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Reallocation and Secularization: The Economic Consequences of the Protestant Reformation

Davide Cantoni
Jeremiah Dittmar
Noam Yuchtman

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

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Abstract

The Protestant Reformation, beginning in 1517, was both a shock to the market for religion and a first-order economic shock. We study its impact on the allocation of resources between the religious and secular sectors in Germany, collecting data on the allocation of human and physical capital. While Protestant reformers aimed to elevate the role of religion, we find that the Reformation produced rapid economic secularization. The interaction between religious competition and political economy explains the shift in investments in human and fixed capital away from the religious sector. Large numbers of monasteries were expropriated during the Reformation, particularly in Protestant regions. This transfer of resources shifted the demand for labor between religious and secular sectors: graduates from Protestant universities increasingly entered secular occupations. Consistent with forward-looking behavior, students at Protestant universities shifted from the study of theology toward secular degrees. The appropriation of resources by secular rulers is also reflected in construction: during the Reformation, religious construction declined, particularly in Protestant regions, while secular construction increased, especially for administrative purposes. Reallocation was not driven by pre-existing economic or cultural differences.

Keywords: protestant reformation, secularization, sectoral allocation, human capital
JEL codes: N13; N33; J24; E02

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Davide Cantoni, University of Munich, CEPR and CESifo. Jeremiah Dittmar, London School of Economics, CEPR and Centre for Economic Performance, London School of Economics. Noam Yuchtman, UC-Berkeley, Haas School of business, NBER and CERifo.

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1 Introduction

Secularization is a process that has defined the modern, Western world, but its origins are poorly understood. Many social scientists argue that the Protestant Reformation catalyzed the process that reduced the role of religion in European culture and society (Weber, 1904/05; Troeltsch, 1906; Mills, 1959; Berger, 1967).[1] Contemporary observers have pointed out the lead taken by Protestant societies in reducing the presence of religiosity in public life (Hölscher, 2005). Yet very little evidence exists establishing a direct link from the Reformation to secularization, with many scholars arguing for the importance of intermediate factors such as industrialization, social conflict, or nationalism (McLeod, 1981; Norris and Inglehart, 2004; Martin, 2005; Becker and Woessmann, 2013; Becker et al., 2017). Indeed, it is natural to wonder whether and how a religious revival movement that increased competition in the market for religion would drive secularization.

In this paper we take an economic approach to studying the impact of the Reformation on secularization. First, we conceptualize economic secularization as the allocation of resources between religious and secular uses. Second, we develop a political economy framework to understand the transmission of a shock from the market for religion to the sectoral allocation of economic activity. Third, we assemble new, highly disaggregated data on monastery expropriation, the universe of German university graduates, and construction events by sector (religious and secular) at the town-by-year level, across over 2,000 German towns. We use these data to examine the reallocation of economic resources between the religious sector—whether Catholic or Protestant—and the secular sector, in Germany, in the decades following Luther's posting of his 95 theses in 1517.[2] We document a sharp reallocation of economic activity away from religious uses—not just away from the Catholic Church—during the Reformation; that is, we observe rapid *economic* secularization in a society that at the same time remained deeply suffused with cultural religiosity.

Our political economy framework helps us understand this process. It begins with a central feature of the Reformation: conflict over the control of resources and jurisdiction between secular state authorities and the Catholic Church, and the expropriation of monasteries by secular authorities. The closure of monasteries transmitted a shock to labor markets: labor demanded by the Catholic Church fell and labor demanded by enriched and empowered secular authori-

[1] Mills (1959, p. 32) writes, "After the Reformation and the Renaissance, the forces of modernization swept across the globe and secularization, a corollary historical process, loosened the dominance of the sacred."

[2] "Religious sector" and "secular sector" are imperfect, but concise, terms for activities in a society that was permeated by religiosity. To be clear, we use the term "religious" to describe actions that were primarily oriented toward religious observance: for example, the construction of a church; taking a position as a monk or priest; or, the study of theology, which almost invariably led to a job as a monk, priest, etc. In contrast, we use the term "secular" to describe actions that were not primarily oriented toward religious observance: for example, constructing a hospital, merchant hall, or palace; taking a position in a secular lord's public administration; or studying law. The "secular sector" of the economy thus included many religious individuals and even involved religious institutions (Catholic and Protestant), but was oriented toward different immediate aims from the "religious sector". "Germany", too, is an anachronistic term. To be precise, we study the German-speaking lands of the Holy Roman Empire. For concision, we use the term "Germany" throughout the text.

ties increased. In turn, returns to investments in human capital specific to church careers fell and became more uncertain. Shifts in resources—skilled labor, as well as land and physical capital—toward the secular authorities were then reflected in fixed investments embodying these factors of production, such as the building of significant urban structures.

