Education, Identity, and Community: Lessons from Jewish Emancipation[*]

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Abstract

Why do some minority communities take up opportunities for education while others reject them? To shed light on this, we study the impact of Jewish Emancipation in 19th century Europe on patterns of education. In Germany, non-religious and Reform Jews dramatically increased their rates of education. In the less developed parts of Eastern Europe, Orthodox and ultra-Orthodox communities imposed unprecedented restrictions on secular education and isolated themselves from society. Explaining this bifurcation requires a model of education that is different from the standard human capital approach. In our model, education not only confers economic benefits but also transmits values that undermine the cultural identity of minority groups. We show that it is *individually* rational for agents who benefit least from rising returns to education to respond by *reducing* their investment in education. Group-level sanctions for high levels of education piggyback upon this effect and amplify it.

Key words: Education; cultural transmission; human capital; identity; Jewish history

JEL classification: D10; D63; D71; I24 ; J24 ; Z12 ; Z13

1   Introduction

Human capital acquisition is an important part of the process of economic development (Schultz, 1961; Mankiw et al., 1992; Galor, 2005, 2011). Despite the fact that returns to education have increased in recent decades, inequality in human capital investment remains persistent (Berman et al., 1998; Acemoglu, 2002, 2003; Autor et al., 2003).[1] As a result, recent work has began to focus on the role played by both institutions and culture in human capital accumulation (Galor et al., 2009; Gallego, 2010; Acemoglu et al., 2014; Dittmar and Meisenzahl, 2016; Carvalho and Koyama, 2016b).

In this paper we present a novel historical case study which sheds light on the impact of economic modernization on human capital acquisition and cultural integration. For centuries, Jewish communities across central and eastern Europe were isolated from mainstream society and subject to legal restrictions which limited their economic opportunities and ability to acquire secular education. Thus, prior to emancipation, Jewish communities both in Germany and further east in what is now Poland and the Ukraine 'displayed substantially similar political, social, and economic features' (Vital, 1999, 31). At the end of the eighteenth century, various restrictions on occupational choice, residential location, and other forms of social interaction were relaxed, a process known as Jewish emancipation. Jewish emancipation was an exogenous development that raised returns to secular education for Jews across Europe.[2] The majority of Jews in Western Europe seized the opportunities offered to them and adapted their religious culture in doing so. But the response was neither uniform, nor monotonic. A small minority, located in Hungary and Eastern Europe, actively opposed these developments and adopted a religious culture that penalized secular education.

To model the relationship between human capital acquisition and cultural transmission, we draw upon seminal work by Bisin and Verdier (2000, 2001).[3] Our analysis focuses on

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[1] Correcting for ability bias, the returns to an additional year of schooling are approximately 6–10 percent (Angrist and Krueger, 1992; Psacharopoulos, 1994; Heckman et al., 2006; Leigh and Ryan, 2008).

[2] Other potential studies of the effect of economic incentives on educational attainment and cultural resistance among minorities confront various confounding factors. For example, migrant populations are subject to selection effects, being different along a range of dimensions from those who choose to remain in their home country. Similarly, other religious countermovements such as the Amish and Hutterites emerged in predominantly rural regions. Hence it is difficult to isolate whether their rejection of modernization stemmed from their peculiar local culture or the material incentives that they faced.

[3] For analyses of cultural transmission in evolutionary biology and ecology, including peer-to-peer transmission, see Cavalli-Sforza and Feldman (1981) and Boyd and Richerson (1985).

peer-to-peer (rather than intergenerational) transmission and devotes special attention to formal education as a means of transmitting values.[4] We assume that education not only confers human capital but also cultural values. In particular, education produces mainstream (secular) values, making it costly to a minority (religious) community. Investment in human capital among members of a minority community thus depends on both the economic returns to education and the cultural distance between the majority and minority community. Due to the cultural role of education, some members of the minority community will respond to an increase in economic returns to education by investing less in education. This resistance to education operates at the individual level. Community-level sanctions for high levels of education piggyback upon this effect and amplify it. Thus, we produce a tractable framework for analyzing the relationship between identity, education, and cultural transmission both at an individual and community level, connecting the identity and cultural transmission literatures with rational choice models of religion and religious organizations (see Iannaccone, 1992, 1998; Berman, 2000; McBride, 2007, 2010; Levy and Razin, 2012, 2014; Carvalho, 2016).

Carvalho and Koyama (2016b) present a distinct model of the dynamics of identity-based resistance to education. In the present paper, there is a single population with secular and religious groups determined endogenously and subject to change over time. The focus is on cultural transmission of traits through the education system and from one individual to another. In Carvalho and Koyama's (2016b) model, the population is partitioned into two groups, A and B, of fixed size. That is, an individual's identity is fixed and not subject to cultural transmission. What does change is the ideal identity prescribed by the education system, which is determined endogenously based on the composition of the educated subpopulation. Under certain conditions, when economic returns to education rise faster in community A, rates of education fall in community B. Here we generate a similar result despite numerous differences in the setup of the model and apply it to understand educational polarization following Jewish emancipation. One novel feature of this paper is the analysis of resistance to education at the group level.

This paper is related to several other literatures. While the polarized response to Jewish emancipation is puzzling and interesting in its own right, it also has important implications for how we think about the development process more generally. Recent work on the de-

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[4]See also Binzel and Carvalho (2016) on the connection between religion and education through the formation of aspirations.

terminants of human capital accumulation has largely focused on the role of institutions in encouraging human capital accumulation. However, as Mokyr writes: 'Clearly decisions about human capital cannot be understood without cultural underpinnings' (Mokyr, 2016, 123). Indeed, Becker et al. (2009) find that the differences in economic outcomes observed in Prussia at the end of the nineteenth century were due to a Protestant religious culture that valued education and accumulation of human capital. Botticini and Eckstein (2005, 2007, 2012) argue that following the demise of the Temple in Jerusalem in AD 70, Judaism became a religion of literate townsfolk because teaching one's eldest son to read was too arduous to do for peasant farmers who gradually converted to Christianity or Islam. Our paper contributes to this literature on the role of culture in human capital acquisition.

Second, our paper is part of a small but growing literature in economics on Jewish history and Jewish institutions, including Berman (2000), Botticini and Eckstein (2005, 2007, 2012), Chiswick (1999, 2008, 2009) and Johnson and Koyama (2016). The religious schism between Reform, Orthodox, and Ultra-Orthodox Judaism has been studied by both Berman (2000) and Carvalho and Koyama (2016a). Berman (2000) was the first to develop rational choice models of the emergence and structure of ultra-Orthodox Jewish communities in the wake of emancipation. He draws on Iannaccone's (1992) club goods model of religion to account for why higher wages have been associated with both an increase in time spent on religious education (yeshiva) and higher levels of fertility among the Ultra-Orthodox in Israel. Carvalho and Koyama (2016a) model the tradeoff faced by Jewish community leaders between contributions of time and money to the community and propose a complementary mechanism for the polarization in Judaism. Whereas both of these papers focus on increases and decreases in religious strictness, in this paper we focus on the divergence in educational outcomes that accompanied the religious schism between Reform, Orthodox, and Ultra-Orthodox.[5]

Third, our analysis contributes more generally to understanding cultural assimilation and resistance by minority groups (see Bisin et al., 2011a,b; Carvalho, 2013). In particular, we analyze the role of clubs in identity formation and cultural transmission. Prior work has focused on cultural transmission within the household and in society at large. Between these extremes, groups such as religious clubs, schools, and neighborhoods play an important role in cultural transmission, a notion introduced and analyzed by Carvalho (2016). In this

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[5]Berman (2000) studies religious education among Orthodox Jews, showing that Orthodox groups use strict requirements for Yeshiva attendance to screen for committed types.

paper, we study how religious groups can internalize some of the externalities inherent in the cultural transmission process by restricting the education of their members.

