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Religious change and persistence in Bosnia: Poverty, conversions, and nationalism, 1468-2013

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Abstract

While economic historians have invested a great deal of effort into understanding the economic consequences of religion, they have invested comparatively little effort into understanding the determinants of religious affiliation. This paper analyses conversions to Islam in the Ottoman Bosnia. Employing village-level data constructed from the Ottoman tax registers of 1468 and 1604, we find that households in the initially poorer villages were more likely to convert to Islam. This finding is consistent with the notion that the poll tax that non-Muslims had to pay stimulated the poorer Christians to convert to Islam. Using a stream of modern population censuses since the 19th century, we also find that our results hold after the end of the Ottoman rule and its discriminatory tax in 1878. We hypothesize that religious identity persisted because it became embedded into the rising national consciousness during the nineteenth century, reinforcing the cost of changing religion.

Keywords: Economic History; Religion; Taxes; Bosnia; Ottoman Empire

JEL Classification Numbers: N33: Z12

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1 Introduction

A growing body of theoretical literature argues that norms and beliefs influence the behavior of individuals, and thus their welfare (Bisin and Verdier, 2000, 2001; Tabellini, 2008; Bénabou and Tirole, 2011). Empirical literature has demonstrated that norms and beliefs today can depend on events and institutional arrangements in the distant past (Nunn and Wantchekon, 2011; Voigtländer and Voth, 2012). Historically, religion has greatly shaped individual behavior and the social environment. For that matter, the importance of religion has long been recognized in social sciences (Smith, 1776; Weber, 1904). Yet, it is only recently that a new generation of economists began to apply the tools of their field to the study of religion (Iyer, 2016). These researchers have devoted a great deal of effort into understanding the economic consequences of religion (Barro and McCleary, 2003; Becker and Woessmann, 2009; Cantoni, 2015; Kersting et al., 2020; Squicciarini, 2020), including that of Islam (Kuran, 2010; Rubin, 2017).[1] They have devoted comparatively little effort, however, into understanding why some religions are more successful than others in attracting believers (Becker et al., 2016, 2021). More broadly, understanding when norms and beliefs persist, and when they are malleable, remains a key challenge in the economics of culture.

This paper examines the determinants of conversion to Islam in the Ottoman Bosnia, as well as the subsequent persistence of Islam in that region. Bosnia emerges as a particularly interesting case to study religious change and persistence for two reasons. First, conversion to Islam left a long-lasting legacy in Bosnia. The region today is extremely ethnically and religiously diverse. It is composed of Bosniaks, Croats and Serbs, which share a similar Slavic origin and language, yet practice different religions; Islam, Catholicism, and Orthodox Christianity, respectively. Second, converts to Islam were the ordinary subjects (peasants), unlike in the other Balkan regions where they were mostly the elite members of society (Lopasic, 1994). Moreover, the conversion process started as early as the 15th century (Zheliazkova, 1994). These facts on Bosnia are not only historically interesting, but are also empirically useful. They allow us to track the determinants of mass conversion over the centuries, stretching from medieval to modern times.

In the main part of the paper, we use the village-level data constructed from the Ottoman tax registers of 1468 (soon after the conquest of Bosnia in 1463) and 1604 (the zenith of conversions). Controlling for a host of socio-economic variables, our OLS estimates suggest that households in the initially poorer villages were more likely to convert to Islam during the peak of the conversion process. Given that a constant feature of 16th century Bosnia was *hunger* (Moačanin, 1999), this implies that abject poverty induced Bosnians to convert to Islam.

This finding is consistent with the poll tax hypothesis proposed by some researchers (İnalcık, 1997; Džaja, 1999; Moačanin, 1999; Saleh, 2018) By converting to Islam, the argument goes, household could avoid paying the *jizya*, i.e., the Ottoman poll tax levied from non-Muslim subjects. This hypothesis is not without its detractors. For that matter, it triggered a fierce debate among historians. Many argue that the poll tax was small and economically insignificant, incapable of stimulating mass conversion (Malcolm, 1994; Imamović, 1997; Minkov, 2004). A counterclaim to this argument points to the regressive nature of the jizya (Moačanin, 1999).

[1] See Kuran (2018) for an excellent survey about the economic effects of Islam.

Given its lump-sum feature, the poll tax placed a higher relative burden on the poorer members of the society. Based on its regressive nature, Saleh (2018) argues that the poll tax stimulated the poorer Christians to convert to Islam in Egypt, leading the remaining Christians to shrink into a better-off minority.

If the poll tax stimulated the poorer Christians to convert to Islam, then one would expect a negative association between income and conversions, exactly as we find. In section 4.3, we test formally the mechanism of taxes, and find that it can explain up to 95 per cent of the overall income effect. By converting to Islam, therefore, the tax burden decreased, and disposable income increased, particularly of the poorest households. Of course, there are many other theories on the Islamization process, which we elaborate upon later. They are, however, either inconsistent with the negative relationship between income and conversions, or they are explicitly controlled for in our empirical analysis.

One threat to our OLS results, however, is endogenous selection - Muslims migrating to poorer villages. To establish causality, we instrument income per household by agricultural suitability of land. The plausibility of the instrument rests on the notion that, in medieval and premodern Bosnia, agriculture was the most important source of income for the majority of households (Moačanin, 1999). The IV specification results are consistent with the OLS ones - households in the initially poorer villages were more likely to convert to Islam. The IV estimates are robust to wide violations of the exclusion restriction, following the method of Conley et al. (2012).

In the second part of the paper, we match the premodern Ottoman tax registers with the modern population censuses since the 19th century (1879, 1910, 1961, 1991, and 2013). Using this novel dataset, we analyze whether our results hold over time, i.e., after the end of the Ottoman rule in 1878. We find that they do: the initially poorer villages (as of 1468) had a larger share of Muslims during the Austro-Hungarian and Yugoslav rule of Bosnia, as well as in modern Bosnia and Herzegovina. We hypothesize that one reason for this persistence is that religious identity became embedded into the rising national consciousness during the 19th century.

In Bosnia, national identities emerged along religious lines (Banac, 1984; Imamović, 1997; Malcolm, 1994). Irrespective of the end of the discriminatory Ottoman poll tax in 1878, switching religious identity remained costly, because now it also implied a change in national identity. By extension, patterns of religious affiliation persist over time. Although we cannot marshal much direct evidence to support our argument, history and theory support it, as well as survey data.

Our paper is closely linked to empirical studies on religious conversions in history. These studies have found that the printing press (Rubin, 2014), the threat of the Ottoman invasion (Iyigun, 2008), strategic neighborhood interactions (Cantoni, 2012), network effects under Martin Luther (Kim and Pfaff, 2012; Becker et al., 2020), and the taste for education (Botticini and Eckstein, 2007), have influenced religious affiliation. Our results suggest that income, through the channel of taxes, may have also shaped religious affiliation.

We are, however, not the first ones to make this argument. Our results are closely related and complementary to the already mentioned paper of Saleh (2018), who demonstrates that the Arab introduction of the poll tax into Egypt stimulated conversions to Islam. Drawing

on the same evidence as Saleh (2018), Saleh and Tirole (2021) construct a theoretical model under which Muslim rulers impose high tax rates to motivate conversion to Islam, despite the sub-optimal revenue generation that this policy can imply. As argued by Becker et al. (2021), the insights of this literature have yet to be extended beyond Egypt. The present article steps in by studying Bosnia - the heartland of the Islamization process in the Balkans, and one of the most important provinces of the Ottoman Empire due to its frontier status and proximity to Vienna (İnalcık, 1973).

By focusing on Bosnia, this paper also contributes to the centuries-long debate about the spread of Islam in the Balkan Peninsula under the Ottomans. Minkov (2004) contends that the elites were more eager to convert to Islam, with the aim of maintaining their higher social status. Other explanations point to trade and Muslim merchants as stimulating conversions (Michalopoulos et al., 2018), or to urbanization and towns that took an Islamic form (Handžić, 1970, 1991; Filipović, 1976; Aličić, 1991). Some also contend that it was Islam's cultural and theological appeal that attracted the converts (Imamović, 1997).

We contribute to this voluminous historiography with the first empirical treatment of religious change in the Balkans, and in the Ottoman Empire in general. Although our results suggests that poverty was of primary importance in stimulating conversions to Islam, this does not mean that the other explanations are irrelevant. They are rather of second-order importance in understanding conversions.

The remainder of the paper is organised as follows. Section 2 provides a historical background on the Islamisation of Bosnia. Section 3 discusses the data that we use, while section 4 provides OLS and IV estimates concerning the relationship between income and conversions, and provides evidence about the poll tax mechanism. Section 5 analyses the persistence of our results, and discusses the reasons that might be driving this persistence. Section 6 discusses alternative theories, while section 7 concludes the paper.

2 Historical background

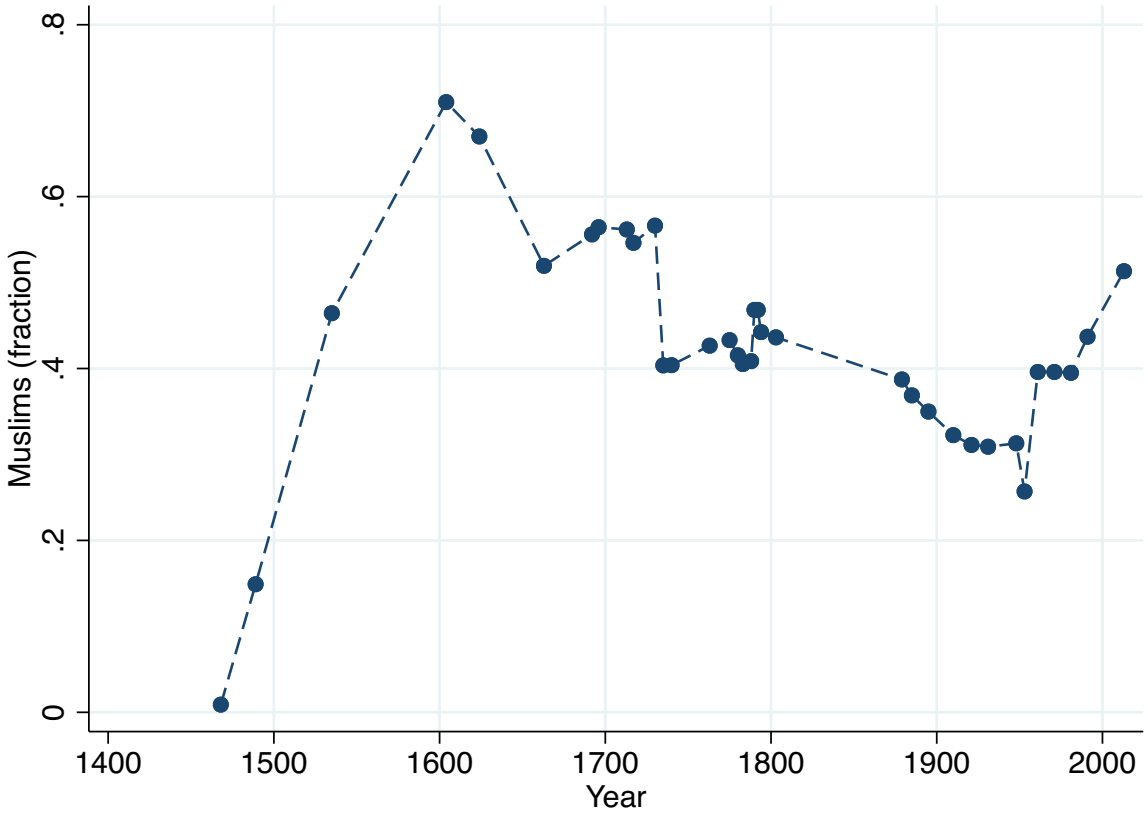
This section begins by discussing the conquest and Islamization of Bosnia. It subsequently provides reasons as to why income and taxes might have shaped conversions to Islam.