We document each component of this process. First, as an indicator of the negative shock to the Catholic Church and of the resources appropriated by secular lords, we provide evidence on the closure of monasteries after 1517. Closures were particularly pronounced in regions that adopted Protestantism. There were no pre-Reformation differential trends in the closure of monasteries between territories that would eventually become Protestant and those that would remain Catholic, consistent with the Reformation playing a causal role in driving the decline of monasteries.[3]

The expropriation of resources belonging to the Catholic Church could have resulted in simply an intrasectoral transfer of resources from Catholic to Protestant uses—if Protestant rulers had the same objective function as the Catholic Church and allocated their newly acquired resources accordingly. The shock to the Catholic Church could even have led to a positive net change in the size of the religious sector, to the extent that competition improved the quality of religious services (Iannaccone, 1998; Ekelund et al., 2006). On the other hand, if secular rulers who adopted Protestantism had objectives that prioritized non-religious activities such as the expansion of public administration we would expect intersectoral reallocation. Intersectoral reallocation might also have been supported by Protestant theology, which aimed to reduce corruption in the religious sector and to effect a partial *disintermediation* in the production of salvation, reducing the role of clerics as religious middlemen, and freeing resources for other uses. We next examine the allocation of resources between the secular and religious sectors during the Reformation.

We study the market for highly skilled labor, where one can observe how the shock to the Catholic Church shaped the allocation of human capital. We examine individual-level data on the career choices of university graduates around the time of the Reformation.[4] We show that during the Reformation, graduates from Protestant universities shifted toward secular occupations, and away from religious ones (e.g., becoming city councillors or goldsmiths, rather than priests or monks).[5] We find no pre-Reformation differences in occupational choice trends between universities that would become Protestant and those that would remain Catholic. Our results reflect the

[3]The question of why particular territorial lords adopted the Protestant religion is an important one, addressed in Cantoni (2012), Rubin (2014), and Curuk and Smulders (2016). Our findings of parallel pre-Reformation trends, in monastery closures, human capital investments, and other economic variables, discussed below, suggest that the sources of variation in adoption were generally not associated with our outcomes of interest prior to the Reformation.

[4]The important roles played by human capital elites in European history have been explored by Mokyr (2009); Cantoni and Yuchtman (2014); Squicciarini and Voigtländer (2015); Dittmar and Meisenzahl (2016). We build on their work by discussing a specific source of variation in university students' selection into fields of study and careers.

[5]Particularly in light of Protestant attacks on Catholic Church corruption, this result calls to mind of work by Murphy et al. (1991), who study the allocation of talent between a rent-seeking and productive sector. We focus here on documenting the reallocation of resources across sectors, leaving the study of efficiency or productivity consequences to future work.

transmission of the shock to the market for religion into causal effects on the labor market.[6]

While the Protestant Reformation was a religious movement, an implication of the labor market shock is the reallocation of forward-looking students' human capital investments *away* from church-specific fields, toward secular ones. Indeed, we find that immediately after the start of the Reformation, individuals at Protestant universities reallocated their human capital investments away from theology degrees, and toward the study of more general, secular subjects.[7] The data are consistent with the Reformation playing a causal role in driving educational choices: we do not observe pre-Reformation declines in the study of theology or pre-Reformation differences in degrees granted between universities that would become Protestant and those that would remain Catholic.

We finally consider major construction events as summary statistics for the allocation of resources, embodying bundles of land and physical, financial, and human capital. Reflecting the reallocation of resources toward secular authorities, during the Reformation new construction events shifted from religious purposes toward secular ones (e.g., from churches to administrative buildings and lords' palaces). Figure 1 shows a striking pivot from church sector construction to secular sector construction precisely at the time of the Reformation. Further analysis finds that this sectoral reallocation away from church uses occurred differentially more in Protestant territories. Again, the evidence is consistent with the Reformation playing a causal role: we find no evidence of a pre-Reformation shift toward secular construction, or of differential pre-Reformation trends in construction between Catholic and Protestant territories.

The disaggregated nature of our construction data allows us to test competing hypotheses. One alternative to our proposed political economy mechanism is that what appears to be secularization is a mere relabeling of activities that were simply transferred from Catholic Church jurisdiction to Protestant secular lords. Historically, construction supporting social service provision is difficult to assign definitively to the religious or secular sectors. However, when we disaggregate secular construction into finer categories, we do not observe a shift in construction for social service provision. Another alternative is that the apparent secularization reflects the transfer of spending commitments to religious warfare conducted by secular authorities. However, in our analysis of finer categories of secular construction, we observe no shift in military construction through 1600. Our own theory predicts that the reallocation of resources should specifically have been toward uses favored by secular lords. We find that the increases in secular construction were predominantly in administrative buildings and lords' palaces—as the theory predicts.