Finally, our work is related not only to the economics of religion but to a broader literature on the economics of non-market decision making that includes studies of kibbutzim (Abramitzky, 2008, 2009), prison gangs (Skarbeck, 2011), drug traffickers (Kostelnik and Skarbek, 2013), private prosecution associations (Koyama, 2012, 2014), and terrorist groups (Iannaccone and Berman, 2006; Berman and Laitin, 2008; Berman, 2009). In particular, we contribute to the literature on the adoption of seemingly irrational norms and behaviors by minority groups (see Iannaccone, 1992). Leeson (2013), for example, studies the practices adopted by Gypsies to enforce social ostracism and punish defectors. In a different setting, Leeson (2014) explores how extreme religious practices—in this case human sacrifice—might be a rational way for a community to protect its property.

The remainder of the paper is organized as follows. Section 2 presents the principle puzzle that motivates this paper. Section 3 presents our model of education and identity. In Section 4 we apply this framework to explain the polarization in Jewish education in the period following emancipation. Finally, in Section 5 we discuss some of the broader implications of our framework.

2 The Puzzle: Jewish Emancipation and Educational Polarization

In the United States and Europe today, Jews are among the most highly educated ethnic or religious group. Holding constant other characteristics, Americans Jews today invest more in schooling and report higher occupational status and larger incomes than average Americans.[6] This attitude to education appears rooted in Jewish culture (secular and religious). At the same time, some Jewish religious groups reject all secular education. Ultra-Orthodox Jews

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[6]Ashkenazi Jews also report high levels of IQ, although this may be a product as well as a cause of their educational culture. This is particularly marked at the high end of the distribution. Ashkenazi Jews have won more than a quarter of all Nobel prizes in the sciences although they are less than 0.6% of the world's population. Cochran and Haprending (2009) propose an evolutionary explanation of this phenomenon. We do not attempt to explain why Ashkenazi Jews have been particularly successful in the sciences or in academia in the post-emancipation period. We are concerned with the polarization that followed Jewish emancipation. As such, our framework is consistent with a number of different explanations of overall levels of Jewish educational attainment.

in the United States, United Kingdom, and Israel acquire no secular education beyond basic reading, writing, and arithmetic, devoting their time instead to religious education (see for example Heilman, 1992; Berman, 2000). This paper seeks to understand the origins of this polarization in the period after Jewish emancipation (c. 1780–1870).

Throughout the middle ages, Jews were more educated on average than Christians. Ancient Judaism was a religion based on prayers and sacrifices made at the Temple in Jerusalem. After the destruction of the Temple, Rabbinical Judaism, which was based around study of the Torah, became the dominant strand of Judaism. As a consequence of this, being an observant Jew required one to be literate; hence in theory all Jewish adult males were literate (see Botticini and Eckstein, 2005, 2007). In contrast, literacy in Christian Europe was confined to the clergy, until the thirteenth century. Higher average levels of Jewish literacy and scientific knowledge are reflected in the extent to which Christian society depended on Jewish doctors, merchants and moneylenders throughout the medieval period (Roth, 1953; Cohen, 1994; Shatzmiller, 1994).

This gradually changed, as the Renaissance, Reformation, and Scientific Revolution transformed Western European society. Secular education became distinct from religious education. Literacy rates increased, particularly in northern Europe. Education in the vernacular became increasingly common, and over the course of the seventeenth and eighteenth centuries, Ptolemaic astronomy, Aristotelian philosophy, Galenic medicine, and scholasticism were replaced by the ideas of Galileo, Kepler, Harvey, Boyle, Locke, and Newton. Jewish society was unable to benefit from any of these developments for several reasons.[7] Jews faced numerous discriminatory barriers that restricted their employment opportunities and these barriers became stricter in the early modern period.[8] Jews were increasingly culturally isolated: 'a republic apart' who wore distinctive clothes and spoke their own languages (Israel, 1985).[9] Persecutions and expulsions intensified in the late middle ages and where

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[7]There was interest in these developments among Jewish scholars, notably Moses Isserles (1525–72) and Judah Loew ben Bezalel (c. 1525–1609) in Prague and Krakow. Ruderman detects 'a tolerance and enthusiastic endorsement of the study of the natural world within Jewish culture, one even greater than in previous eras of Jewish history' (Ruderman, 2010, 130). However, it was difficult for Jews to participate in the debates directly, and over the course of the early modern period fell further and further behind.

[8]See Langmuir (1990); Cohen (1994); Mundill (1998) and Koyama (2010) for analysis of the condition of Jews in the middle ages and Dubnov (1971) and Katz (1974) for details on the discriminatory barriers facing Jews in the early modern period.

[9]Bach notes 'Jews on the whole were not only felt to be alien, but looked it' (Bach, 1984, 32). Jews in Germany did not speak German as they spoke their own vernacular dialect Juden-Deutsch (a form of

they were permitted to remain, Jews were typically confined to ghettos. This enabled Jewish communities to survive, but it came at the cost of their cultural isolation (Kaplan, 2007). In the words of another historian: '[f]ew secular influences pervaded the ghetto, and there was little to disturb its inbred notions and ideas' (Rudavsky, 1967, 95).

Jewish communities in central and eastern Europe in the eighteenth century provided religious education but little or no secular education (Katz, 2000). Eisenbach comments that the 'curricula of religious schools of various grades did not yet include secular subjects. The schools did not impart to the young people knowledge of the surrounding world, of the society in which they lived, its history and culture' (Eisenbach, 1991, 42). It was very difficult for Jews to acquire modern secular education. In his autobiography, Solomon Maimon (1753–1800) recalled that 'to gratify my desire for scientific knowledge, there were no means available but that of learning foreign languages. But how was I to begin? To learn Polish or Latin with a Catholic teacher was for me impossible, on the one hand because the prejudices of my own people prohibited languages but Hebrew, and all sciences but the Talmud and the vast array of its commentators; on the other hand because the prejudices of the Catholics would not allow them to give instruction in those matters to a Jew' (Maimon, 1954, 68).[10]

Similarly, Elon describes Moses Mendelssohn's (1729–1786) trek from Dessau to Berlin as a march 'through a time machine, a journey across centuries, from the hermetic insularity of the medieval ghetto into which he was born to the relative enlightenment of eighteenth century Berlin ... Mendelssohn's education had been exclusively religious. He was still unable to speak German or read a German book' (Elon, 2002, 2–3).[11] The Enlightenment and Jewish emancipation—the lifting of formal legal barriers to Jewish participation in society—which began at the end of the eighteenth century, changed all of this, transforming economic and

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medieval German which was written in Hebrew characters), as a literary language they used rabbinical Hebrew and were largely ignorant of Latin. Further east, Jews spoke Yiddish as this kept them distinct from the Polish population that surrounded them. Interestingly Yiddish was initially an example of the extent of acculturation among Jews in medieval Germany during the high middle ages. The first generations of Jews in Germany had spoken French. However, by the time Jewish communities had moved east into Poland, their use of Yiddish in distinction from the local language was a mark of cultural distance (Funkenstein, 1995).

[10]Maimon describes the typical school as 'a small smoky hut' in which children were tyrannized by their school masters, often went unfed, read Hebrew without understanding it or its grammar, and learnt the scriptures without being able to interpret them' (see Maimon, 1954, 31–34).

[11]Of course within two decades 'almost entirely self-taught, he had become a renowned German philosopher, philologist, stylist, literary critic, and man of letters' (Elon, 2002, 2–3). Mendelssohn is both a driver and an exemplar of the phenomenon we analyze in this paper.

social opportunities for Jews. Emancipation was a complex process and there were many temporary reverses, but it had the overall effect of raising the returns to secular education (see, amongst others Goldscheider and Zuckerman, 1984; Vital, 1999).[12] Jews became able to attend secular or Christian schools and universities and enter the professions. In fact, across central and eastern Europe, the promise of emancipation was tied to the provision of secular education, which was intended to 'socialize' Jews and make them 'useful' members of society. Christian Wilhelm Dohm in his influential 1782 work *On the Civic Improvement of the Jews* emphasized the importance of freeing their minds of religious superstition and what he conceived to be an exclusionary and immoral attitude to the rest of society. He viewed emancipation as 'a reciprocal process in which the Jews were to refashion themselves in exchange for rights, largely through occupational restructuring and *reeducation*' (Sorkin, 1987, 27, emphasis added).[13]

Existing economic models of education and investment in human capital predict that the increase in the returns to human capital brought about by Jewish emancipation should have led to a general increase in educational attainment (see for example Schultz, 1961; Becker, 1975). It goes without saying that the nature of emancipation varied across Europe, and existing models of education would certainly predict variation in the extent to which individuals increase their investment in education in response to emancipation. However, existing models of educational investment cannot explain the polarization that took place. While many Jews embraced the new opportunities to acquire education, many did not, and in parts of Eastern Europe, Jewish emancipation was associated with the rise of ultra-Orthodox forms of Judaism that prohibited all secular education. Emancipation brought polarization, and an increase in the returns to secular education led to the emergence of religious groups that decreased investment in secular education. To shed light on this puzzle, we develop a model which links identity, education, and the transmission of cultural values.