2.1 Conquest and Islamization of Bosnia

Before the Ottomans, Bosnia was ruled by an independent state called the Kingdom of Bosnia (1377-1463), preceded by the Duchy (*Banat*) of Bosnia (1154-1377). The earliest raids of the Ottomans into Bosnia date back to 1386. In 1463, much of modern-day Bosnia and Hercegovina was conquered by Sultan Mehmed II.

Immediately after the conquest, Bosnia became a district (*sandžak*) of the Ottoman Empire, ruled by a governor (*sandžak-beg*). Although it had to wait until 1580 to became a province (*pašaluk* or *eyalet*), the district of Bosnia was always considered of great strategic importance to the Ottomans because of its frontier location (İnalcık, 1973). The governors were chosen from the most prestigious officials, at least initially, and given a great deal of autonomy (Imamović, 1997). By 1468, the district was comprised of six sub-districts (*kadiluks*), each of which was

Figure 1: Population fraction of Muslims in Bosnia, 1468-2013



Notes: Data is not exactly comparable over time for two reasons. First, it is taken from different sources. Data for the 1468-1803 period is based on Ottoman sources (tax registers and poll tax registers), while data for the 1879-2013 period is based on modern population censuses. Second, borders of Bosnia have changed over time. The data presented in the figure should thus be taken as only indicative of the true evolution of the Muslims share of population over time.
Sources: Džaja (1999) for the 1468-1624 period and Moačanin (2013) for the 1663-1803 period. We take the data for the 1879-2013 period from the population censuses reported in appendix A.1.

governed by one or two judges (*kadija*) (Šabanović, 1959).

Figure 1 shows that the Islamisation of Bosnia began already in the 15th century. It reached its zenith at the turn of the 17th century, when the Muslim population share reached about 70 per cent of the population. The Muslim population share decreased in the following centuries, because of higher mortality (Džaja, 1999; Moačanin, 1999) (see also section 6).[2] As of 2013, Muslims form about 50 per cent of Bosnia's population.

The large-scale Islamisation of Bosnia stands in sharp contrast to the other Balkan regions under the Ottoman Rule (Lopasic, 1994). Apart from Albania (Bieber, 2000), converts to Islam in the other regions consisted mostly of a thin crust of urban dwellers (Minkov, 2004). In Bosnia, it was also the peasantry that converted to Islam (Zheliazkova, 1994). To explain the comparatively intense Islamisation of Bosnia, historians mostly point to the pre-existing religious structure of the region.

Bosnia is frequently described as a "no-man's land between the faiths" in the historiography

[2]It is unlikely that population movements drive the decrease in the Muslim population share. Historians typically emphasise the large emigration of Christians after the Ottoman conquest of Bosnia (Malcolm, 1994).

(Handžić, 1991; Malcolm, 1994; Imamović, 1997; Džaja, 1999; Husić, 2011). Before the arrival of the Ottomans, Bosnia was under the influence of the Catholic Church, Orthodox Christianity, and the Church of Bosnia – a form of Christianity marginalized and persecuted by the Catholic Church (Malcolm, 1994). Debilitated by the fierce competition over the religious affiliation of the Bosnians, the argument goes, none of these churches were strong enough to resist the spread of Islam (Handžić, 1991; Husić, 2011).

In particular, the Church of Bosnia is frequently emphasised as playing an important role in the conversion process – see Malcolm (1994) for an excellent survey. Although the exact nature of this Church remains unresolved, most historians talk of some degree of deviancy from the Christian mainstream.[3] According to some, members of the Church of Bosnia embraced Islam in massive numbers, allegedly because of theological similarities with Islam, and perhaps as a final affront to their former Catholic prosecutors. By extension, Muslims in contemporary Bosnia are descendants of this long extinct Church.

Over the recent years, however, the theory that members of the Church of Bosnia drove the conversion process has been discredited. The main problem with this theory is that there were not more than several hundred of its members left by the time the Ottomans came (Džaja, 1999; Moačanin, 1999). The Catholic Church, with the assistance of the Bosnian kings, successfully suppressed the Bosnian Church by the 15th century. It is thus mathematically impossible that the existing members of the Bosnian church formed the majority of converts to Islam.

Instead, we argue that it is poverty that sets Bosnia apart from the other Balkan regions. It is low income, combined with the tax policy of the Ottomans, that drove the conversion process of the Bosnian masses.

2.2 Income and the poll tax

Moačanin (1999) points that one of the defining features of medieval and premodern Bosnia is *hunger*. Although the region was blessed by deposits of silver and lead, the income derived from the exploitation of these resources was captured by the local landlords and the foreigners that managed the mines (Saxons) and traded the metals (Dubrovnik merchants) (Ćirković, 1964). Not much of this income trickled down to the peasant masses, which overwhelmingly subsided on wheat. Given the rugged and mostly mountainous terrain of Bosnia, the agricultural yields, however, were extremely low. They were above subsistence-level only in the best of times.

Moačanin (1999) estimates that the grain yields in 16th century Bosnia were about 100kg of wheat equivalent per capita on an annual basis. This is even lower than the average of 150kg in the near-desert environment of Palestine (Ottoman tax register of 1596/7) (Moačanin, 1999). In central Bosnia, around Sarajevo, wheat yields were higher - 250kg p.c. per annum. Even these yields, however, do not reach the existential minimum, estimated by Clark and Haswell (1970) to be close to 300kg p.c. per annum.

Low wheat yields characterized many other Balkan regions, not only Bosnia. The Christians of the Danubian plain in Bulgaria, or the Christians of the Greek islands, however, could rely upon cattle, wine and oil as substitutes to wheat. The Christians of Bosnia did not have these

[3] Church of Bosnia was initially part of the Catholic Church, but eventually became independent due to its geographical isolation.

options because of unsuitable geography. In this context, even a mild decrease of the tax burden could substantially increase the disposable income of the Bosnian peasants in relative terms.

Besides being released from the obligation of paying the poll tax, a convert to Islam, however, also paid a lower land tax, lower fines, lower wedding fee, and decreased other quasi-fiscal obligations (e.g., court fees). Moačanin (1999) estimates that this amounted to about or one or two *dukats* per household, reducing the overall tax burden by 45 per cent on average. By extension, Bosnian households could, in fact, greatly increase their disposable income through the act of conversion - 25 per cent (Moačanin, 1999).

Not all Bosnian peasants faced the same relative tax burden. Those that led a pastoral and nomadic life were able to migrate in search of higher-quality land, increase their income, and pay the tax obligation easier. The majority of the peasantry, however, consisted of farmers. They were tied to the land by the local landlords (*spahije*), and could not migrate to greener pastures. The only way to mitigate, what was essentially the constant threat of hunger, was to reduce the tax burden.

This is perhaps the main reason why in Bosnia, comparatively speaking, the peasantry converted to Islam *en masse*. In the other Balkan regions, agricultural yields were much higher, and income was further away from the subsistence-level. As such, in such regions, converting to Islam decreased the tax burden to a lower relative degree. The economic benefits that peasants obtained from the act of conversion were relatively lower.

For example, Moačanin (1999) estimates that in the fertile region of Slavonia (modern-day Croatia) bordering Bosnia, converting to Islam decreased the tax burden by about 8 per cent. Given that agricultural yields were 10 times higher than in Bosnia, converting to Islam did not bring much economic benefit to the Slavonian peasants (Moačanin, 2006). It is thus unsurprising that, in Slavonia, the converts consisted of a thin layer of local landlords and town dwellers, seeking social privileges.

Converting to Islam can thus be perceived as a lever that mitigated the constant threat of hunger in Bosnia - an act, *in extremis*, that a convert can accept easier from a moral standpoint. Contemporary observers were aware of this. One collection of stories and anecdotes from 1585 chronicles the arrival of an Ottoman administrator (*pasha*) to Bosnia. Upon arriving, the administrator observed that Bosnia was economically impoverished. He asked the local elite "´How can this people economically recover?´, they answered him that the land was poor because 'we are burdened by the enormity of the jizya and the fear of the high tax obligations´. The Porte refused the pasha's suggestion to eliminate the jizya, so he thought of an alternative way to help the Bosnians; he came to an agreement with the elites that, from each village, one person should take a Muslim name.... Živko thus became Jahja, Vuk became Kurt, and Gvozden Timur. Jizya was immediately abolished... and the villages prospered..." (Moačanin, 1999, p. 112). While this story alludes to people becoming Muslim in name only, importantly, it stresses poverty, operating through the mechanism of taxes, as a crucial motivating factor of conversions.

3 Data

The main source of data that we use are the Ottoman tax registers (*tahrir defterleri*). These records were kept mainly to estimate the amount of tax to be levied from the newly conquered lands, and were repeated when needed. In the first stage of the construction of the tax registers, the government agents prepared detailed registers (*mufassal*) to determine the size of the population and the expected tax revenues at the level of settlements – villages and towns. In the second stage, a summary register (*icmal*) was prepared to distribute the share of the tax revenues between the fief-holders and the central treasury.

Regardless of the purpose of their preparation, the tax registers contain valuable information for the modern historian. They contain detailed village-level data on the names, number and religious status of adult males (household-heads), amount of land in use, and estimates of household income from all productive activities and resources. They also provide information on the number of fugitives, migrants, widows and members of the Church of Bosnia for each settlement, alongside its legal status (village, monastery, market-centre, mine, and etc). This novel source of data allows us to estimate the religious composition of the population, as well as its income.

Despite their rich content, the Ottoman tax registers have remained largely unknown to economic historians. When used, they have been employed mostly by local historians to estimate the population size of small regions, rather than for large-scale empirical studies in social sciences. Some scholars, however, criticize the use of tax registers on the grounds that the value of income is estimated, not actual, that the population data does not resemble modern censuses, and that the sheer amount of information contained in them renders their usage unwieldy (Lowry, 1992). Coşgel (2004) argues that these problems afflict similar data sources in other premodern societies, while suggesting methods of mitigating them, like strategic-sampling.

Ottoman tax registers are located in various archives in Turkey and in the other countries that were once under Ottoman rule. In this paper, we employ two of such defters: the 1468/9 defter (Aličić, 2008) and the 1604 defter published in four volumes (Handzić, 2000). The former is a summary register, while the latter is a detailed one.

Table 1 reports the descriptive statistics of the main data that we use in the paper. We take most of our control variables from the 1468 tax register. The controls thus largely correspond to the time of the treatment variable (income per household in 1468). We take the controls on the pre-existing religious structure of Bosnia (Christian and Orthodox monasteries) from Ćirković (1964). We report in detail all of our data sources in the appendix.

Figure 2 shows the religious composition of Bosnia at settlement-level over the matched tax registers of 1468 and 1608. In 1468, only three settlements were Muslim-dominated. By 1604, 605 settlements became Muslim-dominated – 76 per cent of the data sample. This increase in Muslim affiliation is driven by local conversions to Islam - immigration cannot explain it (Malcolm, 1994; Zheliazkova, 1994; Imamović, 1997) (see also section 4).