In assessing whether the Reformation played a *causal* role in driving sectoral reallocation one first worries about unobserved differences between eventually-Protestant and Catholic territories and universities. However, it is unlikely that territory- or university-specific unobservables

[6]Note that the causal effect of the Reformation on occupation choice reflects both changes in labor supply and changes in labor demand.

[7]See Altonji et al. (2012) for a contemporary analysis of how students' college major choices are affected by expectations of future labor market outcomes.

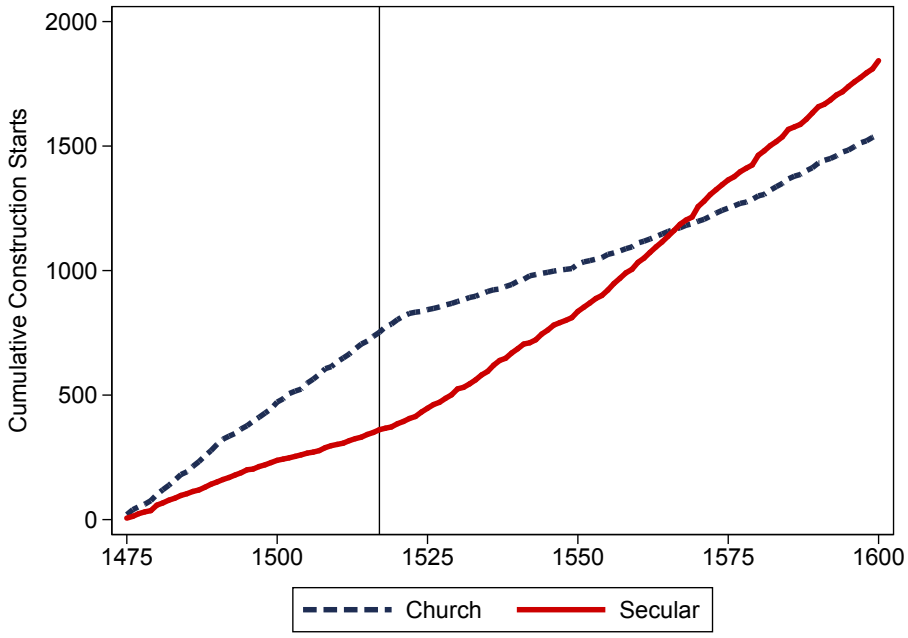

Figure 1: Cumulative number of new construction events in the religious and secular sectors in Germany. Town-level construction data come from the *Deutsches Städtebuch* and are aggregated for all of Germany.

explain our findings: we find no evidence that universities or territories that adopted the Reformation looked any different from those that did not before 1517.

Another natural concern is that time-varying and territory-specific unobservables may have driven both the adoption of Protestantism and economic secularization. A large literature documents a wave of urban support for the Reformation and that cities were key locations where reformist ideas and constituencies developed (Ozment, 1975; Hamm, 1994). One might wonder whether cities at the leading edge of the Reformation drive our findings. However, we find virtually identical results when we limit our analysis to small towns. Another possibility is that changes in economic conditions drove both the adoption of Protestantism and secularization. To explore this possibility, we examine a set of territories where the *timing* of adoption was plausibly exogenous—due to unanticipated changes in rulers. We find that within this set of territorial religious changes that were independent of underlying economic conditions, the same pattern of economic secularization ensues.

Our findings contribute to a larger political economy literature on modernization, much of which has focused on the rise of democratic political institutions or the emergence of modern economic growth.[8] Our work documents another important historical dimension of moderniza-

[8]Among others, see Lipset (1959), Barro (1999), Galor and Weil (2000), Acemoglu et al. (2005), Mokyr (2005), Clark

tion: the secularization of Western society, a component of Émile Durkheim's "functional differentiation" (Durkheim, 1893, 1912). Durkheim argued that the transfer of tasks once carried out exclusively by the Church (through monasteries, churches, cathedral schools etc.) to specialized professionals and organizations was a fundamentally important process in Western history. We provide quantitative, microeconometric evidence of this process, and point to the Reformation as playing a key role in initiating it.

