abilities, and levels of attachment to the Jewish religion, we study the conditions under which some Jewish farmers invest in their children's religious literacy and other farmers do not. We show that there is always a proportion of Jews who decide not to educate their sons and to convert out of Judaism. Hence, the model predicts that Judaism with its increased emphasis on literacy and education cannot survive in the long-run in a subsistence farming society.

Jewish demographic history supports this prediction regarding a slow process of voluntary conversions (Section 4). From the beginning of the first millennium to the sixth century C.E., the Jewish population decreased from about 4.5 million to about 1.2 million. We show that, while many Jews in Eretz Israel and Egypt lost their lives during the crushing of the rebellions against Roman rule in the first and second centuries, a large share of the

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<sup>1</sup>Recent papers on economics of religion include Chiswick (1988), Iannaccone (1992; 1998), Chiswick (1999), Berman (2000; 2003), Carlton and Weiss (2001), Glaeser and Sacerdote (2002), Barro and McCleary (2003), and Guiso, Sapienza, and Zingales (2003).

reduction in the Jewish population in the first half of the millennium was the outcome of conversions among the poor, uneducated rural population once the implementation of the religious/social norm regarding children's education became too expensive in subsistence farming economies, such as Eretz Israel and Mesopotamia in the second-sixth centuries.

In contrast, the Jewish farmers who invested in education gained the comparative advantage and incentive to enter skilled occupations during the vast urbanization in the newly developed Muslim Empire (7th and 8th centuries). This occupational transition was an endogenous and voluntary selection of literate Jewish farmers into skilled occupations when the vast urbanization in the Near East created a large demand for these occupations (Section 5, and for details see Botticini and Eckstein 2005).

We then extend the model to study the choice of religion and children's education of craftsmen, merchants, and urban dwellers (Section 6). Literacy and education, which do not affect farmers' incomes, positively affect craftsmen's and merchants' earnings. The model predicts that (i) Jewish merchants invest more in their sons' education than Jewish farmers and non-Jewish farmers and merchants, and (ii) without a large tax penalty or occupational restrictions for being a Jewish individual, Jewish merchants do not convert.

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

The main insight of our thesis is that Judaism with its costly religious and social norm requiring Jewish 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 Jews can find occupations such as crafts and trade 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-thirteenth centuries (Section 8), and, second, the voluntary conversions of Jews in the Near East after the Mongol invasions of Iraq and Persia in the 1250s (Section 9).

Within the Muslim Empire, 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 millennium coincided with the growth of a small but very wealthy and intellectually prominent Jewish community. In the tenth-thirteenth centuries, 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, which we summarize, indicate that European cities competed for Jewish skilled intermediaries at a time when literacy rates in the local populations were at most 10 percent (Reis 2004). 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 distinctive rules and

customs with respect to the Ashkenazi Jewish communities in Germany, France, and England, which blossomed under the leadership of Rashi. Both communities established new academies that continued the tradition of the Babylonian Talmud but, at the same time, developed their own intellectual centers independent of the large Jewish center in Iraq.

More than one thousand years after the transformation that had made Judaism a religion centered on education, the Mongols invaded Persia and Iraq in 1256-60 and destroyed the economy. Because of massacres, starvation, and epidemics, in less than two hundred years the total population was reduced by half. The Jewish population in Iraq and Persia shrank from about 800 thousands to about 100 thousands in the two hundreds years following the economic disaster brought by the Mongol invasion. There is no evidence that they migrated in huge numbers to western Europe. Moreover, their death rate from starvation and epidemics was similar to the rest of the population, and the death toll from massacres by the Mongols was lower among Jews. The much larger reduction of the Jewish population after the Mongol shock was the outcome of voluntary conversions, as Baron (1952, vol. 17, p. 183) and Ashtor (1959, pp. 65–66) have shown. These conversions among low income Jews when the economy became again a subsistence farming one is consistent with the main insight of our theory.

Our explanation is an alternative view in comparison with the two existing theories. The well known and commonly accepted view that the Jewish people selected into urban occupations because they were prohibited from owning land does not pass the test of the historical evidence. In the Roman Empire, in Parthian and Sassanian Mesopotamia, and especially later in all the lands of the Muslim Empire, the Jewish people could own land and engage in any occupation including farming. A less known view, the theory set forth by Simon Kuznets (1960) that the Jews, like any other minorities, chose to engage in urban occupations in order to maintain their religious and group identity, is also contradicted by the historical facts.<sup>2</sup>

For an economist, the main lesson from Jewish history is that “culture matters” and that cultural traits can be exceedingly long lived. From this viewpoint, our work contributes to the literature that studies the interactions between cultural values, social norms, and economic outcomes.<sup>3</sup> 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. In our paper, we argue that the network externality among Jewish traders highlighted by Greif could not exist without the common written language (Hebrew), the high literacy levels, and the common law (Talmud).

Our work also illustrates that some contemporary economic patterns (e.g., the selection of Jewish people into high-skill jobs) have been influenced by institutions and social norms that emerged centuries ago. From this viewpoint, our research is related to the work of

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<sup>2</sup>In Mesopotamia, the Jews were a minority both when most of them were farmers and when they became merchants. In Eretz Israel, 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). See Botticini and Eckstein (2005) for a detailed discussion of these two alternative theories regarding Jewish history.

<sup>3</sup>See, among many others, North (1990), Temin (1997), and Mokyr (2002). An excellent survey is in Guiso, Sapienza, and Zingales (forthcoming).

Acemoglu, Johnson, and Robinson (2001, 2002, 2005) that show how specific European institutions dating back to the Middle Ages affected the long-run economic performance of Europe and later the economic development of its former colonies, and to the work of Kuran (1997, 2003, 2004) that traces the long-term underdevelopment of some Middle East countries back to institutions (such as the *waqfs*) established to fulfill Islamic religious law.

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

At the beginning of the first millennium in Eretz Israel, there were many religious groups and sects including pagans.<sup>4</sup> 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 C.E. Despite being similar and interrelated in their daily lives, people belonging to different religious groups were becoming increasingly distinguished in their religious rules and norms.

Before the destruction of the Temple in Jerusalem in 70 C.E., 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 the Greek language and culture (Cohen 2002; and Feldman 2002).<sup>5</sup> To reach this goal, some Pharisees prompted a major change in the educational institutions by first (around the first century B.C.E.) encouraging the establishment of free secondary schools throughout Eretz Israel, and later (in the first century C.E.) by issuing a religious ordinance asking parents to send their six or seven years old sons to school to read and learn the Torah.

When the Temple was destroyed by the Roman army to crush the rebellion in Judaea, the Sadducees lost the source of their power and shortly after disappeared as a group within Judaism. Meanwhile, 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 B.C.E. They replaced sacrifices, which could only be performed in the Temple in Jerusalem, with the study of the Torah in the synagogue, whose main function was to provide religious *instruction* to both children and adults.

After 70 C.E., 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.<sup>6</sup> Rabbi Judah ha-Nassi completed their work by redacting the Mishna in about 200 C.E.<sup>7</sup> Under his influence, the word *am ha-aretz* (literally: people of the land) acquired the new meaning of “someone who does not know

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<sup>4</sup>See Botticini and Eckstein (2005) for a detailed description and references.

<sup>5</sup>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.

<sup>6</sup>The existence of the Oral Torah indicates, by itself, that literacy was not widespread in ancient Eretz Israel. If most of people could not read, there was no need to write down the religious rules.

<sup>7</sup>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 in itself provides evidence that Eretz Israel was mainly a farming society at that time (Neusner 1998).

or/and does not teach his sons the Torah” (Oppenheimer 1977). The transformation of the religion created the need for the devoted Jews to be literate and, more important, to make their children literate. To be an “*am ha-aretz letorah*” in a Jewish community meant to be considered an outcast, which involved a social penalty.