The Malthusian model raises a concern about our main independent variable - income per household. In a premodern economy like Bosnia, higher income per household might imply a higher population size. In the extreme case, high-income households could have the same income per person as the low-income households, because their higher income is diluted by higher fertility

Table 1: Descriptive statistics in Bosnia

	Observations (1)	Mean (2)	Standard deviation (3)	Minimum (4)	Maximum (5)
			Main outcome variables		
Muslim household share, 1604	793	0.7578	0.3892	0.0000	1.0000
Muslim population share, 1879	632	0.5284	0.3869	0.0000	1.0000
Muslim population share, 1910	732	0.5012	0.3933	0.0000	1.0000
Muslim population share, 1961	971	0.4198	0.4023	0.0000	1.0000
Muslim population share, 1991	1,036	0.4744	0.4242	0.0000	1.0000
Muslim population share, 2013	883	0.525	0.4477	0.0000	1.0000
			Main explanatory variables		
Income per household, 1468	793	83.9613	63.5749	6.2500	763.6977
Wheat suitability, scalar	793	2715.1630	149.5760	2164.0000	3072.0000
			Main control variables		
Household size (log), 1468	793	2.7151	0.9995	0.0000	6.0014
Mine, 1468	793	0.0101	0.0999	0.0000	1.0000
Widows (household share), 1468	793	0.0018	0.0146	0.0000	0.3333
Fugitives (household share), 1468	793	0.0008	0.0164	0.0000	0.4444
Singles (household share)), 1468	793	0.1851	0.1376	0.0000	0.6667
Migrants (household share), 1604	793	0.0131	0.0806	0.0000	1.3333
Distance to nearest Catholic monastery (km)	793	48.0437	44.4545	0.0000	180.8869
Distance to nearest Orthodox monastery (km)	793	39.2392	29.5737	0.0000	114.6093
Distance to nearest Church of Bosnia (km)	793	2.1187	1.9827	0.0000	16.1179
Distance to nearest market centre (km)	793	12.0925	10.5845	0.0000	55.0040
Terrain ruggedness, scalar	793	6.7566	3.7872	0.0000	37.0000

Notes: The unit of observation is a settlement - village or town. Income per household is expressed in the currency of akçe. Migrants as a share of households can exceed 1 (column 5), given that migrants are measured as individuals. Controls and explanatory variables in this table, mostly derived from the 1468 tax register, are matched to the the Muslim household share in 1604, of which there are 793 matched observations. Matched observations across different time-periods vary due to emergence and disappearance of settlements - some settlements merge, some split, over time.
Sources: For data sources, see section 3 and the data appendix A.1.

and lower mortality. If so, this implies that we are underestimating the income effect, biasing our results towards zero. The true coefficient on income is thus larger than what the estimates imply, reinforcing our results. Be that as it may, the poll tax was levied at household-level, not individual-level. If the poll tax hypothesis is correct, the decision to convert depended on total household income, not individual income. Malthusian dynamics, therefore, cannot overturn our results.

4 The relationship between income and conversions to Islam

This section provides evidence about the relationship between income per household and conversions to Islam. It begins by using OLS regressions, and conducting robustness checks that lend some credibility to the uncovered correlations. It then provides IV estimates, and analyses the poll tax mechanism.

4.1 OLS results

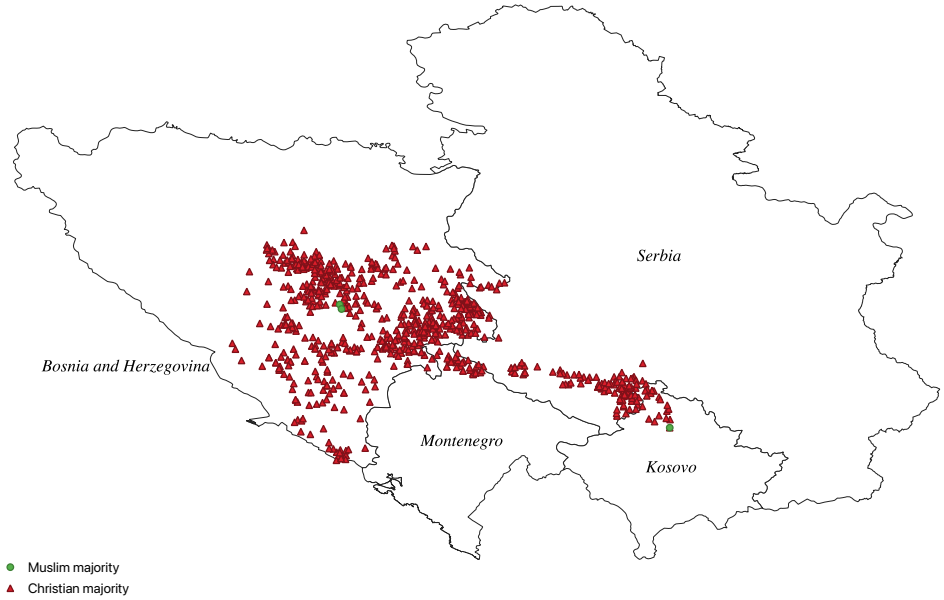
The linear regressions are of the following form:

$$m_i = \alpha + \beta y_i + \gamma X_i + \epsilon_i \tag{1}$$

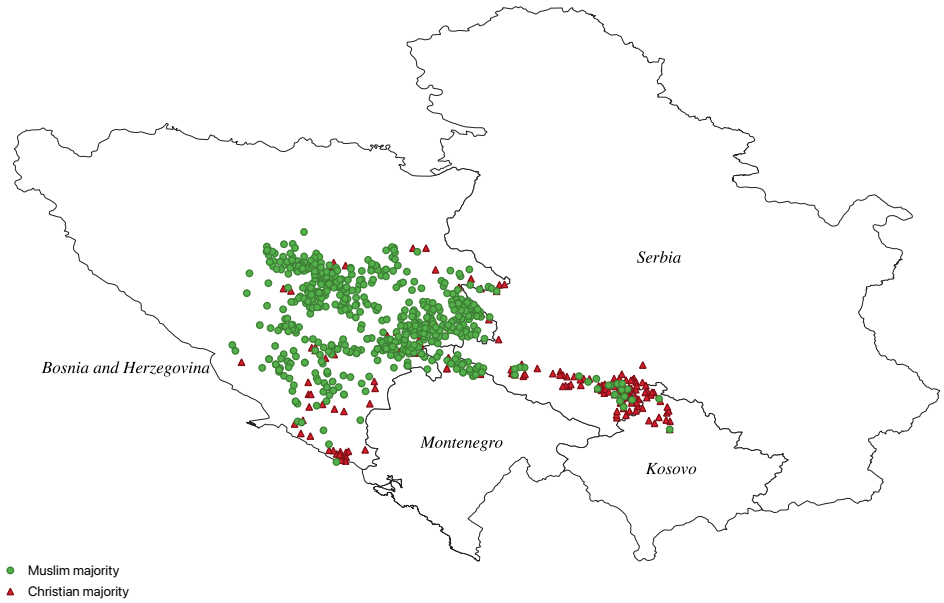
where m is the fraction of Muslim households in village i, y is income per household, X is a

Figure 2: Religious composition of the district of Bosnia, 1468-1604

(a) 1468



(b) 1604



Notes: Each observation marks a geo-coded settlement (village or town) that we matched over the 1468-1604 period. The district of Bosnia stretched over modern-day Bosnia and Herzegovina, Kosovo, Montenegro and Serbia. Borders in the map are those of modern states.
Sources: Aličić (2008) for 1468 and Handzić (2000) for 1604.

vector of controls, and ϵ is a random error term. The coefficient of interest is β, the effect of income per household on Muslim affiliation.

Table 2 reports the relationship between the initial income per household (1468) and the share of Muslim households in 1604 for a variety of specifications. Column 1 indicates a strong negative correlation between initial income and subsequent Muslim affiliation. This suggests that households in the initially poorer villages were more likely to convert to Islam. The coefficient on income is economically substantial. It implies that moving from an income of zero *akçe* per household to the sample average of 84 is associated with a decrease in the household share of Muslims by 16 percentage points $[84x(-)0.0019]$, relative to the mean 0.76. The effect is statistically significant at 1% under two types of standard errors that we report below the coefficient. The first standard errors, reported in parenthesis, are robust to heteroskedasticity. The second standard errors, reported in square brackets, account for spatial correlation using the Conley (1999) method - the equivalent of correcting for both heteroskedasticity and autocorrelation.[4]

Columns 2-13 add covariates that might have influenced conversions, and that feature prominently in the literature. We add the covariates sequentially to assess the stability of the coefficient on income. If the coefficient on income is unstable under different specifications, this indicates the presence of multicollinearity and/or the omitted variable bias in an informal manner.

A prominent explanation emphasizes urbanization and towns as stimulating the Islamisation of Bosnia (Handžić, 1970; Filipović, 1976). Towns became the centers, not only of Ottoman administration and army, but also of the Islamic way of life. Various Islamic establishments, like mosques, *madrasas* (religious schools), and *tekkes* (Islamic orders), were built and concentrated in the pre-existing Bosnian towns, fortresses and market-centers. The urban and feudal elite of the society could thus maintain their social privileges and gain access to the new public goods by converting to Islam (Filipović, 1976; Minkov, 2004). Column 2 controls for the number of households as a proxy for the level of urbanization.

Although Bosnia was agriculturally poor, it was rich in natural resources. Namely, the silver mines of Bosnia were a major source of revenue for the kings of Bosnia and the local landlords (Ćirković, 1964), and later for the Ottomans (İnalcık, 1997). Saxons managed and operated the mines, while the merchants of Dubrovnik controlled the trade of silver. Both of these two communities were Catholic and tightly knit, and the mining towns containing their colonies became the bastions of Christianity (Ćirković, 1964). They resisted the Islamization of Bosnia for a long period (Handžić, 1970). Column 3 controls for the location of mines.

Lopasic (1994) argues that the depopulation of Bosnia, caused by the Ottoman conquest, was an important driving force of conversions. The Ottomans replaced the original Christian population that fled to Croatia and Hungary with the *Vlachs* – people that led a pastoral and nomadic life, of Orthodox faith (Moačanin, 1999). Vlachs eventually became sedentary, and some converted to Islam. Columns 4 and 5 control for the household share of fugitives and widows as a proxy for the intensity of depopulation. Share of fugitives and widows might also

[4]When using cross-section data, a common alternative in empirical literature to account for spatial correlation is to cluster standard errors by an administrative unit. In this paper, this is not appropriate due to the small amount of administrative units (six sub-districts), which would bias the standard errors downwards. The wild-bootstrap procedure proposed by Cameron et al. (2008) can account for the small number of clusters. Even they, however, exercise caution when the number of clusters is very small, like in the present paper. We thus prefer to use the Conley (1999) standard errors, which are more flexible in dealing with spatial correlation.