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[12] Jews were granted some limited rights in Baden in 1781 and in the Habsburg empire in 1782. As studied by Acemoglu et al. (2010), the French Revolution led to the emancipation of all Jews in France in 1791 and in the lands occupied by the French between 1791 and 1815. Prussia and some other German states gave Jews some citizen rights between 1810 and 1815. Full emancipation, however, only took place in 1867 in the Habsburg monarchy and in 1871 in Germany (Katz, 1974).

[13] Similarly, one of the first edits of emancipation, Joseph II's *Toleranzpatent* required Jewish schools to teach in German called for both 'graciously influenced education of a better direction and the moral cultivation of their character' (quoted in Patai, 1996, 215). In the parts of Germany conquered by France, Napoleon ruled that every rabbi should be fluent in the vernacular (Baron, 1938, 57–58).

3   The Model

In our model, education not only confers economic benefits, but also transmits secular cultural values. We analyze a single minority religious community composed of a continuum of individuals I indexed by i. This community can be thought of as a Jewish religious community in central or eastern Europe, but our analysis applies more generally to any cultural, ethnic, or religious minority. We first examine individual responses to an increase in the return to education and then consider how an organization that is able to control access to education might respond to an increase in the return to education. The timing of the model is as follows.

At *Date 0*, each individual i is endowed with an ability $\sigma_i > 0$. Ability is distributed across individuals according to the cumulative distribution function F, with support $[0, \overline{\sigma}]$ for some $\overline{\sigma} > 0$.

At *Date 1*, each individual i chooses an investment in education $e_i \in [0, 1]$. Education e yields an economic payoff to a σ type of $\beta(\lambda, \sigma)e$, where λ is a common shift parameter measuring the *return to education*.[14] β is strictly increasing in its arguments and $\beta_{12}(\lambda, \sigma) > 0$, so that high ability individuals benefit more from an increase in the return to education than low ability individuals. We assume that individuals decide how much education to acquire but this could be easily modified to make it a parental decision as in Bisin and Verdier (2000). Let $\lim_{\sigma \to 0} \beta_1(\lambda, \sigma) = 0$, so that there are some individuals who benefit very little from an increase in the return to education. In addition, we assume that education has a (direct) cost $c(e)$, where $c'(e) > 0$ and $c''(e) > 0$ for all e, $c'(0) = 0$ and $c'(e) \to \infty$ as $e \to 1$.

Thus far this setup is a fairly standard model of human capital acquisition. The point of departure in our model is that education also shapes cultural or religious values via socialization. This feature of our analysis builds on the findings of sociologists and historians of education and is explored in recent work in economics, notably by Akerlof and Kranton (2002), Akerlof (2016) and Carvalho and Koyama (2016b).

At *Date 2*, individuals form values $\theta_i \in \{S, R\}$. Education produces and transmits main-

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[14]Essentially, $\beta(\lambda, \sigma)e$ is a (linear) production function converting education into earnings. λ is a property of the environment, whereas σ is a property of the individual and can be interpreted as any individual characteristic such as ability, inherited human capital or parental income/capital that raises the return to education.

stream (secular or Christian) values S: the likelihood of individual i acquiring secular values denoted by $p(e_i, q)$ is a function of i's own education e_i and the mean level of education in the community q. Specifically, we assume

$$p(e_i, q) = e_i q,$$

so that education choices are strategic complements.[15] The likelihood of acquiring religious (Jewish) values is $1 - p(e_i, q) = 1 - e_i q$. The strategic complementarity reflects the fact that cultural values are not simply generated individually through education but also transmitted from person-to-person through social contact.

Finally, at *Date 3*, each individual i receives an identity payoff of $\nu(\theta_i)$. Define $\delta \equiv \nu(R) - \nu(S)$. Since we are analyzing education choice by members of a minority religious community, we assume that $\delta > 0$. That is, education imposes a cultural cost by transmitting secular values and undermining their religious identity. We interpret δ as the 'cultural distance' between the minority community and mainstream society.

Thus the expected total payoff to a type σ individual at date 1 from choosing education e_i is:

$$U(e_i, e_{-i}; \sigma) = \beta(\lambda, \sigma)e_i - c(e_i) \\ + \gamma e_i q \nu(S) + \gamma(1 - e_i q)\nu(R) \,, \tag{1}$$

where $\gamma > 0$ is the salience of identity.

Individuals take the mean level of education q as given when choosing education. Hence the corresponding first-order condition for a solution to a σ type's problem is:

$$\beta(\lambda, \sigma) - \gamma q \delta = c'\left(e_i^*\right). \tag{2}$$

We assume throughout that $\beta(\lambda, 0) > \gamma\delta$ to guarantee interior solutions.

An individual's choice of education reduces to the standard model without cultural transmission when identity is not salient ($\gamma \to 0$), i.e., when economic concerns overwhelm identity-based concerns, or when cultural differences are minimal ($\delta \to 0$). Without this assortative social mixing, cultural transmission would negatively affect an individual's welfare, but not

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[15]The results can be generated by more general forms of strategic complementarities, but this formulation simplifies the analysis.

his education choice. Social mixing means that religious individuals are more likely to be matched with other religious individuals in the social transmission process. Education determines whether an individual enters this process with religious values.

By inspection of (2), any two individuals with the same σ choose the same education level. Thus the equilibrium choice of education by an individual with type σ given q is denoted by $e^*(\sigma, q)$. Although not explicitly noted, education choice is also a function of the other exogenous parameters $(\gamma, \lambda, \delta)$. The mean level of education is:

$$q = \int_0^{\bar{\sigma}} e^*(\sigma, q) \, dF(\sigma). \tag{3}$$

Note that mean education q also determines the equilibrium proportion of individuals with secular values, which equals q^2.

3.1 Equilibrium Education

Equilibrium education choices are characterized as follows:

Proposition 1 *There exists a unique Nash equilibrium* $\left(e_i^*\right)_{i \in I}$*. In equilibrium, q is strictly between zero and one.*

All proofs are in the Appendix. In equilibrium q is between zero and one so there is always a mix of individuals with secular and religious values.

Proposition 2 *The mean level of education q is:*

(i) strictly increasing in the return to education λ,

(ii) strictly decreasing in cultural distance δ.

As in canonical models of human capital acquisition, the mean level of education rises with the return to education. In the standard approach this is because every individual increases education in response to a rise in λ. When education shapes values, however, a focus on average levels of education obscures a surprising degree of heterogeneity in educational responses. This heterogeneity can explain the polarization that we observe among Jewish communities in nineteenth century Europe.

3.2 Resisting Education

Throughout the remainder of the paper we shall characterize how rising returns to education can induce polarization in educational choices as some individuals resist (secular) education. In the case of Jewish communities this resistance to secular education went hand-in-hand with increased religious education. But as introducing religious education to our model does not alter our results on resistance to secular education, we do not model it explicitly. Let us take our first look at resisting education by analyzing the response to rising returns to education at an individual level. We define the phenomenon formally as follows:[16]

Definition. If equilibrium education $e^*(\sigma)$ for type σ is (locally) strictly decreasing in the return to education λ, then type σ *resists education*.

This enables us to state the following result:

Proposition 3 *There exists a set of types with positive measure who resist education.*

Therefore, agents who benefit very little from a rise in the return to education will always resist education. Equation (6) implies that individuals are most likely to reduce their investment in education in response to an increase in the returns to education when the level of cultural distance that exists between them and secular society (δ) is high and when the salience of identity (γ) is high.