The change in religious preferences brought by the shift in leadership from the Sadducees to the Pharisees should be viewed as exogenous, and is the main assumption of the model.

### 3 A Model of Education and Conversion of Farmers

The basic setup is a two-period overlapping generations model with no population growth.<sup>8</sup> An individual is assumed to live for two periods. In the first period, he is a child (son) living with (and maybe 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 whether to keep or change his religion  $r$  ( $j = Jewish, n = non-Jewish$ ), and the education level of his children.

Before the educational reform within Judaism (up to 200 C.E.), Jews and non-Jews are assumed to have the same level of education and income. *After* the religious reform, the Jewish people are assumed to derive higher utility from their children’s and their own Hebrew literacy (education). Specifically, a Jewish individual 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. The taste parameter is equal to 0 for an individual whose father is non-Jewish (either because born non-Jewish or because he had converted).

Like Iannaccone (1992), we assume that utility comes from consumption and religious participation.<sup>9</sup> The utility of an adult individual has the following simple structure:

$$\text{Jewish individual} \quad : \quad u^j(c, e_s; e, x) = \log c + x(e + 1)e_s - \epsilon h \quad (1)$$

$$\text{Jewish individual who converts} \quad : \quad u^{jn}(c, e_s; e, x) = \log c - \pi x \quad (2)$$

$$\text{Non-Jewish individual} \quad : \quad u^n(c, e_s; e, x = 0) = \log c. \quad (3)$$

where  $c$  is family consumption.

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<sup>8</sup>The no population growth hypothesis fits the well known fact that the world population did not significantly grow during the first millennium (Kremer 1993). Also, it would be straightforward to include fertility as an endogenous variable: the increased cost of raising children because of the religious requirement regarding education would make Jewish farmers have fewer children. This prediction (the decrease in the Jewish population because of lower fertility) would complement the prediction regarding the decrease in the Jewish population through conversions that we explore here. 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 of Judaism (see our discussion at page 14).

<sup>9</sup>The model can be modified to be like Iannaccone (1992)’s model of religion as a “club” whose size is endogenously determined. The utility needs to be specified as a general concave function. Then, in equilibrium the utility and the cost of education can depend on the Jewish population size.

In (1), the educational reform within Judaism is captured by the interaction of the preference parameter  $x$  with the level of education in the family; that is, the utility from being a Jew is increasing with the individual's education and his son's education.<sup>10</sup>

The term  $\epsilon h$  captures the subsequent development within Judaism (third century on) that imposed a social penalty on illiterate individuals (*am ha-aretz*).  $h = 1$  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  $\epsilon > 0$ .<sup>11</sup>

If a Jewish individual converts (2 above), he does not get any utility from his and his son's education (yet, the education of both may still contribute in production). The term  $\pi x$  represents the disutility from conversion ( $\pi \geq 0$ ).<sup>12</sup> In contrast, the conversion of a non-Jewish individual to Judaism is assumed to have zero cost.

The utility of a non-Jewish individual (3 above) depends only on family consumption because non-Jewish religions in the first millennium did not place any value on literacy.

An individual who follows the Jewish religious norm regarding children's education has to provide at least a minimum level  $e^{\min} > 0$  to his son; otherwise, if  $0 < e < e^{\min}$ , 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  $\gamma$ , which can be interpreted as the teacher's salary and the cost of the books. It is possible that  $\gamma$  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,  $\gamma$  can be interpreted as the child's intellectual ability (with  $\gamma$  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.<sup>13</sup>

Given the features of agriculture in the first millennium, education does not affect a farmer's productivity. Thus, all farmers earn the same wage, equal to the constant  $w^F$ . A farmer spends his income on family consumption, children's education, and a tax  $\tau^{rF}$  that

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<sup>10</sup>The specification above implies that if  $e_s = 0$ , the adult individual does not get any utility from belonging to the Jewish religion. This is an extrem version of the model, but it captures the paramount importance of educating children in Judaism after the educational reform.

<sup>11</sup> $\epsilon$  can be made an increasing function of the proportion of educated Jews in the community. This assumption, which Robert Barro suggested to us, would enhance the conversion result we derive below. It would also make the model closer to Iannaccone (1992)'s 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  $\epsilon$  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 goal of our model.

<sup>12</sup>The inclusion of the disutility from conversion is not essential for our main result but it helps interpreting the data in view of the model.

<sup>13</sup>By making  $\gamma$  a decreasing function and  $\epsilon$  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, as well as the optimal community penalty that maximizes the proportion of educated Jewish individuals—the goal of the religious leaders in Talmudic times.

depends on religion and occupation. As such, a farmer's budget constraint is,

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

**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 does not provide any benefit (neither in utility nor in production).

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

$$e_s^* = 0 \quad \text{if } x(e+1) < \frac{\gamma\theta}{w^F - \gamma - \tau^{jF}} \quad \text{and } x(e+1) < \log\left[\frac{w^F - \tau^{jF}}{w^F - \gamma - \tau^{jF}}\right] - \epsilon \quad (5)$$

$$e_s^* \geq 1 \quad \text{otherwise, and } e_s^* \text{ solves the equation } x(e+1) = \frac{\gamma\theta(e_s)^\theta - 1}{w^F - \gamma(e_s)^\theta - \tau^{jF}}. \quad (6)$$

The first condition in (5) is because of the corner solution at  $e_s = 1$ . The second inequality is because of the condition that the utility of a Jewish individual with  $e_s = 0$  has to be larger than that with  $e_s = 1$ .<sup>14</sup> The two conditions give 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,  $\gamma$  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 make it almost impossible to invest in sons' education.

At the individual level, families with low ability sons ( $\gamma$  large), or families whose opportunity costs of sending the sons to school instead of having them work on the farms are high (again, large  $\gamma$ ), will be less likely to invest in sons' 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.** A Jewish farmer converts if his utility as a Jewish individual is lower than his utility as a converted individual. That is, if

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

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

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

<sup>14</sup>It should be noted that the model could be simplified by assuming that education for farmers is a discrete choice of either zero or one. Then,  $e_s^* = 0$  if  $x(e+1) < \log\left[\frac{w^F - \tau^{jF}}{w^F - \gamma - \tau^{jF}}\right] - \epsilon$ , and all the implications discussed above hold. We prefer modeling education as a continuous variable mainly for the sake of equivalence with the model for Jewish merchants that is presented later.

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

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

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

Thus, heterogeneity across individuals (different  $x$ ,  $e$ , and  $\gamma$ ) and changes in aggregate economic conditions over time (a change in  $w^F$ ,  $\tau^{rF}$ , or  $\gamma$ ) 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, by itself, reduces the Jewish rural population in any period. Also, conversions are more numerous when aggregate economic conditions are bad (low  $w^F$ , high  $\tau^{rF}$ ), and in small communities (high  $\gamma$ ).<sup>15,16</sup>

Second, in the *long-run* Judaism cannot survive in a subsistence farming society as the Jewish rural population is shrinking because 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 high-skill occupations that provide positive returns to education.

## 4 Jewish Farmers Before the Eighth Century

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

**Education.** From the first throughout the seventh century, the majority (about 80–90 percent) of the Jewish population in Eretz Israel, Mesopotamia, and North Africa was engaged in farming exactly as the non-Jewish population (Botticini and Eckstein 2005, Table 1). 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 (Iannaccone 1992; and Berman 2000). To the farmers it provided no benefit in terms of higher productivity and earnings. It was costly both at the community level as 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 expenses amounted to about 40-50 percent of a family's total

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<sup>15</sup>If cognitive skills are inherited from fathers to sons, our work would share some of the features of Galor and Moav (2002)'s model of natural selection.