Table 2: OLS estimates, the relationship between initial income per household (1468) and conversions to Islam, dependent variable: household share of Muslims (1604)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Income per household, 1468	-0.0019	-0.0020	-0.0019	-0.0019	-0.0019	-0.0020	-0.0020	-0.0020	-0.0020	-0.0019	-0.0018	-0.0020	-0.0020	-0.0019
	(0.0004)***	(0.0004)***	(0.0004)***	(0.0004)***	(0.0004)***	(0.0004)***	(0.0004)***	(0.0003)***	(0.0004)***	(0.0004)***	(0.0004)***	(0.0004)***	(0.0004)***	(0.0004)***
	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***	[0.0005]***
Household size (log), 1468		-0.0299												0.0015
		(0.0134)**												(0.0117)
		[0.0301]												[0.0180]
Mine, 1468			-0.0430											-0.1864
			(0.2308)											(0.2305)
			[0.1442]											[0.1142]
Widows (household share), 1468				-0.4717										0.5554
				(0.5887)										(0.8781)
				[0.6297]										[0.7964]
Fugitives (household share), 1468					0.2286									-0.3706
					(0.3791)									(0.5270)
					[0.3409]									[0.1872]**
Singles (household share)), 1468						-0.3838								-0.0223
						(0.1000)***								(0.0860)
						[0.2579]								[0.0633]
Migrants (household share), 1604							-0.3225							0.0668
							(0.2280)							(0.0812)
							[0.3379]							[0.0599]
Distance to nearest Catholic monastery (km)								-0.0049						-0.0017
								(0.0002)***						(0.0007)**
								[0.0008]***						[0.0011]
Distance to nearest Orthodox monastery (km)									-0.0015					0.0007
									(0.0005)***					(0.0006)
									[0.0028]					[0.0007]
Distance to nearest Church of Bosnia (km)										-0.0155				-0.0055
										(0.0067)**				(0.0054)
										[0.0073]**				[0.0047]
Distance to nearest market centre (km)											-0.0070			-0.0062
											(0.0013)***			(0.0014)***
											[0.0021]***			[0.0020]***
Terrain ruggedness												0.0119		0.0008
												(0.0028)***		(0.0026)
												[0.0095]		[0.0021]
Sub-district effects	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes
Observations	793	793	793	793	793	793	793	793	793	793	793	793	793	793
R-squared	0.101	0.107	0.101	0.102	0.101	0.120	0.106	0.409	0.115	0.107	0.137	0.114	0.489	0.521

Notes: The unit of observation is a settlement - village or town. Two standard errors are reported below each coefficient. Heteroscedasticity-robust standard errors are reported in parentheses. Conley (1999) standard errors, which adjust for both heteroscedasticity and autocorrelation, i.e., spatial correlation, are reported in square brackets. The Conley (1999) standard errors are constructed assuming a window with weights equal to one for observations less than 100 kilometers apart, and zero for observations further apart. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Sources: For data sources, see section 3 and the data appendix A.1.

proxy for state repression (e.g., indicated by widows) and local resistance (e.g., indicated by fugitives). This is important, because state repression, and the resistance it can provoke, can strengthen local identities relative to those associated with the state (i.e., Islam) (Dehdari and Gehring, 2022).

Pinjuh (2018) points that the the poll tax was levied at the household-level, no matter its size. Given the level of disposable income, it is thus possible that unmarried households faced a higher relative tax burden.[5] Column 6 controls for the share of unmarried households (singles). By that, it also adjusts households for their size, at least partially.

One important threat to our OLS estimates is endogenous sorting. If Muslims from the remainder of the Ottoman Empire migrated to the poorer villages of Bosnia, the negative association between initial income and subsequent Muslim affiliation might reflect these migratory flows. Column 7 controls for migration.

Before the Ottoman conquest of Bosnia, Catholicism was the dominant religion of Bosnia (Ćirković, 1964). The competition with the Church of Bosnia and the Orthodox Church over the religious affiliation of the Bosnians, however, severely weakened it. Catholicism successfully resisted the spread of Islam only in those areas that were close to Catholic monasteries (Aličić, 1991; Husić, 2011). In particular, the Franciscan monks, who walked to nearby villages, were of critical importance in resisting the spread of Islam (Džaja, 1999). To account for the influence of the Catholic Church, column 9 controls for the distance to the nearest Catholic (Franciscan) monastery.

Before the Ottoman conquest of Bosnia, the influence of the Orthodox Church was limited to the fringes of today's eastern and southeastern Bosnia (Ćirković, 1964). The Ottomans, however, favored it relative to the Catholic Church – the faith of its archenemy, the Habsburg Empire. For that reason, Džaja (1999) argues that the Orthodox Church was more successful in resisting the spread of Islam than the Catholic Church was. Column 10 controls for distance to the nearest Orthodox monastery to account for the influence of the Orthodox Church.

A popular theory about the Islamization of Bosnia is that it resulted from the mass conversion of the members of the Bosnian Church (see section 2.1). Column 11 controls for distance to the nearest Church of Bosnia to account for its influence.

Michalopoulos et al. (2018) argue that distance to premodern trade routes is a robust predictor of today's Muslim adherence across countries in the Old World. In premodern times, Muslims diffused across important global trade routes, perhaps because of the importance that Islamic scriptures confer on trade-related matters (Kuran, 2010). Column 11 controls for distance to the nearest market-center to account for the influence of trade.

Bulliet (1979) argues that access to information determined the diffusion of Islam. Areas that are more rugged are more isolated and difficult to reach, mitigating the spread of information. Column 12 controls for terrain ruggedness as a proxy for isolation, which might have influenced the probability of conversion.

Finally, column 13 includes sub-district effects to control for unobservables specific to these regions. Under the Ottomans, judges enforced institutions at the sub-district level. Sub-district effects should thus control for the enforcement of institutions, including the collection of taxes.

[5] Unmarried households, however, paid a lower tax.

Column 14 includes jointly all the considered controls. Given the inclusion of sub-district effects, column 14 specification exploits the within-regional variation in income and Muslim affiliation. The analysis is thus not hampered by regional institutional heterogeneity, which could otherwise make it difficult to disentangle the effect of institutional quality and enforcement from income.

Of the considered controls, only fugitives, distance to Catholic monastery, and distance to market–centre, are significant in column 14. The relationship between distance to Catholic monastery and Muslim affiliation, is negative, opposite to what we expected. The coefficient on the distance to the nearest market-centre mirrors the results of Michalopoulos et al. (2018).

Through specifications 1-14, the coefficient on income remains close to identical. This is reassuring, as it informally indicates that the issue of omitted variable bias is not of serious concern. Appendix A.2 analyses formally the extent of the omitted variable bias. Using the method of Oster (2019), we find that selection on observables would have to be 14.8 times greater than selection on unobservables to overturn our results. Although we cannot control for all the seemingly important theories about conversions, this inability, therefore, is highly unlikely to overturn our results.

Nevertheless, the possibility of reverse causality remains, irrespective of endogenous sorting. Alongside the omitted variable bias, this should positively bias the OLS estimates. A plausible instrument for income is required. To satisfy the exclusion restriction, the instrument should be associated with the variation in income. It should have no direct impact on Muslim affiliation.

4.2 IV results

Many studies use the suitability of land for agriculture as a source of exogenous variation in income in premodern and early-modern economies (Nunn and Qian, 2011; Galor and Özak, 2016; Boberg-Fazlić et al., 2022). We follow their lead, and use the suitability of land for wheat production as an instrument for income. The Bosnian economy, at the time of the Ottoman conquest, was overwhelmingly rural. The vast majority of households lived in villages. According to the Ottoman tax register of 1468, 86 per cent of households lived in villages, generating 81 per cent of total income. The suitability of land for wheat cultivation shaped a large proportion of that income. According to the 1604 Ottoman tax register, income derived from wheat formed 84 per cent of the total agricultural income.[6]

We use the agricultural suitability data from the Food and Agricultural Organization (FAO). This data measures the suitability for cultivating crops at a disaggregated, geographical, level (grid cells). To construct this measure, FAO uses three sets of environmental characteristics required for the cultivation of crops. The primary characteristics FAO uses are climactic: precipitation, mean temperature and range, sunshine, vapor pressure, wet days, cloud cover, ground-frost frequency, and wind speed. The second characteristics are land characteristics, while the final characteristic is the slope of soils. Combining the information on the constraints for the cultivation of crops with the data on the physical environment, the FAO calculates the potential yield for each crop, given an assumed use of inputs. To approximate historical

[6]The 1468 Ottoman tax register does not provide a detailed breakdown of income by category. The 1604 tax register does.

conditions as closely possible, we use a measure of agricultural suitability constructed under the assumption that cultivation occurs under rain-fed conditions with low input intensity.

One concern is whether the measure calculated by FAO in the 1990s is a good indicator of agricultural suitability five hundred years ago. The suitability measure does not give an obvious cause for concern. It is based primarily on climactic conditions, like humidity, sunlight and rainfall, which have not changed significantly during our period of analysis. Economic activity can influence land characteristics (e.g., soil erosion), but these characteristics are of secondary importance in calculating the suitability measure. Land characteristics affect yield calculations only after the agricultural suitability of a grid cell has been estimated based on climactic characteristics. Moreover, to mitigate measurement error, we deliberately use the suitability measure based on rain-fed conditions and low input intensity. This allows us to avoid possible changes in land characteristics caused by human activity - e.g., irrigation and technological improvements.

Another concern is whether our instrument satisfies the exclusion restriction. Agricultural suitability might have influenced conversions beyond the income channel, by shaping the patterns of urbanization and commerce. Importantly, these are precisely the factors that we control for, alongside a swath of other socio-economic variables that are perhaps correlated to both land suitability and conversions (e.g., migrants and fugitives).

Nevertheless, as with any instrument, we cannot decisively reject the possibility that our instrument violates the exclusion restriction. What we can do, however, is to test whether our results are robust when deliberately violating it. Appendix A.3 uses the Conley et al. (2012) method, and shows that the direct impact of the instrument on Muslim affiliation would have to equivalent to about 100 per cent of the overall reduced reduced-form effect to render the IV estimates insignificant. This indicates that the IV approach is robust. The instrument would have to deviate extremely far from the exclusion restriction to make our results insignificant.

Table 3 documents the two-stage least square (2SLS) estimates of equation 1. We treat income per household, y_i, as endogenous, and estimate the following equation:

$$y_i = \lambda + \zeta w_i + \eta X_i + \nu_i \tag{2}$$

where w_i is the suitability of land for wheat production. The exclusion restriction is that w_i is uncorrelated to the error term of equation 1. In the IV analysis presented in Table 3, panel A documents the first stage impact of w_i, the coefficient on wheat suitability in equation 2. The coefficient is statistically significant across different specifications – no controls (column 1), controls (column 2), and controls and region effects (column 3). The coefficient in column 3 implies that moving from zero wheat suitability to its average increases income per household by 165 akçe per household, relative to the mean of 84. The F-statistic, equal to 15, indicates a very strong first stage relationship.

Panel B presents the second stage estimate, where the variation in income caused by wheat suitability predicts Muslim affiliation in 1604. The coefficient on income is statistically significant and economically substantial in column 3. The size of the coefficient implies that moving from zero income to the sample average decreases the share of Muslims households by 23 percentage points, relative to the average of 0.77. These IV estimates imply a stronger decrease in Muslim

Table 3: IV estimates, the relationship between initial income per household (1468) and conversions to Islam

	(1)	(2)	(3)
Panel a: first stage outcome - Income per household, 1468			
Wheat suitability	0.0405	0.0615	0.0609
	(0.0170)**	(0.0159)***	(0.0157)***
	[0.0148]***	[0.0169]***	[0.0175]***
Controls	No	Yes	Yes
Sub-district effects	No	No	Yes
R-squared	0.009	0.096	0.1124
Panel B: second stage outcome - Muslim share of households, 1604			
Income per household, 1468	-0.0083	-0.0026	-0.0026
	(0.0037)**	(0.0011)**	(0.0011)**
	[0.0057]	[0.0019]	[0.0015]*
Controls	No	Yes	Yes
Sub-district effects	No	No	Yes
Observations	793	793	793
First stage F-statistic	5.7	15.02	15.08

Notes: The unit of observation is a settlement - village or town. The controls are household size, mine location, household share of widows, fugitives, singles and migrants, distance to nearest Catholic monastery, Orthodox Monastery, Church of Bosnia and market centre, and terrain ruggedness. These controls are the same as those in column 14 specification of table 2. Two standard errors are reported below each coefficient. Heteroscedasticity-robust standard errors are reported in parentheses. Conley (1999) standard errors, which adjust for both heteroscedasticity and autocorrelation, i.e., spatial correlation, are reported in square brackets. The Conley (1999) standard errors are constructed assuming a window with weights equal to one for observations less than 100 kilometers apart, and zero for observations further apart. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Sources: For data sources, see section 3 and the data appendix A.1.

affiliation than the OLS estimates do. This is consistent with the notion that reverse causality and/or omitted variables are, perhaps, positively biasing the OLS estimates.