The intuition for the result is as follows. An increase in the return to education produces a rise in mean educational attainment q [Proposition 2(i)]. Due to the strategic complementarities in the cultural transmission process, this means that a given level of education is more likely to produce secular values. Intuitively, when mean education q is high, education does not simply produce secular values directly but also exposes one to a larger number of other individuals with secular values. Hence individuals who wish to retain their religious values do so by reducing secular education. There is a cost to doing so, however, as education increases one's productivity. Thus those who benefit least from an increase in the economic return to education (those with low σ) are the ones who reduce their investment in education in a bid to retain their minority identity.

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[16]In Carvalho and Koyama (2016*b*), we use the term "resisting education" more broadly to refer to underinvestment in education due to identity-based motivations.

3.3 Collectively Resisting Education

Proposition 3 establishes that there is an incentive to resist education at the individual level. When education poses a threat to their identity, some individuals may reject opportunities to acquire education even as the return to education increases. What is more easily observable in practice is that social norms and organizations emerge to restrict secular education. It turns out that, in our model, this is not an independent phenomenon. Collective forms of resisting education piggy-back on and amplify the forces that motivate individuals to resist education.

Given our case study, it is relevant to introduce a religious or community organization into our framework. Prior to educational choices being made, the organization announces a maximum level of secular education for its members, $\bar{e}$. Members decide whether or not to join the organization and choose their level of education. Finally, cultural transmission of values takes place as before, except that the process is regulated by group membership, as in Carvalho (2016). In particular, let the mean level of education be q_1 among members of the organization and q_0 among non-members. The likelihood that i acquires secular values is $p(e, q_1) = e_i q_1$ if she is a member and $p(e, q_0) = e_i q_0$ if she is a nonmember.

We assume that an individual's level of education is perfectly observable. If a member's education exceeds $\bar{e}$ she is ostracized from the organization prior to the cultural transmission stage (date 2) and thereby subject to the transmission probability $p(e, q_0)$. In addition, she pays a penalty $k > 0$. We shall show that *even without repetition* of the game, this threat of ostracism can further depress levels of education.

Proposition 4 *Suppose the organization sets a cap on education $\bar{e}$. For every level of $\bar{e} > 0$:*

(i) there exists a threshold $\widehat{\sigma}$ such that all types $\sigma < \widehat{\sigma}$ join the organization; and

(ii) the mean level of education is lower than in the absence of the organization.

We first demonstrated that some agents can individually improve their welfare by reducing their level of education. Now we have shown that organizations which restrict education can further improve individual welfare and attract members by (imperfectly) screening out individuals with secular values. Given that the mean level of education is lower in the presence of such an organization, a subset of those individuals joining the organization

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restricts its education. As association is voluntary, these individuals must be made better off by restricting their education choice and joining the organization. The reason for this is that organizations can further internalize the identity externalities faced by individuals in the social transmission process.[17] This is what we mean by collectively resisting education.

4 The Model Applied to History

Prior to Jewish emancipation, the level economic development (λ) was low for all Jewish communities and the return to secular education was low in all regions. There was little difference between Jewish communities in Germany and Jewish communities in Poland or Galicia. Then beginning in the late eighteenth century, Jewish emancipation exogenously increased the return to education in western Europe and Germany. At the same time λ remained low in Eastern Europe. How did this affect different Jewish communities across Europe?

To answer this question we develop three historical case studies. We first study how emancipation affected Jewish communities in Germany. We develop this example in case study (1). This provides a benchmark community and we compare the outcomes experienced there to developments in other parts of Europe where emancipation and economic growth came later and more slowly. Our second case study (2) allows us to compare this benchmark community in Germany with communities in in Hungary. Finally, case study (3) analyzes how developments in Russia and Galicia were shaped by the emancipation and economic development in Germany.

4.1 The European Enlightenment and Jewish Emancipation

First, we can consider the impact of the European Enlightenment of the eighteenth century. Even before Jewish emancipation increased the returns to secular education in Germany and other parts of central Europe, the Enlightenment reduced the degree of cultural distance between mainstream Christian society and Judaism. In terms of our model the Enlightenment represents an exogenous decrease in cultural distance δ. Proposition 3 predicts that a decrease in δ reduces the set of individuals who wish to resist education.

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[17]See Carvalho (2016) for further discussion and analysis of such organizations.

The Enlightenment was associated both with greater religious tolerance and with secularization (Kamen, 1967; Grell and Porter, 2000).[18] It generated a new secular culture that made it easier for Jews and Christians to interact socially and economically. Significantly, the Enlightenment had an effect on Jewish communities that it did not have on non-Jews: according to historians, a 'central question, unique to the Jewish context and not confronted by other European enlighteners, was whether it was legitimate to introduce secular knowledge into Jewish culture. The sciences were largely perceived at the time as forbidden fields, and Jews who devoted effort to their study had to cope with the danger of being condemned by society and with their own fear of undermining their religious faith' (Finer and Naimark-Goldberg, 2011, 13–14). Despite the fact that many Enlightenment thinkers voiced anti-Jewish sentiment, the overall effect of the Enlightenment was to create a religiously neutral sphere where Christians and Jews could meet on an equal footing (Low, 1979).[19] This was particularly true in the Berlin salons where Mendelssohn became accepted as a celebrated member of the Enlightenment movement (Graupe, 1978; Bach, 1984; Goldfarb, 2009; Finer and Naimark-Goldberg, 2011).[20]

In Germany, this exogenous reduction in cultural distance found a response in the Jewish enlightenment movement (*Haskalah*).[21] The 'enlighteners' (*maskilim*) sensed that the environment 'was currently more friendly to their aspirations than ever before and attributed this change to cultural processes that had been at work for some time among the Western

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[18]Economists have largely ignored the Enlightenment. The exception to this rule is Mokyr (2002, 2009, 2016) who emphasizes the significance of the Enlightenment as a phenomenon that set north-western Europe apart from the rest of the world. The Enlightenment, in Mokyr's argument, played a crucial role in creating an environment in which innovation became increasingly common and sustained economic growth possible.

[19]Anti-clerical Enlightenment thinkers, most notably Voltaire, often voiced anti-Jewish views and denigrated the Jewish religion, even as they called for religious toleration for Jews (see Sutcliffe, 2000). Voltaire for example, described the Jewish nation as 'the most detestable ever to have sullied the earth'.

[20]Bach describes Mendelssohn as opening 'a window into the world from the spiritual wall of the ghetto, demonstrating that Western education, in addition to their own traditions, could pave the way to social reception on a footing of equality' (Bach, 1984, 73). Finer notes, that 'although Haskalah neither started in Berlin nor took place only within its confines, at the time of its apogee the Prussian capital was its indisputable centre, physically and, perhaps even more so, ideologically. Berlin was the city every maskil sought to visit; it was the city where the first modern Jewish school was founded ... it was the city where a maskilic publishing house was established in 1784 ('The Oriental Press'), printing the largest number of maskilic publications produced anywhere' (Finer and Naimark-Goldberg, 2011, 4). Gotthold Ephraim Lessing (1729–1781) played a particularly important role in bringing together Enlightenment and Jewish thinkers. Immanuel Kant was a friend of Moses Mendelssohn and a mentor for Markus Herz and Solomon Maimon (1754–1800).

[21]Where the Enlightenment was not fully developed and δ remained high, a polarized response to an increase in the returns to education was more likely to emerge.

European nations. These processes had set non-Jews far ahead of Jews, who did not participate in them ... But now a moment of opportunity had arrived' (Meyer, 1998, 370). The *Haskalah* movement focussed on secular education. It was a response to the particular German interpretation of the Enlightenment or *Aufklärung* which stressed learning and cultural achievement.[22]

We can now turn to the impact of Jewish emancipation. Jewish emancipation was part of the larger process whereby the modern state replaced local with central authority and in the process abolished old privileges and restrictions (Baron, 1928, 524–525). Like other reforms, emancipation can be seen as a defensive policy presided over by the political elite: '[w]hen compelled, autocrat and aristocracy initiated social change' (Sorkin, 1987, 12).[23] Liberal bureaucrats, influenced by Enlightenment thought, were willing to grant rights to the Jews in exchange for internal reform and to achieve reform they agreed to open up educational institutions to Jews.[24]

Emancipation gave Jews access to employment in law, medicine, and eventually the civil service, and it meant that they could attend Christian schools and universities. It both made secular education easier to obtain and raised the pecuniary returns to education. Our model captures both effects through an increase in λ.