<sup>16</sup>With the additional assumption that cognitive skills are inherited, one obtains the prediction that in the long run, the Jews would have higher than average cognitive abilities. Consistent with this prediction, Cochran, Hardy, and Harpending (2005) maintain that there is genetic evidence supporting a natural selection argument to explain the higher than average cognitive abilities of Ashkenazi Jews.

expenses. With taxes taking an additional 30 percent, little was left to buy other items such as clothing, books, and paying for the teacher’s salary.

Table 1 presents data on the cost of living consistent with Safrai’s estimates.

TABLE 1—COST OF LIVING (IN DENARII), 1<sup>ST</sup>–3<sup>RD</sup> CENTURIES C.E.

<i>Items in a household budget</i>	<i>Eretz Israel</i>	<i>Egypt</i>	<i>Babylon</i>
Monthly wage of an agricultural worker	24–48	4–32	72–96
Monthly wage of an urban skilled worker	48–72	6–40	—
Monthly 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

Source: We put the data in Sperber (1965, 1966) in the same unit of account (denarii).

Note: The range of values indicate (i) the different figures mentioned in primary sources, and (ii) the increase in wages and prices from the first to the third century.

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 very expensive until the invention of the movable type printing in the 1440s.<sup>17</sup>

Despite education being very costly and “useless” in production for farmers, there is evidence from two independent sources that religious instruction and primary education were becoming more and more spread among the Jewish communities in Eretz Israel and Mesopotamia.<sup>18</sup> In addition to the many rulings and discussions in the Talmud regarding schools, synagogues, and teachers, there is the wealth of archeological discoveries on synagogues, of which Table 2 presents a sample. Of the more than one hundred synagogues found, the largest number was built from the third to the fifth centuries in villages and rural communities in Judaea, Galilee, and the Golan.<sup>19</sup> The existence of synagogues in many lo-

<sup>17</sup>Van Zanden (2005, Figures 4 and 5) has estimated that in 1450, a printed Bible cost about the equivalent of the *annual* wage of a laborer. Around 1780, the cheapest Bible cost only the equivalent of the *daily* wage of a carpenter. The drop in the real price of books was even more dramatic: in 1800, real book prices were 10 percent of what they have been in 1470.

<sup>18</sup>See Botticini and Eckstein (2005) for a detailed and extensive discussion of the implementation of the Jewish educational reform from the second to the eighth centuries. The historical evidence on standards of living, the cost of education, and the archeological findings on synagogues, which we present in this section, are new and in addition to the evidence discussed in Botticini and Eckstein (2005).

<sup>19</sup>The growth in the number of synagogues occurred even though the economic conditions in Eretz Israel were deteriorating and some Jews were migrating to Mesopotamia (Safrai 1976a, pp. 343–44). Synagogues were also built in many locations in the diaspora (Levine 1999).

cations is very important as other sources (e.g., the Talmud) document that synagogues at that time were primarily a place where children and adults read and learned the Torah.<sup>20</sup>

TABLE 2—SAMPLE OF SYNAGOGUES IN ERETZ ISRAEL, 200–550 C.E.

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

Sources: Levine (1982; 2000), Hachlili (1989), Stern (1993), and Urman and Flesher (1995).

The same archeological evidence is not available for Mesopotamia, but one can infer the existence of synagogues there from the many references in the Talmud (Gafni 1995).<sup>21</sup>

At the same time, the many quotes in the Mishna and Talmud against the *ammei ha-aretz* indicate that some Jews chose not to educate their sons.

The historical evidence fits very well the predictions of the model regarding education. Facts and narrative accounts from different sources confirm that, while some Jewish farmers did not invest in their children's education, an increasingly larger share of the Jewish rural population decided to follow the religious norm regarding children's education despite their low standards of living.

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 the same period (third to eighth century C.E.). In the Roman, Byzantine, Christian, and Persian worlds there was no mandatory primary education, and the non-Jewish rural population was almost entirely illiterate.<sup>22</sup> Even in 1500, the share of the literate population in most of western Europe was no more than 10 percent (Reis 2004).

<sup>20</sup>See Safrai S. (1976b), Safrai Z. (1987; 1995), Oppenheimer (1995), Urman (1995), and Schiffman (1999).

<sup>21</sup>From the third to the sixth century, the scholars (*Amoraim*) in the academies in Eretz Israel 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) in the late fourth century, and the *Talmud Bavli* (the Babylonian Talmud) in the early sixth century.

<sup>22</sup>In the Roman Empire, primary schools were widespread in the cities but primary education was neither compulsory nor universal. The lower socio-economic groups in the cities and the rural folks were illiterate (Marrou 1982, chapters 4 and 7). There is no information on primary education in Iran and Iraq under the Parthian and Sasanian rulers.

**Conversions.** The main prediction of the model is that some Jewish farmers convert to other religions as a result of the implementation of the costly educational reform in Judaism. The key evidence supporting this implication comes from the size of the Jewish population, which went from about 4.5 million in the first century (with the three main centers being in Eretz Israel, Mesopotamia, and Egypt) to about 1.2–1.5 million in the sixth century (Table 3).<sup>23</sup>

TABLE 3—DISTRIBUTION OF THE JEWISH POPULATION (IN MILLION)

<i>Location</i>	<i>Time</i>			
	0-65 C.E.	66-130	135-300	6 <sup>th</sup> century
Eretz Israel	2.5 <sup>a</sup>	1.7 <sup>b</sup>	0.7 <sup>c</sup>	0.2 <sup>d</sup>
Mesopotamia, Persia	1	1	1.2	0.8–1
Egypt, North Africa	1	0.1 <sup>e</sup>	very few	very few
Syria	many	many	some	few
Asia Minor, Balkans <sup>f</sup>	many	many	some	few
Roman Empire <sup>g</sup>	some	some	some	—
Western Europe <sup>g</sup>	—	—	—	very few
Total Jewish Population	4.5–5.0	3–3.5	2–2.5	1.2–1.5
Total Population <sup>h</sup>	59	59	55	48
$\frac{\text{Jewish Population}}{\text{Total Population}}$ (%)	7.0	6.0	4.5	3.0

Sources: For Mesopotamia, Neusner (1965–1970, vol. 1, pp. 14-15, vol. 2, pp. 246-48), and Issawi (1981, pp. 376, 381). For Eretz Israel, Herr and Oppenheimer (1990, pp. 108-9), Hamel (1990, pp. 137–40). For Egypt, Issawi (1981, pp. 376, 381), and Musallam (1981, p. 432). For data on Jewish population in all locations, Baron (1971), and DellaPergola (2001, Tables 1 and 2). For data on total population, Clark (1968), McEvedy and Jones (1978), and Kremer (1993).

<sup>a</sup> Out of 2.5 million people, about 2.2 million were Jews and 300,000 were Samaritans. In addition, there were about 500,000 Greeks, pagans, and other ethnic groups.

<sup>b</sup> The death toll from the revolt of 66–70 C.E. amounted to about 600,000 Jews.

<sup>c</sup> The death toll from the revolt of 135 C.E. amounted to about 500,000 Jews.

<sup>d</sup> The total population in Eretz Israel was about 1.1 million people, and most were Christians.

<sup>e</sup> The figure refers to the Jewish population in Egypt *after* 115, when the crushing of the rebellion against the Roman Empire almost completely wiped out the Jewish community there.

<sup>f</sup> Asia Minor and Balkans include Turkey and Greece.

<sup>g</sup> The Roman Empire mainly consists of western Europe given that in the Table we consider separately the Balkans, the Middle East, and North Africa.