4.3 Mechanism: poll tax

The finding that low income caused conversions to Islam is consistent with the poll tax hypothesis. If the tax on non-Muslims placed a higher relative burden on the poorer members of the society, the initially poorer households should have been more likely to convert, exactly as our OLS and IV estimates imply. In this section, we construct a proxy for the tax burden that households faced, and test formally the tax mechanism.

Ideally, we would want to exploit the variation in tax rates across the villages. The problem we face is that tax rates in the Ottoman Empire varied only at the district-level. Given that we are analysing only the district of Bosnia, the tax rates across our data sample are uniform.

While we cannot exploit the variation in tax rates, what we can do is to exploit the variation in the tax enforcement and abuse. We use distance to Sarajevo as proxy for the effective tax burden that Christian households faced, and thus the increase in disposable income that they could obtain by converting to Islam. Sarajevo was founded in the 1450s soon after the Ottoman conquest of the region. Due to its central location in Bosnia, Sarajevo was chosen as the administrative center of the Ottoman rulers (Šabanović, 1959).

Historians argue that tax enforcement was higher in the areas close to Sarajevo (Šabanović, 1959; Imamović, 1997; Moačanin, 1999). The head of district (sandžak-beg) was stationed in Sarajevo, as well as the bulk of the Ottoman administration (Šabanović, 1959). The administrators rode on horseback to the neighboring areas of Sarajevo to ensure the effective collection of the poll tax due to the Sultan. To avoid the sandžak-beg and his retinue, Moačanin (1999) reports that some villages gradually shifted from the traversed roads, moving into the surrounding hills and mountains (we control for terrain ruggedness).

One reason why households behaved that way is because the sandžak-begs frequently engaged in tax abuse, extracting more resources from the peasants than what they were legally obliged to pay. The mechanism that sandžak-begs used was that of *avariz*. These were irregular taxes to be used mostly for military and other exceptional purposes. In effect, they were used by the local administrators mostly as an opportunity to enrich themselves (Moačanin, 2006).

Many Ottoman administrators were corrupt because of the incentive structure that they faced (Malcolm, 1994; Imamović, 1997). The sandžak-begs were typically chosen by Sultan to rule over Bosnia for a few years only, before being sent to another district (Šabanović, 1959). This incentivized the provincial rulers to extract as much resources from their subjects as possible, given that they had little stake in the long-run prosperity of the district.

We use the casual mediation analysis developed by Dippel et al. (2022) to establish the mechanism through which income shaped conversions. Within a 2SLS setting, they modify the standard mediation model by adding an instrument that causes the treatment. When using their method, we also control for distance to the nearest dervish lodge to account for the influence of Islamic orders in stimulating conversions (Lopasic, 1994; Zheliazkova, 1994). It is possible that distance to Sarajevo influenced not only the tax burden, but also exposure to Islam, particularly through the work of Islamic orders.

Table 4 presents the causal mediation results. Column 1 coefficients imply that the poll tax mechanism can explain about 28 per cent of the overall effect of income on conversions. This still leaves about 70 per cent of the income effect unexplained. We believe that this mostly reflects measurement error of our tax burden measure, biasing the results towards zero.

The period that we analyse (1468-1604) is associated with the Ottoman Golden Age, when its institutional strength was at its zenith, and the Porte was able to constrain the sandžak-begs from engaging in excessive abuse of power (İnalcık, 1973). Afterwards, the Ottoman Empire experienced a process of steady decline and institutional decay (İnalcık, 1997). Given the gradual weakening of the Porte over the far-away regions like Bosnia, the sandžak-begs became

Table 4: Mediation analysis, testing the mechanism of taxes, dependent variable: share of Muslims

	(1) 1604 tax register	(2) 1879 population census
Total effect of income per household, 1468	-0.0026**	-0.0078**
	(0.0012)	(0.0039)
Of which:		
- Direct effect	-0.0018***	-0.0004
	(0.0002)	(0.0003)
- Indirect effect	-0.00072	-0.0075*
	(0.0012)	(0.0045)
Controls	Yes	Yes
Sub-district effects	Yes	Yes
Observations	793	632
F-statistic for excluded instruments		
- First stage, step one (treatment regressed against instrument)	14.484	6.134
- First stage, step two (mediator regressed against instrument, conditional on treatment)	56.696	21.806

Notes: The unit of observation is a settlement - village or town. The mediation analysis is conducted following the framework of Dippel et al. (2022). The indirect effect of income operates through the channel of distance to Sarajevo (mediator) as a proxy for the effective tax burden, and thus the increase in disposable income that households could attain by converting to Islam. The instrument is the suitability of land for wheat production. The controls are household size, mine location, household share of widows, fugitives, singles and migrants, distance to nearest Catholic monastery, Orthodox Monastery, Church of Bosnia, dervish lodge and market centre, and terrain ruggedness. The size of the coefficient on income is not comparable across columns 1 and 2. Column 1 measures the *household* share of Muslims, while column 2 measures the *population* share of Muslims. Matched observations across different time-periods vary due to emergence and disappearance of settlements - some settlements merge, some split, over time. Heteroscedasticity-robust standard errors are reported in parentheses. Under the mediation analysis of Dippel et al. (2022), however, the standard errors and the corresponding p-values have no conventional meaning. This is also why we do not use the Conley (1999) standard errors. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Sources: For data sources, see section 3 and the data appendix A.1.

increasingly independent and unconstrained in their rule, increasing the extraction of resources from their subjects (Malcolm, 1994; Imamović, 1997; Moačanin, 1999).

Distance to Sarajevo should thus serve as a better proxy for the intensity of the tax burden when analysing the whole Ottoman period (1468-1878). This is exactly what our results in column 2 of table 4 imply. When using the population share of Muslims derived from the 1879 population census as the dependent variable, taxes can explain about 95 per cent of the overall income effect. Therefore, our mediation results suggest that the poll tax was of high importance. By converting to Islam, the tax burden decreased, and disposable income increased, particularly of the poorest households.

5 Persistence results

This section analyses whether the patterns of religious affiliation persist after the initial conversion process. The results of the previous section imply that they do. However, it is unclear whether they persist over a longer time-frame. Theoretically, it depends on whether the cost of changing religion outweighed the associated return.

Importantly, changing norms and beliefs is intrinsically costly, especially if these have been transferred over the generations, and internalised within the family (Bisin and Verdier, 2000, 2001). All else given, patterns of religious affiliation should thus persist over time. But many things changed in social reality, including the elimination of the tax benefit that Muslims enjoyed under the Ottomans.

Table 5 shows the relationship between the initial income per household (1468) and the

Table 5: OLS and IV estimates, the persistence of the relationship between initial income per household (1468) and Muslim affiliation

	Austro-Hungarian period		Yugoslav period		Modern Bosnia
	1879	1910	1961	1991	2013
	(1)	(2)	(3)	(4)	(5)
Panel A: 2SLS, first stage outcome - Income per household, 1468					
Wheat suitability	0.0315	0.0315	0.0384	0.0417	0.0426
	(0.0130)**	(0.0130)**	(0.0157)**	(0.0153)***	(0.0169)**
	[0.0192]	[0.0192]	[0.0206]*	[0.0190]**	[0.0188]**
Controls	Yes	Yes	Yes	Yes	Yes
Sub-district effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.061	0.061	0.079	0.073	0.087
Panel B: 2SLS, second stage outcome - Muslim population share					
Income per household, 1468	-0.0078	-0.0091	-0.0086	-0.0053	-0.0055
	(0.0040)*	(0.0044)**	(0.0039)**	(0.0026)**	(0.0029)*
	[0.0038]**	[0.0043]**	[0.0033]***	[0.0020]***	[0.0022]**
Controls	Yes	Yes	Yes	Yes	Yes
Sub-district effects	Yes	Yes	Yes	Yes	Yes
First stage F-statistic	4.840	5.550	6.030	7.380	6.330
Panel C: OLS outcome - Muslim population share					
Income per household, 1468	-0.0007	-0.0005	-0.0003	-0.0010	-0.0009
	(0.0003)**	(0.0003)**	(0.0002)*	(0.0002)***	(0.0002)***
	[0.0003]**	[0.0003]*	[0.0002]*	[0.0003]***	[0.0004]**
Controls	Yes	Yes	Yes	Yes	Yes
Sub-district effects	Yes	Yes	Yes	Yes	Yes
Observations	632	733	973	1,036	883
R-squared	0.134	0.092	0.167	0.137	0.163

Notes: The unit of observation is a settlement - village or town. The controls are household size, mine location, household share of widows, fugitives, singles and migrants, distance to nearest Catholic monastery, Orthodox Monastery, Church of Bosnia and market centre, and terrain ruggedness. These controls are the same as those in column 14 specification of table 2. Matched observations across different time-periods vary due to emergence and disappearance of settlements - some settlements merge, some split, over time. Two standard errors are reported below each coefficient. Heteroscedasticity-robust standard errors are reported in parentheses. Conley (1999) standard errors, which adjust for both heteroscedasticity and autocorrelation, i.e., spatial correlation, are reported in square brackets. The Conley (1999) standard errors are constructed assuming a window with weights equal to one for observations less than 100 kilometers apart, and zero for observations further apart. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Sources: For data sources, see section 3 and the data appendix A.1.

population share of Muslims during the Austro-Hungarian rule of Bosnia. Panel B depicts the IV results, where income is negatively associated with Muslim affiliation at the time of the 1879 population census (column 1), as well during the 1910 census (column 2).[7] The corresponding OLS coefficients in panel C are also negative.

Columns 3-5 of table 5 extend the analysis into more recent times – socialist Yugoslavia and modern Bosnia and Herzegovina. Under socialist Yugoslavia, Bosnia underwent a process of profound modernisation. Unlike other socialist regimes, Yugoslavia allowed free practice of religion, and eliminated all forms of religious discrimination as vestiges of the previous feudal and bourgeois regimes. Combined with rapid secularisation, this greatly decreased religious

[7] 1879 census was the first census conducted under the Austro-Hungarians, while the 1910 census was the final one.

tensions (Calic, 2019). By extension, the cost of changing religion presumably declined.

Nevertheless, the relationship between income and Muslim affiliation remains negative when using the 1961 census (column 4), the period of time when the modernisation process was at its peak (Calic, 2019). Column 5 shows that the relationship is negative during the 1991 Yugoslav census as well, just before the disintegration of Yugoslavia and the outbreak of the Bosnian war in 1992. These results also hold in 2013 (column 6), after the war ended in 1995.[8]

These estimations demonstrate that our results persist under different political, social and economic regimes. We hypothesize that one reason for this persistence is that religious identity became embedded into the rising national consciousness during the 19th century. Despite the secularisation experienced under socialist Yugoslavia, switching religious identity remained costly, or perhaps became even costlier, because now it also implied a change in national identity. By extension, patterns of religious affiliation persist over time.