4.2   Case Study 1: Reform and Modern Orthodoxy in Germany

We can use our model to study the response of Jewish communities to emancipation in Germany. As we document, λ increased at a fairly steady pace throughout the nineteenth century as a result of *de jure* and *de facto* acts of emancipation and as a consequence of

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[22]There had been important precursors of the *Haskalah* before Mendelssohn. Notable scientific thinkers include Raphael Levi of Hannover (1685-1779), David Gains (1541–1613) and Mordechai Gumpel Schnaber (1741–1797). Jewish doctors had begun to attend German universities for the first time at the end of the seventeenth century (Kober, 1954*a*, 7–8).

[23]There is a large literature on the rise of the modern state and the role played by absolutism in centralizing legal institutions (see Johnson and Koyama, 2015). For other examples of 'defensive reforms' see Acemoglu and Robinson (2005); Acemoglu et al. (2011).

[24]We follow the consensus view of historians in taking the Enlightenment and emancipation as largely exogenous. 'The Enlightenment presaged the emancipation of the Jew from his physical segregation in the ghetto and his position as an alien in his native land. These changes catapulted the Jew from his medieval status into the modern world. Culturally, this meant that the Jew was belatedly experiencing the intellectual exhilaration which the Renaissance had brought to Europe four centuries earlier. Thus, whole centuries of slow transition were telescoped for the Jew into a relatively brief period of transformation' (Rudavsky, 1967, 17).

economic growth. Substantial movement towards Jewish emancipation in Germany began in Prussia in 1812, freeing Jews from discriminatory laws, gradually allowing Jewish employment in law, medicine, and eventually the civil service. Most significantly for our purposes, it meant that Jews could attend Christian schools and universities. It both made secular education easier to obtain and raised the pecuniary returns to education. Our model captures both effects through an increase in λ.

In Germany, Jews responded to emancipation as both our model and the standard human capital model would predict: they 'were seized with a hunger for the new education. To belong to the educated classes became for the German Jews especially the watchword of life, which sometimes threatened almost to take the place of religion' (Kober, 1947, 211-212). Naftali Wessley (1725–1805) circulated an open letter criticizing traditional Jewish education and encouraging Jews to send their children to German schools and to embrace secular learning (Wind, 1953, 87). As Kaplan puts it: 'For newly emancipated German Jews, the educated bourgeoisie became the ideal. The German word *Bildung* combined the concepts embodied in the English word "education" with a belief in the primacy of culture and the potential of humanity' (Kaplan, 1991, 10).

Many more secular Jewish schools were established in the 1820s and 1830s. Baden in 1809 allowed Jews to establish their own primary schools. From the 1820s onwards, Jews were authorized to build new primary schools in the Rhineland and in Wurttemberg in 1829 Jews were given permission to either send their children to public schools or build their own schools. In Bavaria, 140 Jewish schools were built in the first half of the nineteenth century alone (Kober, 1947, 212). The new schools broke 'the hold of the traditional program that concentrated on Jewish subjects and taught Pentateuch and Talmud to the exclusion of all else' (Katz, 1974, 128). Moreover the content of education changed. Traditional Jewish subjects declined in importance. The new schools taught the Pentateuch not in Hebrew but in German. Through the German language and 'Germanizing Jewish schools.' Jews in Germany internalized these new cultural values (Katz, 1985, 86).[25]

Emancipation progressed slowly and unevenly, especially during the first half of the nine-

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[25]The rise of secular education paralleled a collapse in religious education. The early nineteenth century was 'the decline of a major force in Jewish socialization, the Jewish school' and its replacement with the secular or public school (Pulzer, 1992, 6). Traditional Talmudic schools and academies 'disappeared within two generations', and, within the new schools, religious instruction was increasingly neglected in favor of secular education (Katz, 1986, 6).

teenth century. Jews were not formally emancipated in Bavaria until 1871; similarly the pace of economic growth varied from region to region. Nevertheless, these developments effectively raised λ across all of Germany. Even partial reforms lowered the cost of secular education for Jews.

In addition to formal emancipation, rapid economic growth raised the returns to education. Economic historians date the onset of sustained modern economic growth in Germany to the period 1850–1870 (Breuilly, 2003, 206). It was accompanied by rapid urbanization. Between 1834 and 1890 the proportion of the population living in towns with more than 2,000 inhabitants almost doubled from 26 percent to 47 percent. The population of Berlin more than doubled between 1800 and 1850, increasing from 172,132 to 418,733 in 1849 before tripling in size to around 1.58 million in 1890. Other cities such as Hamburg, Leipzig, and Dresden all grew rapidly in these years (Guinnane, 2003).

Consistent with Proposition 2, increasing economic development λ was accompanied by increased education. Rahden observes 'the more the economy was liberalized, and the more trade and industry grew at the expense of agriculture, all the clearer was the road that beckoned to the hard worker, and the more chances emerged for the advancement of Jews from Central Europe . . . From the perspective of many German-speaking Jews in Central Europe, the long nineteenth century was a golden age of economic advancement' (van Rahden, 2008, 27).[26] Sustained growth meant that there was space within society for Jews to move into new professions and ascend the class ladder (Barkai, 1981). The rising prosperity of the German economy and the growth of Reform Judaism went hand-in-hand.

The adoption of secular education cumulated with 'the well documented surge of Jews into secondary and higher education, which began as early as the 1840s and which was a most conspicuous aspect of the entry of Jews into the secular world' (Pulzer, 1992, 6).[27] Lowenstein notes that '[b]y mid-century, Jews were already overrepresented in the student bodies of institutions of secondary and higher education' (Lowenstein, 1980, 222). Table 1 presents data from 1900 onwards, demonstrating the extent to which Jews in German-speaking central

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[26]By 1871 more than 60 percent of all German Jews were in the middle or higher income brackets (Barkai, 1981). In 1871, 43 percent of inhabitants of Hamburg earned less than 840 marks a year. Among Jews the proportion who belonged to this low income category was only 3.4 percent (Richarz, 1975, 70).

[27]As Kober observes, '[l]ong before the constitution of the German Reich gave them full equality, the Jews had attained the educational aim which the German states had postulated as a prerequisite for full emancipation' (Kober, 1954*b*, 167).

	Year	% of Jewish students	Factor by which Jewish students exceeds pop. share
Germany	1900	approx. 10 %	10
	1929-30	3.4 %	3.7
Vienna	1900	approx. 30 %	3
	1928-29	21.2 %	2
Czechoslovakia	1927–28	14.5 %	5.6
Hungary	1928–29	10.5 %	1.8
Poland	1929–30	19.3 %	1.9
Lithuania	1926	9.7 %	3.2

Table 1: Source: Mendes-Flohr and Reinharz (1995, 712) and Reinhard (2004)

Europe had seized the new opportunities for education. In Vienna, 30-35 percent of high school students and 25-30 percent of students were Jewish despite the fact that Jews only made up 10 percent of the population. In Berlin, they made up a third of students despite only representing 5 percent of the city's population. In Prussia, as a whole, 42 percent of Jewish girls attended a high school compared to 2.7 percent of non-Jews. In Germany, Jews formed 1 percent of the total population but 10 percent of the student population (Reinhard, 2004, 8).