<sup>h</sup> The figures include only the areas where the Jews lived at this time (Eretz Israel, Mesopotamia, Persia, Egypt and North Africa, Syria, Asia Minor, the Balkans, and western Europe).

<sup>23</sup>For population data in the first millennium, we rely on the works of leading historians and demographers. We also greatly benefited from a very helpful discussion with Sergio DellaPergola. While there is disagreement among scholars on specific numbers, 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, instead of 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).

Three factors could generate this large population reduction: death rates from massacres or demographic shocks (famines, epidemics, etc), conversions out of Judaism, and lower fertility rates in the centuries following the religious transformation.<sup>24</sup>

Massacres explain most of the huge reduction in the Jewish community in Egypt, which went from about 1 million to few thousands after the revolt in 115 was crushed by the Roman emperor Trajan.<sup>25</sup>

In Eretz Israel the Jewish population shrank from about 2.5 million (including 300,000 Samaritans) at the beginning of the first century to only 200,000 by the sixth century. Again, deaths explain a significant part of this reduction. Both the Jewish writer Flavius Josephus and the Roman historian Tacitus maintain that the death toll of the rebellion against Rome in 66-70 amounted to about 600,000 Jews.<sup>26</sup> Less than a century later, the death toll of the Bar Kokhba revolt in 135 C.E. was in the range of about 500,000 Jews.<sup>27</sup> Overall, the massacres following the revolts in the first and second centuries account for a reduction of more than 1 million Jews in Eretz Israel.<sup>28</sup>

After these revolts, many Jews migrated to Mesopotamia, as one can see from the increasing size of the Jewish population in the Near East in the second and third centuries. However, these migrations are not enough to explain the *additional* reduction of more than one million Jews in Eretz Israel from the first to the sixth century. We show that once the Jewish religion became centered around the reading and learning of the Torah in the synagogue, *voluntary* conversions out of Judaism occurred and *they* explain the rest of the reduction in the Jewish population in Eretz Israel in the first half of the millennium.<sup>29</sup>

The first group who departed from Judaism were the early Jewish converts to Christianity. Under the influence of Paul's doctrine, instead of knowledge and obedience to the Law, faith became the main requirement for being a devoted Christian (Neusner 1990). Until the destruction of the Temple, Jewish leaders held ambivalent feelings toward the Jewish Christian sects, but overall the trend was one of tolerance. However, after the Bar Kokhba revolt in 135, the Jewish scholars in the academies declared the various sects of Jewish Christians outside the Jewish fold.

In a very detailed work on the spread of Christianity, Harnack (1908, vol. 2, pp. 89–306) provided a long list of specific settlements in Eretz Israel, Syria, Egypt, Asia Minor, Armenia, Edessa, Greece, and the Roman Empire where Jewish converts to Christianity could be traced before 325 C.E. He maintained that in the first three centuries, outside Eretz Israel Christianity spread 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. Both Jewish and non-

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<sup>24</sup> Although there is no direct evidence on mortality rates due to famines and epidemics for the Jews in the first millennium, none of the sources we consulted mentions the reduction in Jewish family size due to Malthusian positive checks in the first millennium.

<sup>25</sup> Safrai (1976, pp. 370–73).

<sup>26</sup> The Samaritans sided with the Romans and the crushing of the rebellion did not affect them.

<sup>27</sup> Baron (1971, pp. 870–75), and Herr and Oppenheimer (1990, p. 109).

<sup>28</sup> The number of known Jewish settlements shrank from more than 200 to less than 50 between 135 and 640 C.E. See Avi-Yonah (1976, p. 20).

<sup>29</sup> The documented episodes of *forced* conversions are not large enough to account for all the Jews who converted in the first half of the millennium.

Jewish sources indicate that most early Jewish converts to Christianity were uneducated, low income Jews.<sup>30,31</sup>

Conversions of Jews to Christianity must have continued in the fifth and sixth centuries if in 426 C.E., an imperial decree in the Roman Empire established the annulment of any Jewish will in which a baptized son, daughter or grandchild, were disinherited. The Theodosian Code in 438 went even further by decreeing the death penalty by fire for Jews who harmed Jewish converts to Christianity.<sup>32</sup> Gil (1992, p. 222) states that in the early Byzantine period, many Jewish farmers in Palestine converted to Christianity.

The second group who increasingly separated from the Jewish religion in Eretz Israel was the Samaritans. In about 200 C.E., there were about 300,000 Samaritans but the community shrank to no more than a few thousands by the seventh century. What separated the Samaritans from the Jewish community was the fact that the Samaritans kept considering sacrifices the core of the religion, accepted only the Pentateuch (the first five books of the Bible) as the sole source of religious law, refused the Oral Torah developed by the scholars in the academies, and never codified their canon law into a Mishna. Some Jewish scholars in the second century were still considering 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* or *ammei ha-aretz*.<sup>33</sup> Like for Jewish farmers, Gil (1992, p. 222) maintains that many Samaritan farmers converted to Christianity during the Byzantine period.

There were also conversions of Jews to Christianity in fourth-century Mesopotamia (Neusner 1965–1970, vol. 4, p. 435). Christians became as numerous as the Jews there, and a certain proportion of these Christians must have been converted Jews given that in Babylon there were no attempts to forcibly convert pagans to Christianity as in the Byzantine Empire (Gil 1997, vol. 1, p. 57).

Despite conversions to Christianity, the size of the Jewish community in Mesopotamia remained roughly constant from the first to the sixth century (Table 3) because of the migrations of Jewish farmers prompted by the deteriorating economic conditions in Eretz Israel from the third to the fifth centuries. At that time, Babylon became the center of Jewish religious and economic life. Jewish religious leaders discouraged this migratory movement but they partly failed to convince many Jews not to leave Palestine.<sup>34</sup> These migrations occurred at the same time when some Jewish farmers in Eretz Israel and Babylon started investing in their children's religious education and when conversions out of Judaism were occurring in the Jewish rural population in both Eretz Israel and Babylon.

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<sup>30</sup>See Harnack (1908, vol. 1, p. 47; vol. 2, pp. 33-34) and Baron (1952, vol. 2, pp. 163–66) for the primary sources that are used to support this claim.

<sup>31</sup>As for conversions of non-Jews into Judaism, the model predicts no conversions of non-Jews to Judaism *after* the religious/educational reform. There were conversions of pagans to Judaism *before* the revolts in the first century C.E. (Baron 1952, vol. 1, pp. 173–76). In contrast, *after* the third century people converted to Judaism only by coercion, such as in the case of slaves owned by Jews. On the attitudes of Jewish religious leaders towards conversions and proselytizing, see the insightful work of Cohen (1999).

<sup>32</sup>See Baron (1937, vol. 2, p. 253), and Alon (1984, p. 753).

<sup>33</sup>For details on the history of the Samaritans, see Montgomery (1968, chapters 4–9), Herr and Oppenheimer (1990, p. 204), and Alon (1984, p. 745).

<sup>34</sup>Baron (1952, vol. 2, p. 204–14), and Herr and Oppenheimer (1990, pp. 133–35).

The historical evidence of conversions and the demographic data are consistent with the prediction of our model that conversions occurred mainly among uneducated, low income Jewish farmers in the first half of the millennium. That process was slow and Jewish leaders were not concerned with the conversions of the *ammei ha-aretz* to other religions since they were outcast anyway.