In Bosnia, national identities emerged along religious lines (Lopasic, 1981; Banac, 1984; Malcolm, 1994; Friedman, 1996; Bieber, 2000; Calic, 2019). Due to the shared Slavic origin and language, the most important point of distinction between the Bosniaks, Croats and Serbs today is religion. The Bosniaks are associated with Islam, Croats with Catholicism, and Serbs with Orthodox Christianity. This stands in sharp contrast to the experience of western Europe, where language played a pivotal role in the formation of nations (Anderson, 1983).

The association between religious and national identity in Bosnia stems from the *millet* system of the Ottoman Empire (Lopasic, 1981). Under the Ottoman concept of community (millet), nationality was not recognized. What was recognized was religion and religious affiliation, whereby Christians, Muslims and Jews became members of autonomous communities, administered by their own religious leaders. Each millet administered its own communal affairs, primarily through independent court systems and religious schools. The millet system preserved local autonomy and customs, but strengthened the division between the different religious groups (Lopasic, 1981). It mitigated the construction of a single Bosnian society, because it emphasized religious exclusiveness in an environment of high religious diversity.

During the 19th century, the millet system encouraged the morphing of the religious with the national (Friedman, 1996). The teaching of Orthodoxy, for example, was infused with nationalist sentiment. From its inception in the 13th century, the Serbian Orthodox Church worshiped the medieval Serbian kings and emperors as saints (Judah, 2000). With the rise of independent Serbia during the 19th century, pride in Serbian accomplishments encouraged by the clergy was internalized by the Orthodox peasantry in Bosnia (Friedman, 1996). Eventually, the concept of being an Orthodox Christian fused with the concept of being a Serb. Simultaneously, the rise of nationalism in 19th century Croatia filtered into Bosnia through the work of the Croatian Franciscans stationed in the region (Friedman, 1996). Their teaching of Catholicism intermingled with the propagation of Croatian nationalist sentiment, which Catholic Bosnians embraced.

The Bosniak (Bosnian Muslim) national identity emerged later than the Croatian or the Serbian one. For that reason, the 19th century Serbian and Croatian nationalists laid claims

[8]The 1961 population census is the first census under socialist Yugoslavia that provides data on religious affiliation at settlement-level, while the 1991 census is the last one under the socialist regime. 2013 census is the only one that has been conducted in Bosnia and Herzegovina. There is no data on religious structure at settlement-level during the interwar period (Kingdom of Yugoslavia).

over the Muslims. The Serbians claimed that the Muslims (converts) were of Serbian, Orthodox, origin, while the Croatians claimed that they were of Croatian, Catholic, origin (Imamović, 1997). Faced with these competing claims over their national affiliation, Muslims started emphasizing Islam as a foundation of their group identity (Friedman, 1996). This served as a tool of communal mobilization, driven by the fear of the Muslim elites that the newly-independent Serbia could annex Bosnia, and purge Muslims from positions of economic and political power, just like it occurred in Serbia after the Ottomans were driven out (Malcolm, 1994).

It was, however, the Austro-Hungarians that annexed Bosnia. Under their rule, further national building of the Bosniaks was encouraged by the development of the first Muslim political parties (Banac, 1984). During the interwar Yugoslavia, these nascent political parties transformed into a Muslim national movement of massive proportion, seeking political and regional autonomy from Belgrade (Banac, 1984). Under the communist rule, the Bosnian Muslims were formally recognized as a constituent nationality of Yugoslavia in 1968 - a belated recognition of the fact that the Muslim nation was fully formed by then (Kamberović, 2009).

The tight association between religious and national identity in Bosnia is reflected in the extremely high correlation between religious and ethnic diversity at settlement-level, derived from the 2013 population census – 0.8. We now use survey data from Yugoslavia (1989/90) and contemporary Bosnia and Herzegovina (2019) to support further our qualitative argument.

Table 6 depicts the relationship between religiosity and the strength of nationality identity both before and after the Bosnian War of the early 1990s. We measure the strength of religiosity by the survey-question "How important is religion to you personally?". Equivalently, we measure the intensity of national identity by the survey question "How important is your nationality to you?" (1-4 scale in column 1, and 1-5 scale in column 5). The results imply that, either in socialist Yugoslavia (column 1) or in contemporary Bosnia and Herzegovina (column 2), individuals that are more religious also tend to express a stronger sense of national identity. These correlations lend support to our claim that religious affiliation and nationalism are tightly associated in Bosnia, which reinforces the cost of changing religion. This is one reason why patterns of religious affiliation persist over time, despite that the Ottoman discrimination of the Christians has long ended.

6 Alternative theories

This section discusses alternative theories about the mechanism that connects low income to conversions, as well as the alternative channels as to why the patterns of religious affiliation persist in Bosnia.

6.1 Theories on the mechanism connecting income and conversions

There are two sets of explanations about the Islamisation of Bosnia. (1) We argue that conversions drove the Islamisation process. Instead, (2) it might be that demographic factors, correlated to income, drove it (Džaja, 1999). As pointed out by Saleh (2018), such demographic factors could include population replacement via Muslim immigration or Christian emigration, the higher birth rate and lower death rate of the Muslims, and intermarriage between between Christian

females and Muslim males (opposite is forbidden), which results in Muslim offspring under Sharia law. We argue that these demographic factors are *not* the main cause of Bosnia's Islamization.

Migration as a driving force of Islamization has attracted a great deal of attention in the Balkan historiography, mostly in Bulgaria, but also in Greece (Lopasic, 1994; Minkov, 2004). In the case of Bosnia, however, historians reject the proposition that migration drove the Islamisation process (Lopasic, 1994; Malcolm, 1994; Zheliazkova, 1994; Imamović, 1997). The Christians that emigrated from Bosnia in the aftermath of the Ottoman conquest were replaced by Christians from the other Balkan regions, not Muslims (Moačanin, 1999). Muslim settlers of Middle-Eastern origin consisted of a thin layer of administrators and merchants. As such, Muslim immigrants can account for only two to five per cent of the ethno-genetic structure of the contemporary Bosnian Muslims (Zheliazkova, 1994).

We now consider differences in fertility and mortality. Historians argue that the mortality rate of the Muslims was higher than the mortality rate of the Christians for two reasons. First, the incessant plagues and diseases that characterised Bosnia between the 16th and first-half of the 20th century were more frequent in densely-populated and unsanitary towns, populated disproportionately by the Muslims (Džaja, 1999; Moačanin, 1999). Second, the Bosnian Muslims were engaged in frequent wars with the neighboring Habsburg Empire, and engaged in other wars under the Ottoman military machine, further increasing their mortality (Moačanin, 1999). The Christians, on the other hand, were barred from serving in the army.

It is difficult to find historical evidence about fertility in Bosnia. What we can do, however, is to use the theoretical reasoning of the Malthusian model to speculate about it. The model suggests that, in a premodern economy like 16th century Bosnia, fertility should be positively associated with income, not negatively. Therefore, given that they were initially richer, those that remained Christian presumably had a higher fertility rate than the converts.

It thus seems unlikely that Muslims had lower mortality and higher fertility than the Christians. The Austro-Hungarian censuses support this claim. They predate the demographic transition of Bosnia, and provide a window into the demographic history of Bosnia. Using the 1885 census, table A3 of appendix A.4 shows that Christian population share is associated with a higher population share of children (age below 10) and the old (age above 60). This suggests that Muslims had a lower fertility rate and a higher mortality rate,

The final demographic factor we consider is intermarriage, which was extremely low. For example, in the 1800-1914 period, the court records indicate only several hundred instances of intermarriage (Gelez, 2008). Moreover, it is unclear why intermarriage would be related to poverty.

Even if Bosnia's Islamisation was driven mostly by conversions, there are alternative theories about the relevant mechanism. In particular, urbanization and trade might be correlated to income. If so, these factors might be the mechanisms through which income shaped conversions, rather than the poll tax. Urbanization and trade, however, are exactly the controls that we use in our OLS and IV specifications. Moreover, if urbanization and commerce are the principal mechanisms driving our results, income should be positively associated with conversions, given that towns and commercially vibrant areas are typically richer. We find, however, exactly the opposite. It is poorer settlements that were more likely to convert, not the richer ones.

Table 6: The relationship between religious and national identity, survey data, dependent variable: answer to 'How important is your nationality to you?"

	1989/90 Survey	2019 Survey
	(1)	(2)
"How important is religion to you personally?"		
- "Not important" (reference category)		
- "A little important"	1.5909***	
	(0.1436)	
- "Fairly important"	2.4363***	
	(0.2327)	
- "Very important"	4.2635***	
	(0.3828)	
"How important is religion to you personally?"		
- "Not at all important" (reference category)		
- "Not important"		1.2070***
		(0.1449)
- "Neither important nor unimportant"		2.0390***
		(0.1394)
- "Important"		2.9283***
		(0.1449)
- "Very Important"		4.1404***
		(0.1725)
Female Respondent	-0.0084	-0.1470***
	(0.0939)	(0.0437)
Age	0.0007	0.0063***
	(0.0039)	(0.0017)
Migrant	-0.0397	
	(0.0831)	
Ethnicity	Yes	Yes
Religion	Yes	Yes
Occupation category	Yes	Yes
Education category	Yes	Yes
Marital status	Yes	Yes
Settlement category	Yes	Yes
Municipal effects	Yes	No
Mean dependent variable	1.95	3.69
Number of municipalities	18	-
Observations	2,108	3,000
Pseudo R-squared	0.4752	0.2479

Notes: The unit of observation is an individual. Coefficients are derived from an ordered probit estimation. Dependent variable in both columns is the answer to the question "How important is nationality to you personally?". Outcomes in column 1 and column 2 are reported on a 1-to-4 and 1-5 scale, respectively, with a higher number indicating that a respondent attaches greater importance to national identity. Standard errors in column 1 are clustered at municipal-level. Conley (1999) standard errors are not applicable, given that the residuals in a probit estimation are now well defined. Column 2 standard errors are heteroskedasticity-robust, but are not clustered - the survey does not report the respondent's residence. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Sources: We take the 1989/90 survey from Kunovich and Hodson (2002) and the 2019 survey from USAID (2020).

Another prominent theory links conversions to the boy-tribute system *devširma*. Under this system, boys were periodically taken from Christian families, and trained as janissaries or high-ranking officials in Istanbul. About 200,000 Christians boys were levied from the Balkans, with the exact number coming from Bosnia unknown (Malcolm, 1994). Some, like Džaja (1999), claim that devširma is one of the principal mechanisms underlying the conversion process. The Christian families converted out of fear that their children would be enslaved and abducted.

There are three reasons why devširma is unlikely to be the main mechanism leading from low income to conversion. First, there is no evidence that the Ottomans were targeting poor areas. For that matter, the available historical evidence suggests that the boys were taken mostly from towns, with higher population density and easier access (Imamović, 1997). Second, in Bosnia, boys were also taken from Muslim families. The Muslims insisted that their children should taken too, as they perceived it as a mechanism through which their children could socially advance (Malcolm, 1994). Finally, although it is possible that devširma provoked fear of abduction and stimulated conversions, it is also possible that it provoked resistance and strengthened the Christian identity. For example, Dehdari and Gehring (2022) argue that state-repression under foreign rule strengthened the local identity in the French region of Alsace-Lorraine.