In general those Jews who embraced the new opportunities and accumulated more education also tended to be in favor of religious reform. Education and religious reform 'were the two instruments with which the enlightened hoped to remodel Jewish life' (Katz, 1974, 124).[28] Reform Judaism was based on the concept of religious 'edification' defined as 'the internalization necessary to transform it into a key means of regeneration' (Sorkin, 1987, 32). This required 'purifying' the Jewish religion. Many rituals and prohibitions associated with traditional Judaism were dispensed with and in their place a simplified liturgy closely modeled on German Lutherism was imposed.[29]

Reform Judaism reduced the cultural distance between Jewish and non-Jewish society. It therefore allowed Jews to benefit from economic growth and secular education without abandoning their religion or cultural identity. In a companion paper, Carvalho and Koyama

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[28]Leaders of religious reform like Israel Jacobson (1768–1828) advocated secular education in the vernacular. The journal he established, the *Sulamith*, saw itself as bringing 'the Jewish nation back to its native level of education ... *It wants to enlighten the Jewish nation about itself*' (Wolf, 1806, 1995, 85–86).

[29]See Lilla (2008, 236–237) and Breuer (1992).

(2016a) explicitly consider the incentives facing leaders of religious communities and argue that economic growth and emancipation in Germany provided the preconditions for the development of Reform Judaism.

Furthermore, Reform Judaism can be thought of as a cultural movement that complemented the material incentives to acquire education. That is, the Reform movement was explicitly conceived as an attempt to preserve what was valuable and true in traditional Judaism, while eradicating elements that inhibited interaction with mainstream society. Reform thinkers like Abraham Geiger re-envisioned Judaism as an evolutionary body of religious knowledge that, rather than staying fixed in time, could evolve with societal and economic change. He argued that traditional Judaism had served the Jewish people well in the Diaspora period but was not unsuitable for modern society.[30] Reformulating Judaism required rabbis trained in secular education. Switching from traditional to Reform Judaism thus spurred investment in education.

Importantly, however, the increased investment in secular education was not driven by the movement for religious reform. Even in those religious communities that did not embrace Reform Judaism, members also accumulated more education. Thus, when a schism occurred in Germany between Reform and other more conservative versions of Judaism in the mid-nineteenth century, it did *not* center on education. In fact, in Germany the two sides did not disagree particularly in their attitude to secular education.[31]

The two main religious groupings in Germany—Reform and Modern Orthodoxy—both believed in the need for change. Modern Orthodox leaders, however, believed that innovations had to be carried out in the spirit of traditional Talmudic law. While Reform Judaism dispensed with the traditional practices of sacrifices and atonement, Orthodox thinkers like Hirsch provided a philosophical defense of both of these concepts.[32] But Reform and Modern

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[30]Geiger observed that even 'when the ceremonial laws were much more highly esteemed and considered much more binding, the ancient sages said that in fact a Jew was everyone who rejected idolatry and who did not place another power next to the one God. But Judaism developed greatly later on, and especially so during the last century. In the historical process it has reached a level of knowledge which lays less stress on external acts and more on those fundamental convictions of the unity of God' (Geiger, 1858, 1963, p. 240).

[31]Authorities across central and eastern Europe only recognized a single Jewish community in each area. Thus while some religious communities in Germany became Reform and others became modern Orthodox, it was illegal for any single Jewish community to split until 1876.

[32]Modern Orthodoxy accepted many of the changes that had taken place in German Judaism during the first half of the nineteenth century. They agreed that secularly trained rabbis were required. Modern Orthodoxy attempted to redefine traditional Judaism in ways that were defensible in modern terms: German

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Orthodox versions of Judaism embraced secular education. The modern Orthodox Hirsch would write:

> "'Create schools! Improve the schools you already have!" This is the call we would pass from hamlet and hamlet, from village to village, from city to city; it is an appeal to the hearts, the minds and the conscience of our Jewish brethren, pleading with them to champion that most sacred of causes—the cause of thousands of unhappy Jewish souls who are in need of schools, of better Jewish schools, for their rebirth as Jews' (Hirsch, 1992, 3).

Hirsch argued both against the urge to abandon traditional Judaism in favor of Reform, and against those traditionalists who rejected all the benefits of modern learning.

> 'Equally serious problems can arise when your children grow up with a one-sided Jewish education that either ignores secular studies and culture altogether or, out of sheer ignorance, views them with suspicion or contempt' (Hirsch, 1992, 22).

The comparison of Reform and modern Orthodoxy indicates that the returns to secular education in Germany by the mid-nineteenth century were sufficiently high that it did not make sense for any religious group to attempt to restrict or limit access to education.[33]

4.3   Case Study 2: Resistance to Education in Hungary

Our second case study allows us to evaluate the second part of Proposition 2. Hungary presents the most marked example of resistance to education. In response to improving economic conditions and higher returns to education, new ultra-Orthodox religious organizations emerged that *reduced* secular education. In Russia and Galicia, traditional Jewish communities provided little secular education to begin with so it is difficult to find evidence of them actively reducing access to secular education in response to emancipation or liberalization. In Hungary, this was not the case. Hungarian Jewry was influenced by the German

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Orthodox Jewish thinkers were as anxious as their liberal colleagues to learn from the scientific advances of the time.

[33]'By the second half of the century, almost every one of the traditional institutions of Germany Orthodoxy had been transformed: rabbis were increasingly university trained and preached sermons in German; order and decorum reigned in the synagogue; and the education vision was one of cultural synthesis where Western culture was viewed as a necessary complement to Jewish tradition' (Silber, 1992, 32).

Haskalah movement from the 1780s onwards. In fact, the Hungarian rabbinate were initially favorable towards the Jewish enlightenment movement: 'in these lands the *Haskalah* was welcomed without abandoning appreciation for traditional rabbinic culture' (Silber, 1987, 113).

Some of the earliest moves towards full emancipation began in the Habsburg empire. However, these developments stalled and were only resumed in the 1840s and 1850s. In 1859, some restrictions on the rights of Hungarian Jews to marry and testify in court were lifted and complete emancipation became the subject of political debate and was increasingly anticipated by the Jewish community in Hungary. At the same time, a movement in favor of religious reform and secular education arose, known as the Neologs. As part of the measures leading to emancipation, a system of compulsory secular education was instituted. In terms of our model, these acts of emancipation raised the returns to secular education for Jews in Hungary. There were two reasons, however, why this did not translate into a broad rise in secular education among Hungarian Jews, as occurred in Germany.

First, emancipation in Hungary took place in an economy with lower returns to education than in Germany (low σ types), though still culturally connected to developments in Germany. There was some economic growth in Hungary, but it was considerably slower than in Germany or western Europe, and the source of this growth was agriculture rather than manufacturing.[34] As a result, while increased economic development and rising returns to education initially led to higher levels of investment in secular education, some Jewish communities, particularly those in less developed parts of Hungary, found that the threat of greater cultural assimilation outweighed the purely economic benefits of investing in secular education. This explains the success that ultra-Orthodoxy had in the more economically underdeveloped parts of Hungary, as documented by historians.[35] Unlike the more economically backwards parts of Eastern Europe, the Jewish communities in Hungary were more culturally connected with and influenced by communities in Germany.

Second, the process of emancipation in Hungary was closely connected to Hungarian or Mag-

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[34]See Good (1984) and the discussion in Carvalho and Koyama (2016*a*). In 1880, 74 percent of the population were still working in agriculture (Good, 1984, 139).

[35]Ultra-Orthodoxy was most successful in north-eastern Hungary, which was more rural and had lower literacy rates than in the rest of the country. In the words of Silber: '[d]welling in the backwater of Unterland enabled one to take a tougher stance, one of resolute rejection rather than weak-kneed compromise' (Silber, 1992, 42).

yar nationalism. The Hungarian elite 'held out the promise of a tantalizingly near emancipation, but expressly made it conditional on religious reforms' (Silber, 1987, 135–136).[36] These religious reforms were combined with a policy of 'Magyarization'—which was interpreted by traditionalists as the demand that they 'completely renounced their national identity, and to merge with the Magyars' (Dubnov, 1973, 303). The Neolog movement reflected the political situation in Hungary. Magyar nationalists demanded that the Jews reform themselves in order to qualify for civic rights. In 1861 the Israelite Hungarian Society was founded. 'It organized Hungarian language classes, headed by Pál Tenczer, and published the *First Hungarian-Hebrew-Phonic and Elementary Reader*, which helped the teaching of the Hungarian language in the Jewish schools' (Patai, 1996, 308). The majority of Hungarian Jews, however, shared the Yiddish culture of other central European Jews. Thus the policy of Magyarization represented an increase in δ, the measure of cultural distance, in an environment where returns to education were not sufficiently high to make it worthwhile for all individuals to increase their investment in secular education. This is a major reason why it was in Hungary that the policy of resisting education came to be embraced by ultra-Orthodox religious communities.