Our analysis also contributes to the large literature on the economic consequences of religion and culture (e.g., Barro and McCleary, 2003; McCleary and Barro, 2006; Guiso et al., 2006; Kuran, 2011), and more specifically to the growing body of quantitative empirical work on the impact of the Reformation on economic outcomes in Europe. Becker et al. (2016) present a comprehensive review of this literature, discussing studies of the Reformation's effects on human capital acquisition (e.g., Becker and Woessmann, 2008, 2009; Boppart et al., 2013); work ethic (e.g., Basten and Betz, 2013; Spenkuch, 2016); and, economic development (e.g., Becker and Woessmann, 2009; Cantoni, 2015; Heldring et al., 2015; Dittmar and Meisenzahl, 2016). As Becker et al. (2016) observe, existing work typically studies effects over the long run, with outcomes observed in the 19th, 20th, and even 21st centuries.[9]

Our work complements the existing empirical work on the Reformation by treating it as a sector-specific macroeconomic shock, and examining its short- and medium-run effects on the allocation of resources between religious and secular uses.[10] It thereby complements a large contemporary literature on sectoral shocks and the allocation of economic inputs, particularly labor (e.g., Davis and Haltiwanger, 2001; Autor et al., 2016; Charles et al., 2016a,b). Our finding of *economic* secularization—distinct from cultural, social, or even political secularization—following the Reformation can reconcile views of a Reformed Europe that was both extremely religious, and also on the path toward secularization (e.g., Saint-Simon, 1975; Berger, 1967; Taylor, 2007).[11]

In what follows, we first, in Section 2, present a historical overview of the Reformation viewed through a framework linking religion to Europe's political economy and labor markets. Next, in Section 3, we describe the datasets that we constructed to study the Reformation's economic consequences. In Section 4, we document the reallocation of resources between the religious and secular sectors. Finally, in Section 5 we offer concluding thoughts.

(2007), Acemoglu et al. (2009), Allen (2009), Mokyr (2009).

[9] Exceptions include Dittmar and Meisenzahl (2016), who study human capital responses to institutional change in the short run, and Cantoni (2015), who studies consequences for growth in the early modern era.

[10] In examining the impact of religious shocks on the allocation of resources within a society, our work is closely related to that of Chaney (2008, 2013), but examining a different context, and exploiting more disaggregated data along multiple margins. See also Paldam and Paldam (2017) for a study of church construction over time in Denmark.

[11] Summarizing these positions, Gorski (2000) points out the apparent paradox of a religious movement that, at the same time, broke the authority of a monopolistic church and yet introduced tight links between the new churches and states: "differentiation—-the breakup of the Roman Church and the emergence of the great confessions—was accompanied by de-differentiation—tighter links between church and state and closer cooperation between clergy and laity" (p. 158).

2 Historical background and conceptual framework

We view the Reformation as a shock to the market for religion, which precipitated economic secularization. In this section, we place the Reformation in its historical context and describe the ramifications of the religious shock for Europe's political economy and labor markets. Here we describe these historical processes at work. We provide a brief timeline of the Reformation's major events in Germany in Table 1.

Table 1: Timeline of Major Reformation Events, 1517–1648

Date	Event
1517	Luther posts 95 theses in Wittenberg
1521	Edict of Worms condemns Luther as a heretic
1522	First formal Protestant ordinances passed
1524–1525	Great Peasants' War
1546–1547	Schmalkaldic War
1555	Peace of Augsburg establishes *cuius regio, eius religio* principle
1618–1648	30 Years' War

2.1 The Reformation as a shock to the market for religion

At the start of the 16th century, just prior to the Reformation, the Catholic Church enjoyed a virtual monopoly in the market for religion in Western Europe and extraordinary wealth and power (the foundation stone of St. Peter's Basilica in Rome was laid in 1506). The Church functioned as an expensive intermediary between lay people and the divine, with services conducted in Latin and substantial resources devoted to supporting specialist clerics (Cameron, 1991).

In October 1517, Martin Luther posted his famous 95 theses critiquing Church practices. Luther's critiques focused on the corruption of the Catholic Church, particularly the sale of "indulgences," which believers purchased to secure early release from purgatory. While Luther did not set out to challenge the religious monopoly of the Catholic Church, a clear break between the Church and Luther emerged in 1521, when the Edict of Worms condemned him as a heretic. The emergence of the Protestant Reformation as a movement that challenged the Catholic Church was possible for two reasons: first, Luther and his supporters were able to disseminate their ideas widely, rapidly, and relatively cheaply using the newly invented printing press (Rubin, 2014; Dittmar and Seabold, 2016). Second, politically active laymen adopted and adapted reformist ideas and pressed them on governing elites (Cameron, 1991).