The final theory connects conversions to Islam's theological and cultural appeal (Imamović, 1997). It is not obvious, however, why poor Christians would have been more likely to convert. Christianity, like Islam, was attractive to the poor. Moreover, the dominant form of Christianity in Bosnia was that of the Franciscan order, which venerates poverty (Ćirković, 1964).

6.2 Theories on the persistence of Muslim affiliation

We are aware that we cannot exclude the possibility that other factors drive the persistence of religious affiliation after the initial conversion process. Changing religion can be intrinsically costly, and this factor alone can perhaps explain our results. We hypothesise, however, that this cost was reinforced by the morphing of the religious with the national.

A possible counterclaim to our hypothesis is that of endogenous sorting – Bosnian Muslims migrating to Muslim-dominated areas. This is unlikely for the 1468-1945 period. In premodern times, peasants and serfs were tied to the land, and the Ottoman landlords severely constrained labour mobility to avoid the loss of rent (Malcolm, 1994). Nothing changed in this regard during the Austro-Hungarian rule: the pre-existing landownership structure was maintained out of fear of alienating the Muslim, landowning, elite. Serfdom was finally abolished in 1918, but Bosnia remained locked in premodern income stagnation during the interwar period, and labour mobility remained extremely low (Calic, 2019).

Under socialist Yugoslavia, Bosnia experienced rapid economic growth and structural modernisation. The share of population engaged in agriculture decreased from 70 per cent in the 1950s to 20 per cent in the 1980s, which suggests an increase in labour mobility (Kukić, 2020). It is thus possible that endogenous selection mattered during the postwar period. Table A4 in appendix A.4, however, shows that there is no evidence of endogenous selection during this period. When combining survey data with population census data on municipality in which a respondent lives, the relationship between the population share of Muslims and Muslim immigration status is

statistically insignificant.[9] Nevertheless, even if endogenous selection mattered, this still begs the question why migrants, and their descendants, kept their religious affiliation. Further theories that get to the root of religious persistence are thus required.

Apart from the morphing of the religious with the national, persistence of religious affiliation can also be attributed to the intergenerational transmission of cultural differences. Following Botticini and Eckstein (2005), it is possible to argue that Christianity, like Rabbinic Judaism, encouraged the accumulation of human capital. In turn, this might have pushed Christians with a lower preference for education to convert. If these preference were transmitted over the generations, then religious affiliation might persist over time. This theory is unlikely to hold as there is no literacy requirement under Christianity or Islam. Moreover, illiteracy in the general Bosnian population during Ottoman times was extremely high - only 3 per cent of the population could read or write (Babuna, 1999). By 1910, educational level improved, but the vast majority of the population remained illiterate - close to 90 per cent (Babuna, 1999). Given this low level of literacy, it is unlikely that any difference in taste towards education made an an important impact on determining religious affiliation. Using survey data, table A5 of appendix A.4 shows that there is no evidence that Christians are more educated - the relationship between Christian affiliation and education is statistically insignificant.

A final theory to consider is occupational segregation. Ethnic and occupational segregation is common in developing and diverse countries (Alesina and La Ferrara, 2005; Alesina and Zhuravskaya, 2011). If religious groups sorted into different occupations, it might be that each group then attempted to exclude the other ones from the occupations in which it was over-represented. This could have increased the barriers to religious change, leading to a persistence of religious affiliation.

Like in Egypt (Saleh, 2018), it is possible to argue that Christians self-selected into white-collar occupations, and raised barriers against the Muslims. This is unlikely to hold in Bosnia, at least for the postwar period. In socialist Yugoslavia, all forms of ethnic and occupational segregation were forbidden to heal ethnic tensions stemming from WWII (Calic, 2019). The country was characterised by an elaborate system of ethnic quotas in the public sector, proportional to the population size of each group. Modern Bosnia and Herzegovina maintains the same system in place, despite the war of the early 1990s. Table A6 in appendix A.4 uses survey data, and shows that there is no evidence of occupational segregation in Bosnia - correlation between Christian affiliation and white-collar or blue-collar occupation is statistically insignificant.

7 Conclusion

Drawing on novel primary data sources, this paper traces the origins of religious change in medieval and premodern Bosnia to poverty. In particular, we argue that the poll tax, a regressive tax removed upon conversion to Islam, stimulated the low-income households to adopt Islam upon the Ottoman conquest of Bosnia. We also find that patterns of religious affiliation persist after the initial conversion process. We hypothesise that this persistence is at least partially driven by national identities that formed along religious lines in Bosnia, which reinforced the

[9] The relationship between Christian population share and Christian immigration is also insignificant.

cost of changing religion.

The most important contribution of our paper is to shed some light on the roots of the high religious diversity that characterises South-Eastern Europe. Yugoslavia as a union of South Slavic nations attempted to create a supranational identity in the 20th century that would bind the diverse religious and ethnic groups that composed the country. Religious and ethnic divisions, however, were at the center of the conflicts that characterised the region both during WWII and the 1990s. Our paper hopefully fosters the understanding of the formation and persistence of these divisions, and will stimulate other empirical work on the topic. We plan to analyse the interplay between religion and nationalism further, and examine the connection of these two factors to conflict in former Yugoslavia.

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A Appendix

A.1 Data

Outcome variables:

Muslim share of households in 1604 - we take it from the 1604 defter published in four volumes and translated into Bosnian by Handzić (2000). Given that this defter does not cover the totality of the district of Bosnia as of 1468, we complement it by the 1585 defter of *Hersek* (Herzegovina), translated by Aličić (2014). Any difference in time is captured by the sub-district effect of Hersek that our estimations include.

Muslim population share in 1879 and 1910 - we take it from the Austro-Hungarian population censuses of Statistički Odsjek Zemaljske Vlade (1880, 1912), respectively.

Muslim population share in 1961 and 1991 - we take it from the Yugoslav population censuses of Savezni Zavod za Statistiku (1965, 1991), respectively.

Muslim population share in 2013 - we take it from the population census of modern Bosnia and Herzegovina: Federalni Zavod za Statistiku (2017). Given that the district of Bosnia as of 1468 spread also over modern-day Serbia, Montenegro and Kosovo, we also use the 2011 population censuses of Serbia and Montenegro: Republički Zavod za Statistiku (2012) and Zavod za Statistiku (2011), respectively. We exclude the Kosovo population census of 2011 because it is incomplete, boycotted by the Serbs living in northern Kosovo.

Independent variables:

Suitability of land for wheat cultivation - data on the land suitability for wheat production is taken from the Food and Agriculture Organization (Online) (FAO). FAO provides a set of raster data covering the agroecological environment at the global level. The data provide a sufficiently high resolution to examine the average quality of land at settlement-level.

Terrain ruggedness - this variable is calculated as the mean difference between a central pixel and its surrounding cells. We use the European elevation (raster) data provided by European Environment Agency (Online) (EEA). The elevation data is of very high resolution (1 km x 1 km), allowing us to calculate terrain ruggedness at settlement-level.

Orthodox and Catholic monasteries - we take the location of medieval Orthodox and Catholic monasteries from Ćirković (1964).

Other - we take all the other control variables, as well as the main independent variable, from the 1468 and 1604 defters: Aličić (2008) and Handzić (2000), respectively.

A.2 Bias from unobservables

Despite using a rich set of controls, the estimates reported in table 2 of the main text might be biased by unobservable factors correlated with selection into richer areas. We assess the likelihood that the unobservables are biasing the estimates by using the method of Oster (2019), based on Altonji et al. (2005). Altonji et al. (2005) argue that selection on observables can be used to assess the bias from the unobservables. They propose a ratio that compares how much the coefficient on the treatment variable (income per household) declines as the control variables are added. A glance through panel A of table A1 shows that the coefficient on income is identical.

The extension of Oster (2019) stresses the importance of taking into account by how much the overall fit of the regression improves when the controls are added. She argues that it is not sufficient to look only at coefficient stability. It is important to scale it by a movement in the R-squared. In panel A, the R-squared increases from 0.101 to 0.521 when adding the controls. The controls thus account for a substantial share of the overall variation.

In Panel B, we use the bounding argument of Oster (2019) more formally. She considers a standard linear regression model $Y = \beta X + W_1 + W_2 + \epsilon$, where X is the treatment variable, W_1 is a vector of observable controls, and W_2 is the vector of unobservables. She then defines

Table A1: Bias from un-observables, Oster (2019) method, dependent variable: Muslim share of households (1604)

Panel A: Coefficient stability and R-squared			Panel B: δ
Coefficient	R-squared	Controls	Value
-0.0019	0.101	No	14.8
-0.0019	0.521	Yes	

Notes: Following the methodology of Oster (2019), the table reports the strength of selection on unobservables, relative to observables, that is required to attribute the entire OLS estimate of the relationship between income and Muslim affiliation to omitted variables. The controls are household size, mine location, household share of widows, fugitives, singles and migrants, distance to nearest Catholic monastery, Orthodox Monastery, Church of Bosnia and market centre, and terrain ruggedness. These controls are the same as those in column 14 specification of table 2.

the selection relationship as $\delta \frac{Cov(W_1 X)}{Var(W_1)} \frac{Cov(W_2 X)}{Var(W_2)}$, where δ is the factor that would decrease the coefficient on the treatment variable to zero.

The crucial part of the exercise is to determine how much of the variation in Muslim share of households, R_{max}, can W_1 and W_2 explain. She proposes a standard based on the performance of her estimator in randomized data, $R_{max} = 1.3R_1$, where R_1 is the R-squared derived from the model which includes the controls – in this case, 0.521.

Making this assumption in panel B of table A1 produces $\delta = 14.8$. This means that selection on unobservables would need to be at least 14.8 times greater than selection on observables to reduce to coefficient on income to zero. This value comfortably passes the $\delta \geq 1$ threshold that Oster (2019) considers reasonable for the OLS estimate to be robust. In other words, it is extremely unlikely that omitted variables can overturn the results.