Lastly, there is a third factor that might have brought a large reduction in the Jewish population in the centuries following the transformation of Judaism: a reduction in the fertility rate in order to implement the religious ruling of educating the children in a subsistence economy. To the best of our knowledge, there is no historical evidence showing that Jewish households reduced their fertility following the transformation of Judaism into a religion focused on reading and learning. The Mishna and the Talmud contain an endless number of detailed discussions and rulings regarding marriage, sexual behavior among spouses, pregnancy, abortion, infertility, divorce, and the Biblical requirement that the very purpose of marriage is to fulfill the Biblical commandment “be fruitful and multiply” (*peru urevu*). Among these many discussions and rules, there is none regarding reducing the number of children in order to fulfill the religious ruling of educating the children. If this had been a major problem in the Jewish communities in Talmudic times, somehow it would have been brought in front of the scholars and rabbis in the yeshiva, would have been discussed and would find its way in the Talmud.<sup>35</sup>

## 5 Occupational Dynamics: From Farmers to Merchants, 8th-9th Centuries

Given the stagnant economies in the late Roman, early Byzantine, and Persian Empires in the fourth-seventh centuries, the growing number of educated Jewish farmers could not find skilled occupations in the existing cities at that time.<sup>36</sup>

But in the eighth–ninth centuries, urbanization greatly expanded in the newly established Muslim Empire (Lewis 1984). New cities were founded in Iraq and Persia. The Umayyad dynasty, which had its capital in Damascus, established as main centers Basra in 636 and Kufa in 638, whereas the Abbasid rulers developed Baghdad in 762 and Samarra in 836. The population of Baghdad in the eighth and ninth centuries was in the range of 600,000 to 1 million people, whereas the largest European cities in the late twelfth century (e.g., Palermo, Paris, Seville, Venice, Granada, and Cordoba) had populations in the range of 60,000 to 150,000 people (Table 4).

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<sup>35</sup>Work by demographer Sergio DellaPergola (1997) has also shown that the Jewish people anticipated by about one century the demographic transition that the rest of the European population underwent in the late 19<sup>th</sup> century. This means that the Jewish birth rate started declining only around the late 18<sup>th</sup> century.

<sup>36</sup>See Neusner (1965–1970) and Avi-Yonah (1976) for the stagnant and worsened economic conditions in the Roman, Byzantine, and Persian empires in the fourth–sixth centuries.

TABLE 4—URBANIZATION IN THE NEAR EAST AND EUROPE

<i>Iraq, Persia, and Egypt in the 8<sup>th</sup>–9<sup>th</sup> centuries</i>		
	Total Population (thousands)	Jewish Population (thousands)
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
<i>Europe's eight largest cities in the late 12<sup>th</sup> century</i>		
	Total Population (thousands)	Jewish Population (thousands)
Palermo	150	7.5
Paris <sup>a</sup>	110	1.5
Seville	80	many
Venice	70	?
Florence <sup>b</sup>	60	0.1
Granada	60	many
Cordoba	60	many
Cologne	50	some

Sources: For total population in cities in Iraq and Persia, see Watson (1981, p. 56, footnote 45), and Lapidus (1981, p. 203). For total and Jewish population in Cairo, see Ashtor (1976, p. 89). For total population in European cities, see De Long and Shleifer (1993, Table 1, second column). For the Jewish population in Iraq and Persia, see Gil (1997, pp. 487-530) and Benjamin of Tudela (1170, henceforth BT). For the Jewish population in European cities, see BT.

Note: We agree with DellaPergola (2001) and interpret Tudela's numbers as the number of Jewish households in each city. Based on the evidence from the documents of the Cairo Geniza, the average family size was 5 people per household. Therefore, we multiply the number of Jewish households times 5 to obtain the number of Jewish people in a given city.

<sup>a</sup> BT lists 300 Jewish households (about 1,500 people) for Marseilles.

<sup>b</sup> BT lists 20 Jewish households (about 100 people) for nearby Pisa.

The growth of new cities, towns, and administrative centers in the Muslim Near East vastly increased the demand for urban and skilled occupations. The literate Jewish rural population in Iraq and later in all the Muslim Empire moved to urban centers, abandoned agriculture, and became engaged in a wide range of crafts, trade, moneylending, tax-farming, and the medical profession.<sup>37</sup> This occupational transition took about 150 years and by 900, almost all Jews in Iraq, Persia, Syria, and Egypt, were engaged in urban

<sup>37</sup>Here we summarize the detailed description of the occupational transition presented in Botticini and Eckstein (2005). In Table 4 above, however, we present data on urbanization not available in the other paper.

occupations.<sup>38</sup>

In these cities, the Jewish population became very large to the extent that about 1 million Jews (80 percent of world Jewry) lived in hundreds of cities and towns in eighth-century Mesopotamia, with Baghdad alone hosting a large Jewish community of about 200,000 people (Gil 1997, p. 458).

While the most educated Jews (the scholars in the academies) had left agriculture and become merchants well *before* the expanded urbanization in Iraq and Persia, the literate Jewish rural population left agriculture only when the growth of cities in the Muslim Empire made available to them skilled occupations, in which the returns to their investment in literacy and education were high.

Since Jews, Christians, and other non-Muslim minorities could engage in any occupation in the Muslim Empire, the distinctive characteristic of the Jews—their endogenously determined higher literacy and education—gave them the comparative advantage to switch to the better paid occupations in the new cities, whereas most non-Jews remained farmers (Baron 1952; Gil 1997).<sup>39</sup> This occupational selection into urban, skilled occupations remained the distinctive mark of the Jewish people thereafter.

## 6 A Model of Education and Conversion of Merchants

We now present a simple model of education and conversion of merchants by extending the model of farmers described in Section 3. The only difference between farmers and merchants is that education positively affect a merchant's productivity and earnings, that is,

$$w^M(e, e_s) = w^F[1 + Ae_s^\alpha e^{1-\alpha}], \quad (8)$$

and, therefore, his budget constraint is given by,

$$c + \gamma(e_s)^\theta + \tau^{rM} \leq w^F[1 + Ae_s^\alpha e^{1-\alpha}] \quad (9)$$

where  $e$  and  $e_s$  are defined as above,  $A$  is an exogenous productivity parameter, and  $\tau^{rM}$  is the tax paid by a merchant with religion  $r$ . We analyze only the case of literate merchants as the optimization problem of illiterate merchants is the same as the one of illiterate farmers.

**Education.** The main prediction of the model regarding education is that Jewish merchants invest more than non-Jewish merchants in children's education. Consider the first-order condition which gives the optimal level of a child's education for any merchant (Jewish or non-Jewish),

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

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<sup>38</sup>Ashtor (1959, pp. 147–51), Goitein (1967–1988, vol. 1), and Gil (1997, vol. 1). Goitein enumerated about 265 occupations mentioned in the documents of the Cairo Geniza.

<sup>39</sup>At this time, there were many minorities living in Iraq, including Christians who were almost equal in numbers to Jews (Gil 1997, vol. 1, p. 57).

Consider first the steady-state education level ( $e = e_s = e^*$ ) of non-Jewish merchants (who by definition have the exogenous taste parameter for Judaism  $x = 0$ ). Then, from equation (10),  $e = e_s = e^* = [\frac{w^F A \alpha}{\theta \gamma}]^{1/(\theta-1)}$ . In the steady-state, non-Jewish merchants educate their sons (i.e.,  $e^* \geq e^{\min} = 1$ ) if the parameters satisfy the condition that  $w^F A \alpha \geq \gamma \theta$ , 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 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 are 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  $x$ .<sup>40</sup>

**Conversion.** The main insight of the model regarding conversion is that if there is small or no tax difference between Jewish and non-Jewish merchants, *no* Jewish merchant converts. Only 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 very high), the model predicts that over time, the *proportion* of merchants in the Jewish population will increase.