The reformers argued that biblical authority was paramount over and above the authority of existing church institutions, called for moral renewal within cities, and were often anti-clerical and anti-monastic (Moeller, 1972; Dykema and Oberman, 1993). Protestants argued for and began to

implement a program that included the abolition of the Catholic rite mass, the establishment of safeguards against church corruption, and increased public goods provision in health and education (Dittmar and Meisenzahl, 2016). The impact of the movement was seen quickly, with the first local ordinances enshrining elements of Protestant ideology in city laws passed in 1522.[12]

The reform movement also inspired more radical action, inflaming the Great Peasants' War of 1524–1525 (Blickle, 1981). A declaration from the period captures the popular spirit of anti-monasticism of the time (Cohn, 1979, p. 28): "It is well known and clear to all that everywhere there are too many monasteries, and that they unashamedly claim to be outside the world, and yet together with the large foundations they even bring into their own possession all the goods of the world ... we have considered together and decided to tolerate no monastery any longer, but to close them."

2.2 The Reformation as a political economy shock

In the first years after 1517, cities were the main actors behind the movement to reform the Church, with the territorial lords remaining more cautious. However, this changed over the course of the 1520s. The Reformation provided an important opening for renegotiating the balance of power between the Catholic Church and secular lords. Our empirical analysis below shows that princes who turned to Protestantism filled the void left by the Church—a near-monopolistic provider of spiritual, educational, and social welfare services—by reallocating physical and human capital to a secular, state-run administration.

Leveraging the anti-monasticism of the Protestant movement to acquire property and power was a natural temptation for secular princes. Ocker (2010, p. 62) writes, "Monasticism is relevant ... for the simple reason that monasteries were landholders, sometimes very great landholders, and hence they fragmented the dominions of the European historian's much-anticipated confessional states." Some monasteries voluntarily closed for ideological reasons and princes expropriated others in the name of religious duty: "Princes like Philip of Hesse, whose confiscations in 1527 set an early benchmark for evangelical church-plundering, defended their actions as defense of religion, as protecting the church from the malpractice of priests, monks, and nuns" (Ocker, 2010, p. 62; see also Ocker, 2006).

The Reformation provided an opportunity for secular rulers to strengthen their fiscal positions as well. Prior to the Reformation, religious orders enjoyed exemption from taxes and civic duties, monopolies on priced religious services (e.g., funeral services) and on the production of products like beer. Whether in the name of populism or religious duty, many princes saw an opportunity to enhance their political and economic positions as a result of the Reformation. It is

[12]Cities and urban actors played a central role in the development and diffusion of Reformation ideas and institutions (Moeller, 1972; Dittmar and Meisenzahl, 2016). Cities contained the necessary concentrations of people, levels of literacy, and cultural sophistication to put the ideas of religious reformers on the political agenda in the 1520s (Brady, 1998; Ozment, 1975).

worth noting that the shifting of the balance of power was not exclusive to territories that adopted Protestantism: rulers who remained Catholic, too, were able to strike better bargains with the Church under the threat of conversion (Cameron, 1991).

In Germany, the Reformation produced considerable heterogeneity in religion across territories, with many princes, as well the Holy Roman Emperor, remaining Catholic. Conflict between princes who adopted Protestantism and those who remained Catholic reached a climax in the 1540s, with the establishment of the Schmalkaldic League of Protestant princes, and the Schmalkaldic War of 1546–1547. While the Protestant princes were defeated in the war, Holy Roman Emperor Charles V was unable to re-establish a single faith across the Empire. In 1555 the Peace of Augsburg was agreed to, setting the rule *cuius regio, euis religio* (whose rule, his religion), allowing territorial lords to adopt either Catholicism or Lutheranism for their territories. Thus, by the mid-1500s, Protestantism in Germany acquired the geographic distribution it would maintain for several centuries (Brady, 1998, p. 373), though the 30 Years' War of 1618–1648 represented a cataclysmic upheaval a half century after the Peace of Augsburg.

The new political economic equilibrium was quite different from the old, with secular rulers strengthened, particularly in those territories that adopted Protestantism. The Peace of Augsburg provided, for over half a century, a reliable legal setting that allowed for the implementation of the Reformation and the creation of state churches in the territories that converted. As Luther himself wrote (cited in Brady, 2009, p. 260):

> If I, Dr. Martin Luther, had never taught or done anything else than to illuminate secular government or authority and make it attractive, for this one deed the rulers should thank me. ... Since the Apostles' time no theologian or jurist has more splendidly and clearly confirmed, instructed, and comforted the temporal rulers than I, by special divine grace, was able to do.[13]

2.3 The Reformation as a labor market shock

The Reformation's direct political economy effects—strengthening secular rulers, weakening the Catholic Church, and instigating a wave of monastery expropriations and closures—had indirect effects on the market for skilled labor. One can think about this in terms of stocks and flows. Regarding stocks, prior to the Reformation, the Catholic Church was Germany's largest employer of university graduates. Among German university students before 1550, over 65 percent of graduates pursued in careers in the Church. Data in Jürgensmeier and Schwerdtfeger (2005–2008) suggest the existence of over 80,000 monks in Germany just prior to the Reformation—over 1%