A.3 Relaxing the exclusion restriction

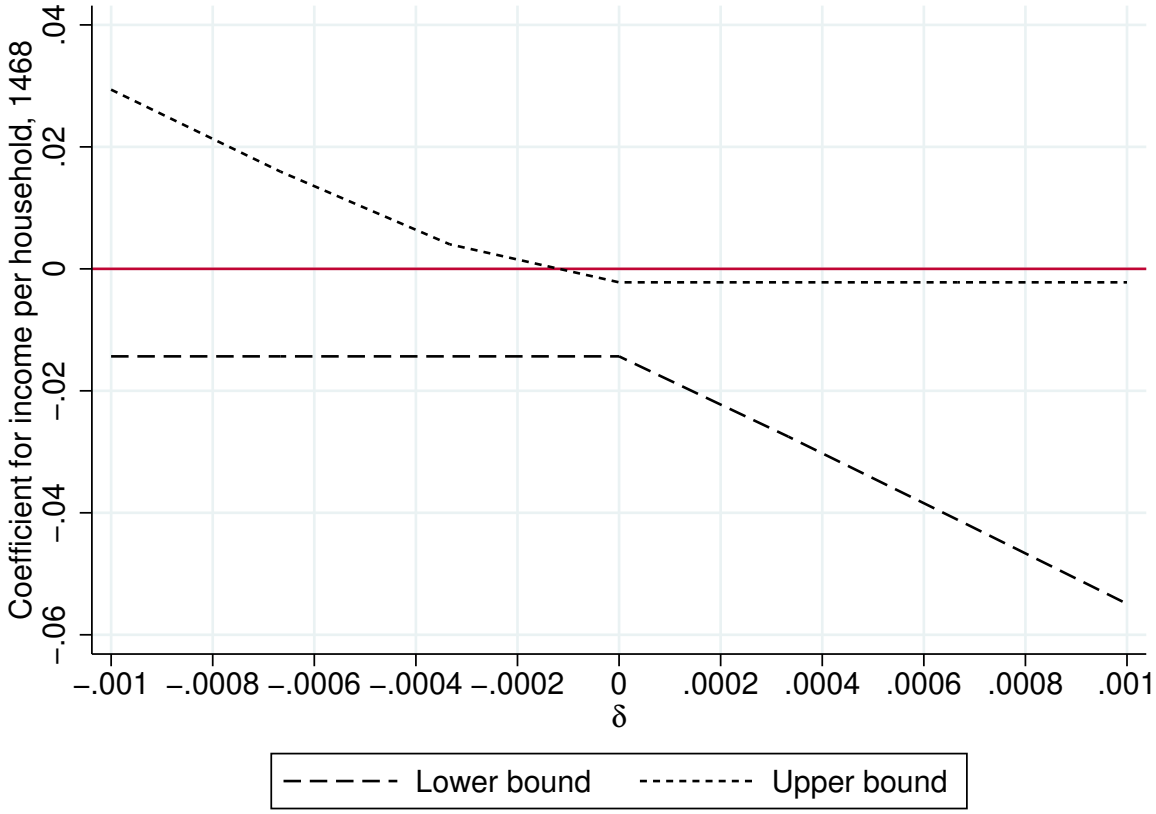
The requirement of perfect exogeneity is a strict assumption that is unlikely to hold exactly in any historical setting. To gain a sense of the robustness of our IV estimates, we relax the assumption of perfect exogeneity and examine the bounds we are able to place on the true effect of income on Muslim affiliation as we deviate from perfect exogeneity.

We follow Conley et al. (2012), who propose a method which allows the instrument to have a direct impact on the outcome variable - in this case, independent of the income effect. Following their method, we assume that the potential impact of land suitability for wheat cultivation on Muslim affiliation, γ, is uniformly distributed in the interval $[-\delta, \delta]$.

With this method, by varying δ, we can identify the threshold at which the coefficient on income per household in the second-stage becomes statistically insignificant at the 10 per cent level. We experiment with both a positive and a negative interval of δ, as the potential direction the instrument affects the dependent variable is unclear.

Figure A1 relaxes the exclusion restriction, and identifies the threshold of $\delta = (-)0.00016$ at which the coefficient on income in the second-stage becomes statistically insignificant at the 10 percent level. Put alternatively, as long as the direct effect of wheat suitability on Muslim affiliation is less than (-) 0.00016, the coefficient on income per household remains significant at the 10 per cent level. For that matter, if $\delta > 0$, the confidence interval on the coefficient

Figure A1: Confidence interval on income per household (1468) with relaxed exclusion restriction, Conley et al. (2012) method



Notes: The figure shows the upper and lower bound of the 90% confidence interval of the second-stage coefficient on income per household, using the column 3 specification of table 3 in the main text. It follows the union of confidence intervals approach in Conley et al. (2012), which allows for a direct effect of wheat suitability on the Muslim share of households, assuming this is uniformly distributed in the interval $[-\delta, \delta]$.

on income moves further from zero, relative to the IV estimate in table 3 of the main text. In other words, if wheat suitability had a positive impact on conversions, then the IV coefficient underestimates the true effect of income on Muslim affiliation.

To gauge the magnitude of the threshold at which the coefficient on income in the second-stage becomes statistically insignificant, we estimate the reduced-form effect of wheat suitability on the share of Muslims in table A2, which is (-) 0.00016. The impact of the instrument on Muslim affiliation ($\delta = -0.00016$) would thus have to be equivalent to 100 per cent of the overall reduced-form effect to render the validity of the 2SLS results insignificant. The analysis reveals that the instrument would thus have to deviate very far from the exclusion restriction to make the results insignificant.

Table A2: OLS estimates, reduced-form relationship between wheat suitability and conversions to Islam, dependent variable: household share of Muslims (1604)

	(1)
Wheat suitability	-0.0002
	(0.0001)**
	[0.0001]**
Controls	Yes
Region effects	Yes
Observations	793
R-squared	0.435

Notes: The unit of observation is a settlement - town or village. The controls are household size, mine location, household share of widows, fugitives, singles and migrants, distance to nearest Catholic monastery, Orthodox Monastery, Church of Bosnia and market centre, and terrain ruggedness. These controls are the same as those in column 14 specification of table 2. Two standard errors are reported below each coefficient. Heteroscedasticity-robust standard errors are reported in parentheses. Conley (1999) standard errors, which adjust for both heteroscedasticity and autocorrelation, i.e., spatial correlation, are reported in square brackets. The Conley (1999) standard errors are constructed assuming a window with weights equal to one for observations less than 100 kilometers apart, and zero for observations further apart. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Sources: For data sources, see section 3 and the data appendix A.1.

A.4 Additional results

Table A3: OLS estimates, relationship between Christian share of the population and the age structure, 1885 census

	(1) Population share of children (0-9)	(2) Population share of old (60 and above)
Christian population share	0.0132	0.0187
	(0.0052)**	(0.0068)***
	[0.0036]***	[0.0082]**
Controls	Yes	Yes
Observations	48	48
R-squared	0.277	0.277

Notes: The unit of observation is a municipality. The 1885 census does not provide data on age-structure at settlement-level. The dependent variable in column 1 is the population share of those aged 0-9 in the population, while the dependent variable in column 2 is the population share of those aged 60 and above. The OLS regression shows that the Christian share of population is positively associated with the population share of children (column 1) and the old (column 2). The controls are agricultural share of labour, male share of population, and the married share of population. Two standard errors are reported below each coefficient. Heteroscedasticity-robust standard errors are reported in parentheses. Conley (1999) standard errors, which adjust for both heteroscedasticity and autocorrelation, i.e., spatial correlation, are reported in square brackets. The Conley (1999) standard errors are constructed assuming a window with weights equal to one for observations less than 100 kilometers apart, and zero for observations further apart. *** p<0.01, ** p<0.05, * p<0.1.
Sources: For data sources, see section 3 and the data appendix A.1.

Table A4: Probit estimation, examining endogenous selection, 1989/90 survey data

	Dependent variable	
	Muslim immigrant	Christian immigrant
	(1)	(2)
Muslim population share	-0.0527	
	(0.2642)	
	[0.3580]	
Christian population share		0.2490
		(0.2554)
		[0.4004]
Female respondent	0.1263	0.1877
	(0.1221)	(0.1168)
	[0.1398]	[0.1286]
Age of respondent	-0.0141	0.1446
	(0.0051)***	(0.4319)
	[0.4763]*	[0.4888]
Ethnicity (19 categories)	Yes	Yes
Education (14 categories)	Yes	Yes
Occupation (18 categories)	Yes	Yes
Marital status (5 categories)	Yes	Yes
Settlement (6 categories)	Yes	Yes
Municipal controls	Yes	Yes
Mean dependent variable	0.1252	0.1461
Number of municipalities	18	18
Observations	1,744	2,098
Pseudo R-squared	0.2929	0.4016

Notes: The unit of observation is an individual. Coefficients are derived from a probit estimation. Independent variable of interest in column 1 is the Muslim population share of the municipality in which a respond lives, while the equivalent independent variable of interest in column 2 is the Christian share of the population. Columns 1 and 2 show that there is no evidence of endogenous selection in Yugoslavia. The relationship between the population share of Muslims and Muslim immigrant status is statistically insignificant in column 1. The equivalent relationship between Christian population share and Christian immigrant status is insignificant as well. Municipal controls are income per capita, population size and the educational attainment of the workforce. The number of observations varies across columns because ethnicity in some cases predicts failure or success completely. Standard errors in parenthesis are robust to heteroskedasticity, while those in squared brackets are clustered at municipal-level. Conley (1999) standard errors are not applicable, given that the residuals in a probit estimation are now well defined. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Sources: We take the 1989/90 survey from Kunovich and Hodson (2002).

Table A5: Probit estimation, relationship between Christian affiliation and education, 1989/90 survey data, dependent variable: educational attainment (9 categories)

	(1)
Christian	0.0163
	(0.2424)
	[0.1876]
Female respondent	-0.3278
	(0.0861)***
	[0.1296]**
Age of respondent	-0.0261
	(0.0034)***
	[0.0050]***
Migrant	-0.0938
	(0.0705)
	[0.0842]
Ethnicity (19 categories)	Yes
Occupation (18 categories)	Yes
Marital status (5 categories)	Yes
Settlement (6 categories)	Yes
Municipal effects	Yes
Mean dependent variable	3.51
Number of municipalities	18
Observations	2,108
Pseudo R-squared	0.2548

Notes: The unit of observation is an individual. Coefficients are derived from an ordered probit estimation. Dependent variable in column 1 is educational attainment, spread over 9 categories, with a higher number indicating higher educational attainment level. The regression shows that there is not evidence that Christians had a stronger taste for education. For that matter, Christian affiliation is negatively associated with education. Heteroscedasticity-robust standard errors are reported in parentheses. Standard errors clustered at municipal-level are reported in square brackets. Conley (1999) standard errors are not applicable, given that the residuals in a probit estimation are now well defined. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Sources: We take the 1989/90 survey from Kunovich and Hodson (2002).

Table A6: Probit estimation, relationship between Christian affiliation and occupation, 1989/90 survey, dependent variable: occupation

	Dependent variable	
	White-collar occupation	Blue-collar occupation
	(1)	(2)
Christian	0.1080	-0.0560
	(0.1423)	(0.1274)
	[0.1491]	[0.1125]
Female respondent	0.6749	-0.7246
	(0.0957)***	(0.0902)***
	[0.1651]***	[0.1510]***
Age of respondent	-0.0115	-0.0523
	(0.0040)***	(0.0045)***
	[0.0036]***	[0.0033]***
Migrant	0.0444	-0.1540
	(0.0950)	(0.0881)*
	[0.1364]	[0.0992]
Ethnicity (19 categories)	Yes	Yes
Education (14 categories)	Yes	Yes
Marital status (5 categories)	Yes	Yes
Settlement (6 categories)	Yes	Yes
Municipal effects	Yes	Yes
Mean dependent variable	0.2172	0.5778
Number of municipalities	18	18
Observations	1,912	1,963
Pseudo R-squared	0.4795	0.4525

Notes: The unit of observation is an individual. Coefficients are derived from a probit estimation. Dependent variable in column 1 is white-collar occupation, composed of protective service, administrative worker, manager, professional and artist. Dependent variable in column 2 is blue-collar occupation, composed of private farmer, agricultural worker, industrial worker or miner, construction worker, transportation worker, worker in trade and service worker. The remaining occupations are composed of worker without steady occupation, with personal income, houseworker, unemployed, other dependent person, and other occupation. The estimations shows that there is no evidence of occupational segregation - the correlation between Christian affiliation and different occupation categories is statistically insignificant. The number of observations varies across columns because ethnicity in some cases predicts failure or success completely. Standard errors in brackets are robust to heteroskedasticity, while those in squared brackets are clustered at municipal-level. Conley (1999) standard errors are not applicable, given that the residuals in a probit estimation are now well defined.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Sources: We take the 1989/90 survey from Kunovich and Hodson (2002).

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