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,

$$\begin{aligned}
 u^j(c, e_s; e, x) &< u^{jn}(c, e_s; e, x) \quad \text{or} \\
 \log(w^F [1 + A(e_s^j)^\alpha (e^j)^{1-\alpha}] - \gamma(e_s^j)^\theta - \tau_t^{jM}) + x(e^j + 1)e_s^j &< \quad (11) \\
 \log(w^F [1 + A(e_s^n)^\alpha (e^n)^{1-\alpha}] - \gamma(e_s^n)^\theta - \tau_t^{nM}) - \pi x. &
 \end{aligned}$$

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 ( $\tau^{nM} = \tau^{jM}$ ), a literate Jewish merchant does not convert.

To see that, let us 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, from (11), a Jewish merchant will choose to invest in his son's education ( $e_s^j$ ) exactly as a non-Jewish merchant ( $e_s^n$ ), and, therefore, he will be indifferent regarding conversion since he derives the same utility as a Jewish and as a non-Jewish individual.

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

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<sup>40</sup>See equation (1).

## 7 Jewish Education and Conversion, 9th to 12th Centuries

We show that the historical evidence from the Muslim period is consistent with the model's predictions.

**Education.** When urbanization greatly expanded in the Muslim Near East and many Jews entered urban skilled occupations, primary education became almost universal among them (Goitein 1962).<sup>41</sup> The two main sources of information are the *Responsa* of the *Geonim* and the documents of the Cairo Geniza. The *Responsa* (*teshuvot*) are the written replies that the Geonim, the heads of the academies in Mesopotamia, sent to the letters they received from Jews everywhere, who asked for their advise on religious, economic, and family-related matters. The existence and extent of the *Responsa* is by itself evidence of the spread of literacy among Jews. 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.<sup>42</sup>

The other impressive source of historical evidence consists of the thousands of letters, contracts, wills, and written transactions from the documents of the Cairo Geniza, which confirm the universality of primary education documented in the *Responsa*, but on a larger scale.<sup>43</sup> The budgets, letters, and contracts of 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 (2 *dirhems* per month per child), each household head was required to pay an education tax to finance the primary education of orphan and/or poor children.<sup>44</sup> Records from Old Cairo, Jerusalem, Damascus, and Baghdad mention “teachers of the orphans” supported by this communal tax.<sup>45</sup>

The historical evidence is also consistent with the model's prediction that non-Jewish merchants also invested in their children's education but less than Jews. 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 fairly widespread system of primary schools.<sup>46</sup> Providing a child with primary education, however, was not a religious law. The Muslim rulers also founded institutions of higher learning (academies) but only from the eleventh century—more than six centuries after the establishment of the Jewish academies in Iraq.

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<sup>41</sup>In Botticini and Eckstein (2005) we present detailed evidence to support this claim. Here we only summarize the main facts.

<sup>42</sup>Assaf (1925–1942, vol. 2, pp. 11–27), and Goitein (1962).

<sup>43</sup>The documents of the Cairo Geniza 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 therefore, they could not be thrown away. Based on these documents, Schlomo Goitein (1967–1988) wrote a monumental work on the social and economic life of the Jewish communities in the Mediterranean and the Muslim lands from the 10th to the 13th centuries.

<sup>44</sup>A teacher's average salary was 80 *dirhems* per month.

<sup>45</sup>Goitein (1967–1988, vol. 2, pp. 174–93).

<sup>46</sup>See Nakosteen (1964, pp. 44–47). Especially in early times, Jewish and Christians teachers were recruited to teach non-religious matters in Muslim schools.

**Conversions.** Table 5 shows that no major change occurred in the size of world Jewry in the Muslim period (8<sup>th</sup> to 12<sup>th</sup> centuries). This implies that conversions almost stopped when the Jews became merchants, which is consistent with the main prediction of our model.<sup>47</sup> The poll tax (3.4 *dirhems* per month, about 5 percent of a teacher’s salary at that time) levied on non-Muslims was not a big burden for Jewish craftsmen, merchants, tax farmers, and doctors to prompt mass conversions among them.<sup>48</sup>

TABLE 5—DISTRIBUTION OF THE JEWISH POPULATION (IN MILLION)

<i>Location</i>	<i>Time</i>		
	6 <sup>th</sup> century	8 <sup>th</sup> century	Late 12 <sup>th</sup> century
Eretz Israel	0.2	few	0.002
Iraq, Persia, Arabia <sup>a</sup>	0.8-1	0.8-1	0.800
Egypt, North Africa	very few	0.004	0.012
Syria	few	few	0.015
Balkans, eastern Europe <sup>b</sup>	few	few	0.047
Western Europe <sup>c</sup>	very few	few	0.103
Total Jewish Population	1.2–1.5	1-1.2	1-1.2
Total Population <sup>d</sup>	48	51	75
$\frac{\text{Jewish Population}}{\text{World Population}}$ (%)	3.0	2.0	1.6

Sources: For Mesopotamia, Neusner (1965–1970, vol. 1, pp. 14-15, vol. 2, pp. 246-48), and Issawi (1981, pp. 376, 381). For Eretz Israel, Herr and Oppenheimer (1990, pp. 108-09), Hamel (1990, pp. 137–40). For Egypt, Ashtor (1967; 1968, p. 13; 1976, chapter 7), Issawi (1981, pp. 376, 381), Musallam (1981, p. 432), and Dols (1981, p. 400–04). For data on Jewish population in all locations, Baron (1971), and DellaPergola (2001, Tables 1 and 2). For data on total population, Clark (1968), McEvedy and Jones (1978), and Kremer (1993).

<sup>a</sup> Arabia refers to the Arabian peninsula including Yemen.

<sup>b</sup> Balkans include Greece and Turkey. Eastern Europe includes Austria, Poland, Czechoslovakia, Hungary, and Romania.

<sup>c</sup> Western Europe includes Spain, Portugal, France, Italy, Germany, Low Countries, and England.

<sup>d</sup> The figures include only the areas where the Jews lived at this time (Eretz Israel, Mesopotamia, Persia, Egypt and North Africa, Syria, the Balkans, eastern Europe, and western Europe).

Also, the few conversions of Jews occurred to Islam—the dominant religion in the Near East—and not to other religions (e.g., Christianity). Hence, the very few conversions of Jews employed in high skill urban occupations in the Muslim period were very different from the conversion to Christianity of many illiterate and low income Jewish farmers in the first half of the millennium in Eretz Israel and Mesopotamia, which were the outcome of the implementation of the costly religious norm.

<sup>47</sup>One of the predictions of Rapoport and Weiss (forthcoming)’s model is consistent with this historical fact.

<sup>48</sup>The poll tax was a burden for poor households, as indicated in some documents of the Cairo Geniza in which the entire Jewish community in a given location had to help poor families pay the poll tax (Goitein 1967–1988, vol. 2, pp. 300–04).

## 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 which provide high returns to their investment in literacy and education. The migrations of Jewish people within the Muslim Empire in the eighth-tenth centuries and then to western Europe in the ninth-thirteenth centuries are an important historical development that supports this argument.

The timing, pattern, and characteristics of the Jewish diaspora from East to West indicate that the Jews had some distinctive features compared to other minorities within the Muslim Empire, who did not migrate to western Europe despite the fact that 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 the returns to their investment in religious human capital, which had spillover effects on their general literacy and education.

The ability to read religious texts in Hebrew enabled the Jews to read any other documents written in Hebrew, such as business letters, contracts, loans, and sales, even if the local languages they spoke were different. In addition, the ability to read and write 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 (1989; 1993). Literacy was a pre-condition for the use of community sanctions and the Jewish court system through (i) the written letters among Jewish merchants as illustrated by the documents of the Cairo Geniza, and (ii) through the rulings of the scholars in the academies in Iraq dispatched to the Jewish communities everywhere through the mail system of the Jewish merchants, as documented by the huge number of rabbinic Responsa.<sup>49</sup>

Education made mobility less costly since it enabled educated people to stay in touch with each other, which was very valuable to maintain family and business connections when living in different and distant countries, as the historical evidence presented below highlights.