[13]Note that Lutherans would not have seen a contradiction in their religious movement strengthening secular lords. Luther's "Doctrine of the Two Kingdoms and the Two Governments" distinguished between two distinct realms of governance: the institution-free realm of "the word," between Christ and the believer's soul, and the "realm of the world," which operated "through visible structures, published rules, and coercive force" (Cameron, 1991, p. 180).

of the German population at the time—with two thirds of them released into the broader labor market by monastery closure in the decades following 1517.[14]

Flows of highly skilled labor entering the labor force would likely have been redirected as well. Prior to the Reformation, the most common first occupation among German university graduates was employment as a monk. Monastery closure and a shift in economic power away from the Catholic Church reduced labor demand and increased uncertainty in the most important sector of employment for the newly graduated. There was a supply-side effect of the Reformation as well: Ocker (2010, p. 62) writes, "The new faith rebutted the most compelling reason to become a monk or a nun—to save one's soul and the souls of others. This rebuttal coincided with, and surely abetted, widespread attrition in monasteries."

Secular princes' increased power and resources meant that the path from higher education into secular employment was increasingly appealing. An ordinance from Württemberg from 1546 notes that "Men are needed to serve in preaching offices, governments, temporal posts, [and] administrative offices" (Strauss, 1988). Luther himself wrote about the importance of high levels of education for state service: "[The common man should be able to read in German at home.] But to preach, to rule, to judge, ... all arts and languages of the world are not enough" (cited in Seifert, 1996, p. 257).

Reflecting their increased demand for skilled labor, princes provided support for investments in university education.[15] In 1527 Landgrave Philipp of Hesse, after establishing a new university in Marburg, also decided to provide students with stipends, financed through the revenues derived from former Church property (Seifert, 1996, pp. 271–272). Thus, shifts in labor market demand and supply seem to have pushed human capital away from church-sector employment and toward secular employment—we will examine this in further detail below.

2.4 The Reformation and resource reallocation

Cameron (1991, p. 159) writes that, "For laypeople, the point about the Reformation was that it abolished the expensive and complicated apparatus to which they had resorted so regularly for the good of their souls." The abolition of this apparatus in parts of Germany freed resources for uses other than salvation. Secular lords acquired and had the opportunity to reallocate large shares of the land, capital, and skilled labor that were previously allocated to spiritual purposes. Flows of skilled labor changed as well, reflecting demand- and supply-side effects of the Reformation. Our empirical analysis examines the consequences of these political economy and labor market shocks to the sectoral allocation of skilled labor and fixed capital.

[14] We describe the sources of these data in more detail below, in Section 3.

[15] University degrees initially fell dramatically following 1517, as students left the universities to follow preachers and join the new religious movements. This can be seen in the degree data presented below, and is discussed in more detail in Seifert (1996). University attendance increased only with the institutionalization of the Reformation in later years, and the formal support provided by princes.

3 Data

Our analysis is focused on three sets of data: *(i)* monastery closures across Germany over time, reflecting the shock to the market for religion and the expropriation of resources by secular lords; *(ii)* German university graduates' degrees and careers, reflecting labor market consequences of the Reformation; and, *(iii)* construction activity across Germany over time, reflecting the allocation of human and physical capital in fixed investments. In this section, we describe the sources from which these data are drawn in turn. We also discuss the corresponding assignment of units of analysis to religious categories. We will assign territories, cities, and/or universities that remained Catholic throughout the period of analysis to the category "Catholic"; similarly, we assign territories, cities, and/or universities that would eventually adopt Protestantism to the category "Protestant."[16]

3.1 Monastery presence

We gather data on 3,094 monasteries described in Jürgensmeier and Schwerdtfeger (2005–2008). For each monastery, we collect data on its precise location, date of foundation, and date of closure, if applicable.[17] In Figure 2, we present a map of the monasteries open in the German lands of the Holy Roman Empire in the 16th century, highlighting those that closed during the 16th century. We also present the time series pattern of monastery closure in Figure 3.

Our analysis of monasteries, like our study of construction events, is oriented around the over 2,200 towns contained in the *Deutsches Städtebuch*, an encyclopedic source of information on each German town's history.[18] For every town, we calculate the number of monasteries in existence in 1517 within 25 kilometers, as well as the number and share of these monasteries that were closed between 1517 and 1600. To go beyond time-series variation, we exploit cross-sectional variation in territorial religion. We assign each town in the *Deutsches Städtebuch* to territorial lords following the territorial mapping provided by Nüssli (2008) for the year 1500 and code the religion of territorial lords using Cantoni (2012).[19] Because not every city can be assigned a religion using

[16] Note that the adoption of Protestantism was almost always an absorbing state.