By the 1860s, many of the younger generation of rabbis 'were now graduates of the secular educational system, with German having displaced Judeo-German or Yiddish as their primary language' (Silber, 1992, 28). These developments promised to undermine the authority of traditional rabbis in a way that was not the case further east in more backwards parts of Eastern Europe. It was out of this crisis that ultra-Orthodox Judaism crystalized. The dispute over education led to the rise of a group of extremely conservative rabbis Maharam Schick (1807–1879), Hillel Lichtenstein (1814–1891) and Akiva Yosef Schlesinger (1837–1922).[37] Emancipation in 1867 was followed by educational reforms in 1868 that made Magyar the sole language of instruction within Jewish schools. In response, the ultra-Orthodox leaders formally broke with Reform and Orthodox Jews, to form their own separate religious community based on the rejection of all secular education and outside influence. Schick, and the other leaders of Hungarian Orthodoxy, could create a religiously pure community isolated

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[36]The nationalist leader Louis Kossuth made the following statement in 1844: 'in what fashion could Jews prepare their full emancipation most effectively, I would reply, "with timely reforms"' (quoted in 137 Silber, 1987).

[37]This divide continued to widen despite the fact that from a legal point of view all Jews remained members of a single religious community (Ellenson, 1994, 47–48).

from those they viewed as heretics or 'evil people' (Ellenson, 1994, 52).[38]

The countermovement that arose in Hungary after 1866 resulted in a stricter religious community than had existed previously; a community that sought to define Jewishness in terms of a series of new prohibitions including a ban on speaking foreign languages and acquiring secular or scientific knowledge—a position that radically differentiated them from the Modern Orthodox movement that arose in Germany. Secular knowledge was 'alien wisdom' (Satlow, 2006, 270). Even secular studies that were necessary to earn one's living were banned (Silber, 1992, 62). In this respect, Hungarian ultra-Orthodoxy was stricter than traditional Judaism. As Silber argues, the rise of a radically stricter version of traditional Judaism in the form of ultra-Orthodoxy can be seen as largely a response to 'the introduction of compulsory secular education by the government; the growing linguistic acculturation of Hungarian Jewry; the increasing pressure to adopt a Magyar national identity; and the steady spread of synagogue reform' (Silber, 1992, 24–25).

This phenomenon: the emergence of a religious organization dedicated to resisting new opportunities for education cannot be explained by standard models of human capital accumulation, but it can be accounted for by a model such as ours in which education shapes cultural values. Our model provides an explanation for the seemingly paradoxical finding that while the movement toward secular eduction for Jews might seem to 'strengthen the forces of reform' (Silber, 1992, 28), it also led to the rise of orthodox opponents of Reform. As Adler notes, the 'conservative majority of Hungary's Jews inevitably resented and resisted this measure' and they 'avoided all Gentile schools as a source of contamination' (Adler, 1974, 122–126). Moreover, as our model would suggest, polarization over the issue of education strengthened the position of the most Orthodox within the Orthodox party. It provided an opportunity for the collective resistance of secular education. These forces were sufficiently powerful that, even though the ultra-Orthodox imposed a highly restrictive cap on education $\bar{e}$, they were able to attract enough members to establish a new community.

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[38]The ultra-Orthodox said that they 'would rather forgo the happy future if the improvement of their civic condition were to be made dependent on the slightest change in their religion' (Patai, 1996, 236).

4.4 Case Study 3: Stagnation in Eastern Europe

In much of Eastern Europe—specifically the lands that comprised the Russian empire, Jewish emancipation did not take place in the nineteenth century and there was little or no economic growth until the very end of the century. Jews remained confined to the Pale of Settlement which had been established by Catherine II in 1791, who when acquiring large tracts of Polish territory had decided to permit Jews to reside in the newly acquired territory but prohibited Jewish settlement in Russia proper (see Baron, 1938, 53). In the language of our model, λ did not increase, and relative to the most advanced Jewish communities in western Europe, the Jews of the Pale of Settlement fell further and further behind. They did not embrace advances in western learning nor did they did liberalize their religious practices.

In Eastern Europe, there was no emancipation and little or no economic growth. As a consequence inequality between and within Jewish communities remained extremely low. Moreover, Jews in Eastern Europe did not feel particularly threatened by developments in Germany. Hence in Eastern Europe there was no uptake in secular education and there was no collective resistance to secular education either.

This analysis is consistent with the historical evidence. Attempts to introduce Reform Judaism into Russia were unsuccessful (see Katz, 1986, 16). If, anything there was a move towards greater orthodoxy or an embrace of Hasidic rejection of secular learning. However, these developments were nothing like as strong or as sudden as the developments that took place in Hungary. The reason for this, according to our framework, is that the ultra-Orthodox communities in Hungary were much more connected to developments in western Europe than those in Russia. This cultural insulation moderated their response to the emergence of Reform Judaism in western Europe. The evidence from Eastern Europe is consequently consistent with both our theory and more standard theory of human capital accumulation.

We summarize the relationship between the model and our historical case study in Table 2. In Germany λ increased rapidly as a result of emancipation and economic growth. Cultural distance between Germans and Jews had declined as a result of the Enlightenment and Haskalah movements. As a result, the increase in secular education among German Jews was almost universal. Both Reform and Modern Orthodox Jewish communities embraced the new opportunities for education. In Eastern Europe λ remained low so there was neither

	Germany (1)	Eastern Europe (2)	Hungary (3)
λ	High	Low	Medium
δ	Low	High	Medium

Table 2: East Europe refers to Galicia and the Pale of Settlement within the Russian Empire. The former comprising parts of modern-day Ukraine; the later corresponding to parts of Belorussia, Lithuania, Latvia, Poland, and Russia.

an uptake in education nor a need to actively resist opportunities for education. In contrast, it was in Hungary where there was emancipation and some economic development that the most rigorous and strict form of ultra-Orthodoxy emerged specifically in order to oppose developments that would make secular education compulsory for their communities.

5 Discussion and Conclusion

This paper examines an historical case study which sheds light on the cultural forces shaping investment in human capital. Jewish emancipation raised returns to education across central and much of Eastern Europe. While standard models of human capital acquisition predict increased investment in education in response, our framework can explain the polarization in educational attainment that we observe historically. Jews in Germany, and other parts of central Europe, reacted to emancipation by embracing the new opportunities to acquire education. Contrary, to the predictions of standard economic models, however, Jewish emancipation also resulted in the emergence of ultra-Orthodox communities which completely rejected all secular education.

We develop a model in which education transmits mainstream or secular cultural values. As a result, individuals who belong to a minority ethnic or religious group face a trade-off: they can benefit materially by investing in education but they face the risk of losing their cultural or religious identity. Our analysis shows that this trade-off interacts in interesting ways with exogenous increases in the return to education and the cultural distance between mainstream and minority culture. In particular, we show that it is possible for some individuals to invest less in education in response to an increase in returns to education. In such an environment, such individuals may benefit from a religious organization that imposes restrictions on secular education.

The phenomenon that we examine in this paper—resisting education—does not have to be organized around religion. Gypsies, Irish Travelers, and other minority groups similarly resist education. This is a broader issue that is of considerable policy relevance and studying it helps us to understand the formation of oppositional cultures in modern societies.

Another issue that is beyond the scope of this paper concerns the persistence of communities that actively oppose mainstream or secular education. Both the examples of ultra-Orthodox Judaism and the Amish shed light on this. Unlike other minority groups that have attempted to inoculate themselves against the influence of secular values, the Old Order Mennonites or Amish have been able to successfully resist secular education because they 'retain economic self-sufficiency, residential independence, and complete control of their own schools' (Dewalt and Troxell, 1989, 308). Strict religious communities that restrict access to secular education are able to persist because they control education and the intergenerational transmission of values (see also Iannaccone, 1990; Bisin and Verdier, 2000; Carvalho and Koyama, 2016a).