**Migrations Within the Muslim Empire.** As shown earlier in Table 5, in the seventh-eighth centuries the demographic, economic, and religious center of the Jewish communities was the Near East under Muslim rule. 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, Eretz Israel, Anatolia, Egypt and North Africa. When the Muslim rulers overtook southern Spain by establishing the Cordoba Caliphate from 711 to 1236, a fairly large number of Jews settled there.<sup>50</sup> 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 (the one of the

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<sup>49</sup>Goitein (1967–1988, vol. 1), Ben Sasson (1976, pp. 393–402), and Gil (1997, vol. 1).

<sup>50</sup>In 1031, the Cordoba Caliphate was split into several kingdoms and for two centuries was under the Almoravidi (Berber) rulers. It fell into Christians hands in 1236 and this ended the Muslim rule in this part of Spain.

caliph alone containing about 400,000 volumes), 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.<sup>51</sup>

The Jews who settled in Muslim Spain specialized in a very 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 *yeshivot* in Muslim Spain created a gradual separation between the very large Jewish community in Mesopotamia and Persia (about 800 thousand to one million) and the comparatively smaller (about 100 thousand) but very wealthy and prominent Jewish community in Muslim Spain (Baer 1961).

The combination of wealth, luxury, and thriving intellectual life of the Jews in Muslim Spain is exemplified by the life of rabbi Samuel ha-Nagid (Marcus 1938, pp. 297–300). Living in early eleventh-century Cordoba, he was a merchant, a scholar, a poet, and later became the chief minister at the court of Granada. He is one of the most prominent examples of the type of Jewish individuals who contributed to the “golden age” in Jewish history (ca. 800 to 1200) (Raphael 1985). This period of spectacular intellectual fervor culminated with the contribution of rabbi Moses ben Maimon (called Rambam or Maimonides) who, born in Cordoba in 1131, later moved to Egypt where he became a court physician for the ruler Salah al-Din. He 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 the Sephardic Jewry as a distinct Jewish community with respect to the Ashkenazi Jewish communities in France, Germany, and England, as we will see below.

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

This is in striking contrast with their migrations to western Christian Europe from the ninth to the thirteenth centuries. Their migrations there, exactly as the migrations of other foreign craftsmen, merchants, and moneylenders (e.g., the Venetian or Genoese traders, the Tuscan bankers, or the Flemish merchants), were regulated by kings, bishops, or local rulers in special charters. Table 6 presents a sample of these early medieval charters to Jewish traders, merchants, and moneylenders.

Despite the different timing and characteristics of the Jewish diaspora in the European countries, it is possible to list three main common features of these migrations.

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, it 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 individual Jewish merchants (Pakter 1988, p. 96).

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<sup>51</sup>Considering the size of other Jewish communities for which there are data (see Table 4), a reasonable estimate is that about one to two thousand Jewish households lived in Cordoba at this time.

TABLE 6—SAMPLE OF JEWISH CHARTERS IN WESTERN EUROPE, CA. 800-1250

<i>Country</i>	<i>City</i>	<i>Year of charter</i>	<i>Activities allowed and regulated</i>		
			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
	—	1190	silent	silent	yes
England	—	ca. 1120, 1170*	yes	yes	yes
	—	1190, 1201	yes	yes	yes
	—	1275	yes	yes	no
Germany	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
	Austria	1244	silent	silent	yes

Sources: Parkes (1938), Amador de los Rios (1960), Baer (1961), Blumenkranz (1966), Cantera Burgos (1966), Roth (1966), Schwarzfuchs (1966a, 1966b), and Pakter (1988).

Note: when no specific cities or towns are listed in the second column, it means that the charter was valid all over a country. YES means that the Jews were allowed to do that specific activity (e.g., own land, or freely travel without paying internal tolls, or trade, or lend money at interest). NO means that the Jews were prohibited from doing that specific activity. SILENT means that the charter did not have any clause regarding that specific activity.

\* These early charters did not survive but the charters of 1190 and 1201 confirmed all the clauses contained in the earlier charters.

Second, the early medieval charters clearly indicate that because of their high human capital and skills, Jews as craftsmen, but especially as local and long-distance merchants, moneylenders, tax collectors, court bankers, and royal treasurers, were viewed as essential for economic growth and development to the point that local rulers in western Europe competed among each other to have some Jews settle in their towns.

This is nicely illustrated by some episodes. In 1066, the Norman king William brought some Jews with him when he conquered England in order to collect taxes and to obtain help

with financial matters. In 1084, bishop Rudiger-Huozmann 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.” 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 around 1250 encouraged Jews from France and North Africa to settle in Aragon with land and property grants and exemptions from taxes. Around the same time, king Ferdinand III of Castile when refusing to implement the Pope’s imposition that Jews be forced to wear special badge and clothing, explained that otherwise, the Jews would flee to Muslim Granada, which would be disastrous for the revenues of his kingdom.<sup>52</sup>

Third, the charters from the ninth to the early thirteenth century established no restrictions or prohibitions on the type of occupations the Jews could engage in. As Table 6 shows, almost all charters enabled the Jews 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. In the locations where the Jews were involved in money changing and moneylending—an activity that became more and more prevalent among Jews from 1200 onward—the charters regulated this activity by setting, for example, the interest rate ceiling.

Up to the early thirteenth century, the Catholic Church issued legislation regulating Jewish business activities with the sole goal of not losing revenues rather than prohibiting certain occupations or land owning. For example, canon 67 of the Fourth Lateran Council in 1215 established that the Jews had to pay the tithes to the Church on the land holdings once owned by Christians and become property of the Jews through purchase or through moneylending (Mansi 1961). This ruling did not certainly prohibit Jews from owning or farming land, it just ensured that the Church did not lose its steady income from tithes regardless of the religion of the property owner.

Exactly as it happened in Muslim Spain, in all western European countries in which they settled, most Jewish people reached very high standards of living.<sup>53</sup> 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).<sup>54</sup> Similarly, in England between 1239 and 1260, despite being a tiny proportion of the population, the Jews contributed to about one-sixth and one-fifth of the crown revenues (Elman 1937, p. 146).

The numerous Jewish communities in Christian Spain, France, England, and Germany

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<sup>52</sup>For these historical episodes, see Parkes (1938, pp. 186-87), Baron (1952, vol. 4, p. 74), Amador (1960, vol. 1, p. 388), Grayzel (1966), and Ben Sasson (1976, pp. 394–97).

<sup>53</sup>The high standards of living did not protect them from persecutions, or may have actually been used as an excuse to harm them. For example, in 1096 the Crusaders killed all the 800 Jews living in Worms. Similar persecutions and massacres occurred in other locations in Europe from the twelfth century onward. These persecutions alternated with periods of peace in which the Jewish communities came back to cities that they had abandoned and re-establish flourishing communities.

<sup>54</sup>To appreciate the extent of the wealth attained by the Jewish communities in Christian Spain, one can also consider the size of the fiscal contributions they made. In 1274, the Jewish community in Saragossa paid 15,000 solidi jac., the one in Catalayud 10,000, where the more recent community in Valencia paid 5,000 solidi (Baron 1952, vol. 10, pp. 128–33).

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 a *yeshiva* in Mainz, Germany, which attracted Jews from all over Europe, including the famous Rashi. Study of the Talmud increased, and the German *yeshivot* 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, both economically and intellectually, separated themselves from the large Jewish communities in the Near East, and by refusing the teaching of Maimonides also separated from the Jewish communities in Muslim Spain (Grossman 1992; 1999; and Limor 1993).