[17] The data include both monasteries and convents, and we use the term "monasteries" as a short-hand. Closure dates are directly coded from Jürgensmeier and Schwerdtfeger (2005–2008). For over 67 percent of monasteries, Jürgensmeier and Schwerdtfeger (2005–2008) provide information on foundations dates. For the remaining monasteries, we first gather evidence on initial monastery construction by order and location from the *Deutsches Städtebuch*. We identify the foundation dates of any residual monasteries from territorial archives. For example, for monasteries in Baden-Württemberg we review the databank "Klöster in Baden-Württemberg" maintained by the Landesarchiv Baden-Württemberg (the State Archive) at https://www.kloester-bw.de/index.php. We then cross-check against individual monastery entries on www.wikipedia.de. In total, we identify foundation dates for 3,085 of 3,094 monasteries.

[18] We use "town" to describe the generic entry in the *Deutsches Städtebuch*, as the modal location was small. But it is worth noting that the *Deutsches Städtebuch* covers, and our data include, all incorporated units of Germany, including large cities.

[19] Jurisdiction in early modern Germany involved fluid and overlapping claims among authorities. We thus view the Euratlas region as a proxy for actual jurisdiction over the time period we study. Another complication is posed by the existence of a small number of "free cities" that are not subject to a territorial lord. Most of these free cities are

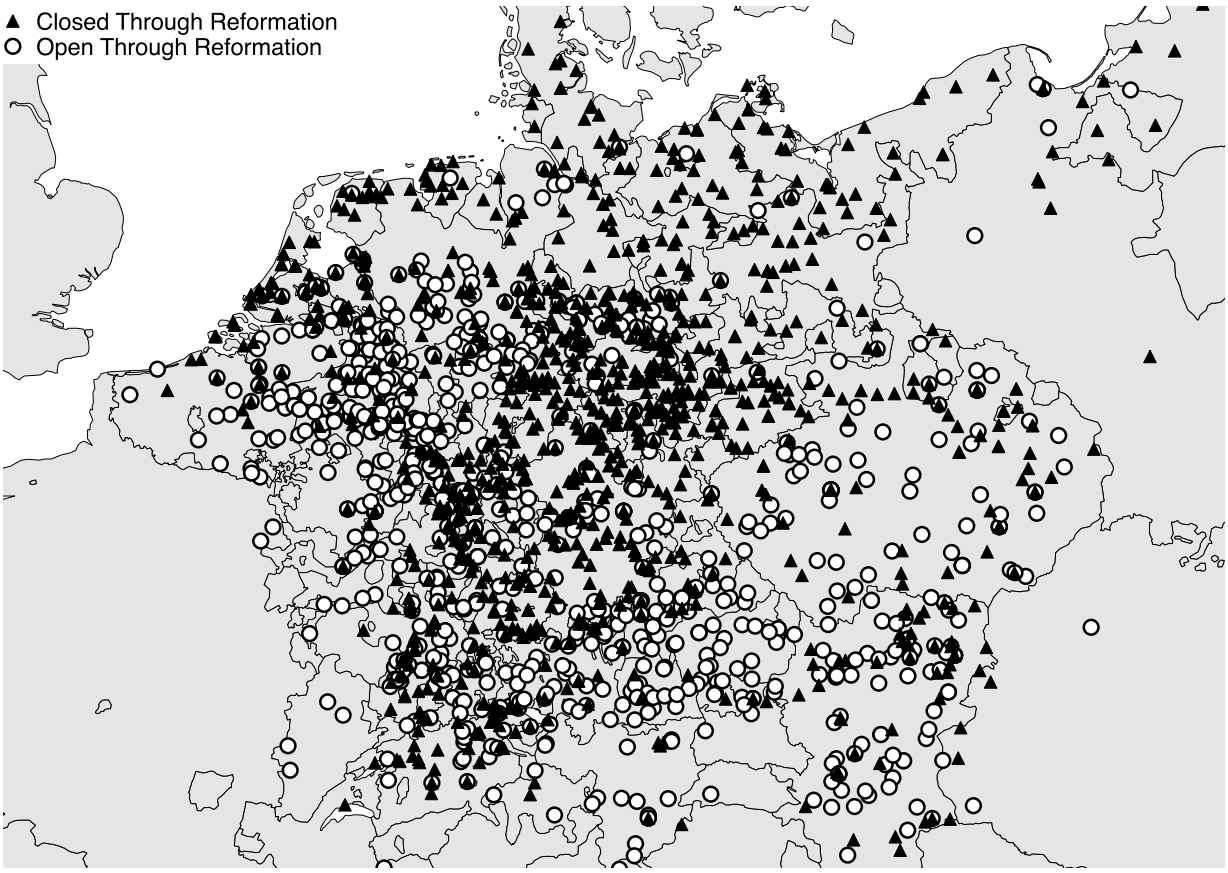

Figure 2: Map of all monasteries in Jürgensmeier and Schwerdtfeger (2005–2008). White circles indicate monasteries that remain open throughout the time period under study. Black triangles indicate monasteries that were opened prior to the Reformation but closed between 1517 and 1600. Territorial boundaries come from Nüssli (2008).

this mapping, as a robustness check, we directly code the religion of as many towns as possible using hand-collected evidence from the *Deutsches Städtebuch*, and find very similar results.