Recently attention has focused on groups such as Boko Haram who combine fierce opposition to secular education with violence resistance to the state. The transliteration of 'Boko Haram' conveys the meaning 'that Western education is sinful, sacrilegious, or ungodly and should be forbidden' (Adesoji, 2011, 106). A natural question is why Boko Haram have taken to violence while other movements based on resistance to education typically have not. This is an important topic for future research.

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Mathematical Appendix

Proof of Proposition 1. The uniqueness of the profile $\left(e_i^*\right)_{i \in I}$ follows from (2). Denote the right-hand side (RHS) of (3) as the function $h(q)$. We seek a fixed point of h. For $q = 0$, $e^*(\sigma, q) > 0$ for all σ by the first-order condition (2). Hence, $h(0) > 0$. In addition, $e^*(\sigma, q) < 1$ for all (σ, q), because $c'(e) \to \infty$ as $e \to 1$. Hence $h(1) < 1$. In addition, $e^*(\sigma, q)$ is continuous and decreasing in q for each σ, by (2). Therefore $h(q)$ is continuous and decreasing in q and there exists a unique fixed point q of h, such that $0 < q < 1$. $\square$

Proof of Proposition 2. Differentiating (2) with respect to λ yields

$$\beta_1(\lambda, \sigma) - \frac{\partial q}{\partial \lambda} \gamma \delta = \frac{\partial e^*(\sigma, q)}{\partial \lambda} c''\left(e^*(\sigma, q)\right), \tag{4}$$

where $\frac{\partial q}{\partial \lambda} = \int_0^{\overline{\sigma}} \frac{\partial e^*(\sigma, q)}{\partial \lambda} dF(\sigma)$. Now suppose to the contrary that $\frac{\partial q}{\partial \lambda} \leq 0$. It follows that the LHS of (4) is strictly positive. Thus the RHS must also be positive. As $c''\left(e^*(\sigma, q)\right)$ is positive by assumption, $\frac{\partial e^*(\sigma, q)}{\partial \lambda}$ must also be positive for every σ. However, $\frac{\partial e^*(\sigma, q)}{\partial \lambda} > 0$ for all σ implies that $\int_0^{\overline{\sigma}} \frac{\partial e^*(\sigma, q)}{\partial \lambda} dF(\sigma) = \frac{\partial q}{\partial \lambda} > 0$, a contradiction. Thus $\frac{\partial q}{\partial \lambda} > 0$. Part (ii) follows immediately by differentiating (2) with respect to δ. $\square$

Proof of Proposition 3. Implicitly differentiating the first-order condition (2) with

respect to λ yields:
$$\frac{\partial e^*(\sigma,q)}{\partial \lambda}c''(e^*(\sigma,q)) = \beta_1(\lambda,\sigma) - \frac{\partial q}{\partial \lambda}\gamma\delta. \tag{5}$$

As $c''(e) > 0$ for all e, $\frac{\partial e^*(\sigma,q)}{\partial \lambda} < 0$ if and only if:

$$\beta_1(\lambda,\sigma) < \frac{\partial q}{\partial \lambda}\gamma\delta. \tag{6}$$

By assumption, the LHS of (6) is strictly increasing in σ, and goes to zero as $\sigma \to 0$. The RHS of (6) is a positive constant in σ. Therefore, for each triple $(\lambda, \gamma, \delta)$, there exists a threshold $\tilde{\sigma} > 0$ such that (6) holds for all $\sigma < \tilde{\sigma}$. Because mean education is strictly increasing in λ, $\frac{\partial e^*(\sigma,q)}{\partial \lambda} > 0$ for some σ. Hence $\tilde{\sigma} < \bar{\sigma}$.

The first-order condition only applies if $0 < e^*(\sigma,q) < 1$. We know that $e^*(\sigma,q) < 1$ for every (σ,q) because $c'(e) \to \infty$ as $e \to 1$. By assumption $\beta(\lambda,0) > \gamma\delta$, so $e^*(0,q) > 0$ for all q. Hence the first-order condition holds for values of σ that satisfy (6). $\square$

Proof of Proposition 4. Let e_i^* denote individual i's unconstrained best response level of education.

We shall first establish that no individual who joins the organization will choose $e_i > \bar{e}$. Recall that any individual who chooses $e_i > \bar{e}$ is ostracized and subject to the transmission probability $p(e_i, q_0)$. But the payoff from choosing $e_i > \bar{e}$ and being ostracized can be attained by not joining the group and avoiding the penalty k. Hence every agent who joins the group will choose $e_i \leq \bar{e}$ in equilibrium.

Now fix an $\bar{e} > 0$. Suppose that $q_0 > q_1$. Consider an individual i for whom $e_i^* \leq \bar{e}$. A type σ individual's payoff from not joining the organization is

$$\beta(\lambda,\sigma)e_i^* - c(e_i^*) + \gamma p(e_i^*, q_0)\nu(S) + \gamma(1 - p(e_i^*, q_0))\nu(R). \tag{7}$$

The individual's payoff from joining the organization is:

$$\beta(\lambda,\sigma)e_i^* - c(e_i^*) + \gamma p(e_i^*, q_1)\nu(S) + \gamma(1 - p(e_i^*, q_1))\nu(R), \tag{8}$$

since she is still able to choose her unconstrained best response e_i^* within the organization.

Therefore the individual joins the organization if and only if (8) is great than or equal to (7), which implies

$$\gamma\big[p(e_i^*, q_0) - p(e_i^*, q_1)\big]\delta \geq 0. \tag{9}$$

This holds as long as $q_0 \geq q_1$ which in turn holds by hypothesis. Therefore all individuals for which $e_i^* \leq \bar{e}$ join the organization.

Now recognize that e_i^* is an increasing function of σ and write $e_i^*(\sigma)$. Consider an individual i for whom $e_i^*(\sigma) \geq \bar{e}$. When joining the organization she will be constrained to choose education $\bar{e}$. Therefore she joins the organization if and only if:

$$\beta(\lambda, \sigma)\bar{e} - c(\bar{e}) + \gamma p(\bar{e}, q_1)\nu(S) + \gamma(1 - p(\bar{e}, q_1))\nu(R)$$
$$\geq \beta(\lambda, \sigma)e_i^*(\sigma) - c\big(e_i^*(\sigma)\big) + \gamma p\big(e_i^*(\sigma), q_0\big)\nu(S) + \gamma(1 - p\big(e_i^*(\sigma), q_0\big))\nu(R) \,. \tag{10}$$

Firstly, subtracting the RHS from the LHS of (10), taking the derivative with respect to σ and applying the envelope theorem, we have:

$$\beta_2(\lambda, \sigma)[\bar{e} - e_i^*(\sigma)] < 0 \,. \tag{11}$$

Secondly, define σ^* as the solution to $e^*(\sigma^*) = \bar{e}$. As $\sigma \to \sigma^*$, inequality (10) converges to

$$\gamma\big[p(\bar{e}, q_0) - p(\bar{e}, q_1)\big]\delta \geq 0 \,, \tag{12}$$

which holds because $q_0 \geq q_1$ by hypothesis.

Taken together, these imply that there exists a threshold $\widehat{\sigma} \in (\sigma^*, \bar{\sigma}]$ such that all types $\sigma \leq \widehat{\sigma}$ join the organization and all types $\sigma > \widehat{\sigma}$ do not join.

As $e_i^*(\sigma)$ is strictly increasing in σ, this in turn implies that the mean level of education among members of the organization q_1 is indeed less than q_0, as hypothesized. Alternatively, suppose that $q_1 \geq q_0$. Then by the above reasoning there exists a threshold $\widehat{\sigma}'$ such that each type σ joins the organization if and only if $\sigma \leq \widehat{\sigma}'$. Hence mean education among members would be lower than among non-members, a contradiction.

Notice that all individuals choose their unconstrained best response except types $\sigma \in (\sigma^*, \widehat{\sigma}]$ who choose $\bar{e} < e_i^*(\sigma)$. Therefore, mean education across all individuals in society is lower than would be the case in the absence of the organization. $\square$