When in 1170 Benjamin de Tudela wrote his travel itinerary, the voluntary Jewish diaspora was at its height and world Jewry was divided in three main and almost independent economic and intellectual centers: (i) the Near East under Muslim rule where about 80 percent 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 were to be found in an endless number of locations all over Italy, Bohemia, eastern Europe, Turkey, the Middle East, Egypt and North Africa, all the way to central Asia, China, and India.<sup>55</sup>

## 9 The Mongol Shock, 1250-1260

The Mongol invasions in the 1250s, which brought the Near East back to being 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 farming 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 Mesopotamia, 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).

The Mongol conquests were a turning point in the demographic history of the Near East. Table 7 shows that the population of Persia and Iraq was almost halved. In Baghdad alone, the population dropped from about 800,000 to about 60,000.<sup>56</sup> 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–tenth

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<sup>55</sup>Studies have shown that contemporary Jewish populations show a closer genetic link to Jews from far away locations than to their neighboring non-Jewish populations (Bonné-Tamir et al. (1978), and 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).

<sup>56</sup>See Baron (1952, vol. 17, pp. 150–51), and Ashtor (1976, pp. 251–57).

centuries almost disappeared and, instead, farming and pastoral activities became the source of income of most households (Bausani 1971, pp. 101–23; and Lambton 1988). The ravages of the invasions, the devastation of the irrigation system, and harsh taxation left many farmers at subsistence levels. Eighty year after the Mongol invasions, tax revenues from Baghdad were only 10 percent of what they had been before. For the entire Iraq, tax revenues dropped by 80 percent (Petrushevsky 1968, pp. 497–504).

As shown in Table 7, about 800,000 Jews (about 80 percent of world Jewry) lived in Iraq and Persia around 1200. The Mongol conquests in Near East had a major impact on the large Jewish community, which two centuries later dropped to at most 100,000 people. Four factors can account for this huge reduction in the Jewish population: massacres during the Mongol invasions, deaths because of famines and diseases, migrations, and conversions.

TABLE 7—THE DEMOGRAPHIC EFFECT OF THE MONGOL SHOCK

Time	<i>Total Population (million)</i>			<i>Jewish Population (million)</i>		
	1200	1300	1490	1170	1300	1490
Eretz Israel	0.5	0.5	0.5	0.002	very few	very few
Syria	1.75	1.75	1.5	0.015	?	0.007
Iraq, Persia, Arabia <sup>a</sup>	13.5	10	9.5	0.800	?	0.100
Egypt	4	5	4	0.012	?	0.005
North Africa <sup>b</sup>	5	5.5	3.8	0.030	?	?
Balkans, eastern Europe <sup>c</sup>	18	23	23	0.047	0.065	0.090
Western Europe <sup>d</sup>	35	50	48	0.103	0.385	0.510
TOTAL	75	95	87	1–1.2	0.8–1	0.7–0.9

Sources: For total population, see McEvedy and Jones (1978). For Jewish population, see Ashtor (1967; 1968, p. 13; 1976, chapter 7), Baron (1971), Dols (1981, pp. 400–04), and Della Pergola (2001, Tables 1 and 2).

Note: The years given as headings in the columns are approximate dates. One should more appropriately think that 1170 stands for late 12th century, 1300 for late 13th century, and 1490 for late 15th century.

<sup>a</sup> Arabia refers to the Arabian peninsula including Yemen.

<sup>b</sup> North Africa includes Morocco, Tunisia, Algeria, and Libya.

<sup>c</sup> Balkans include Greece and Turkey. Eastern Europe includes Austria, Poland, Czechoslovakia, Hungary, and Romania.

<sup>d</sup> Western Europe includes Spain, Portugal, France, Italy, Germany, the Low Countries, and England.

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

Epidemics and famines certainly took a toll on the Jewish population as they did on the non-Jewish population (Ashtor 1959, pp. 66–68). 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.

During and after the Mongol invasions, many Jews fled to Egypt and Syria, which were ruled by the Mamluks. However, as Table 7 indicates, the Jewish communities in Egypt and Syria also dwindled and by the end of the fifteenth centuries, they were less than half the size they had been in the late twelfth century, and consisted mostly of poverty-stricken people.<sup>57</sup> This implies that the migrations of the Jews leaving Iraq and Persia to Egypt and Syria after the Mongol invasions could not have been massive, or else, the Jewish communities in Egypt and Syria would have been much larger after 1300.

Some Jews who left the Near East migrated to western Europe as the increase of the Jewish population there shows (Della Pergola 2001).<sup>58</sup> However, there is no mention of huge waves of Jewish migrations from the Near East to western Europe either in the numerous Jewish sources of the time (letters, travel itineraries, and Responsa), nor in the non-Jewish sources (tax records, censuses, and court records). One has to remember that Jewish migrations to western Christian Europe were regulated by kings, bishops, or local rulers, and the Jews could not freely move there unless they were invited to settle and obtained charters and special privileges (see Section 8).

When considering the (small) death toll from massacres by the Mongols, the death toll from famines and epidemics (similar to the one in the non-Jewish population), and migrations, there is still a large share of the decrease in the Jewish community in Iraq and Persia after 1250 that is left unexplained. Baron (1952, vol. 17, p. 183) and Ashtor (1959, pp. 65–66) maintain that conversions and assimilation of many Jews to Islam was a major factor which explains both the large reduction of the Jewish population in Iraq and Persia, and the shrinking Jewish communities in Egypt and Syria. Some conversions involved wealthy and prominent Jewish leaders, merchants, and doctors. However, there is a lot of evidence from the Responsa (for example of Abraham Maimuni) that many conversions occurred among low income Jewish households.

While the death toll from massacres, famines and epidemics after the Mongol shock was a feature that the Jewish population shared with the local population (although in different proportions), mass conversions (voluntary or forced) to Islam had occurred much earlier in the local population of Iraq, Persia, Egypt, and Syria (Bulliet 1979a, 1979b). Thus, the many conversions of low income Jews to Islam in the two centuries after the Mongol shock were not part of a general conversion process in the entire population.<sup>59</sup>

The conversions of low income Jews to Islam in the Near and Middle East and Egypt 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) became again subsistence farming and pastoral economies, the Jews who could not migrate to

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<sup>57</sup>See Baron (1952, vol. 17, pp. 160 and 219), and Ashtor (1959, p. 65; 1967; and 1968).

<sup>58</sup>Given the high standards of living attained by the Jews in medieval western Europe, a substantial share of the increase in the Jewish population there was the outcome of higher fertility and lower mortality.

<sup>59</sup>Notice that the Mongol rulers adopted Islam only 80 years after their conquest of Iran and Iraq.

western Europe, had to move back to being farmers and low income workers. The investment in children's education, as the Jewish religious norm required, became too costly in the poor farming economies of Iraq, Persia, Syria, and Egypt, and many Jews preferred to convert to Islam. Once converted, they had no longer to pay the poll tax and they were no longer required to invest in their children's religious education, which in a rural economy provided no economic returns.

## 10 Concluding Remarks

It is a common and well-accepted view that the three main economic and demographic features of Jewish 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 all 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: these three main economic and demographic patterns in Jewish history were the joint, long-term, and endogenous outcomes of an exogenous change in the first-second century C.E. This change transformed Judaism into a religion focused on literacy and education and radically altered the religious beliefs and social norm, which defined membership in the Jewish community.

A 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 since they had the skills that enabled them to engage in those occupations with high returns to their human capital. They became a minority in all the places where they settled as their comparative advantage was limited to few skilled occupations.

It might be 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. Under the assumption that cognitive skills are inherited, one can use our argument to explain the higher than average cognitive abilities of Ashkenazi Jews as reported in the very recent study of Cochran, Hardy, and Harpending (2005).

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