3.2 University graduates and their careers

Our main source of information on German university graduates is the *Repertorium Academicum Germanicum* (Schwinges and Hesse, 2015), a research program (and online database) developed by historians at the Universities of Berne and Giessen, collecting information on the universe of recipients of academic degrees from German universities until 1550. The German universities are: Basel, Erfurt, Frankfurt (an der Oder), Freiburg, Greifswald, Heidelberg, Ingolstadt, Köln, Leipzig,

dropped from our analysis, and our results are robust to excluding them entirely. A complete list of territories and their (eventual) religion can be found in the Online Appendix, Table A2.

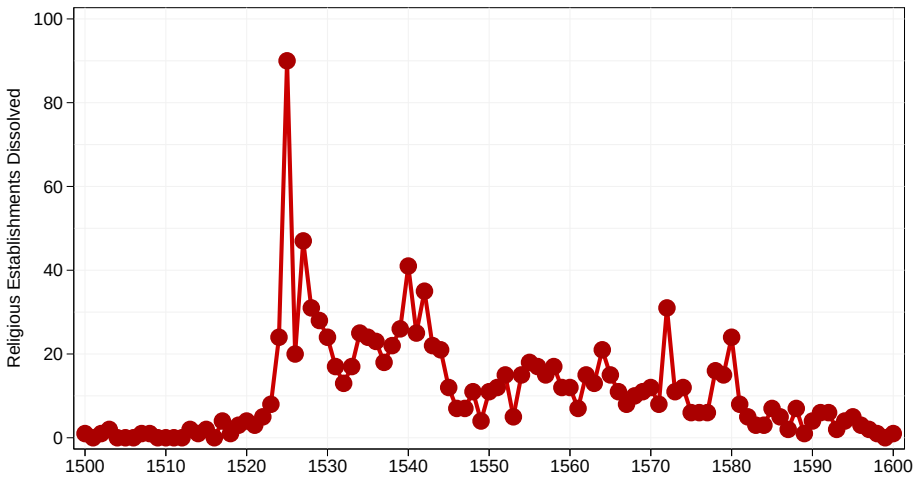

Figure 3: Number of monasteries and convents closing in each year. Closure dates are from Jürgensmeier and Schwerdtfeger (2005–2008).

Mainz, Marburg, Rostock, Trier, Tübingen, Wittenberg, and Würzburg.[20]

Schwinges and Hesse (2015), which we refer to as "RAG" henceforth, collects information on each degree recipient's degree subject(s) and year(s) from university registry sources. The degrees granted include bachelor's degrees, licenses, master's degrees, and doctorate degrees. They were granted by one of the four traditional faculties that universities of the time featured: arts, law, medicine, and theology. We classify degrees in arts, law, and medicine as "secular" to distinguish them from more church sector-specific training in theology (evidence on career paths associated with degrees in different fields is provided in Section 4.3, below).

To measure post-1550 human capital investments, in particular after the Schmalkaldic War (1546) and the Peace of Augsburg (1555), we hand collect data on university degrees granted by the German universities included in the RAG dataset between 1540 and 1600, consulting Bauch (1897); Erler (1895, 1897, 1909); Eulenburg (1904); Kleineidam (1983); Leinweber (1991); Rüegg (1996); Steinmeyer (1912).[21]

In Figure 4, we show the number of theology degrees and "secular" degrees over time, from 1475–1600. One can see that after the Reformation, the number of degrees granted falls for all fields initially; the number of secular degrees recovers by the late 1500s, while the level of theology degrees remains low throughout the remainder of the 16th century.[22]

In addition to information on degrees received, the RAG database contains information on

[20]Note that we do not consider in our analysis universities attended by Germans outside of the borders of modern Germany, such as Louvain or Prague; nor do we include several small universities opened after 1550, such as Jena. Basel joined the Swiss Confederation only during the period of our study.

[21]We collect data from 1540–1550 in order to compare across data sources using the decade of overlap between 1540 and 1550. Our data and the RAG data closely match. One can see in Online Appendix Figure A1 that the patterns we

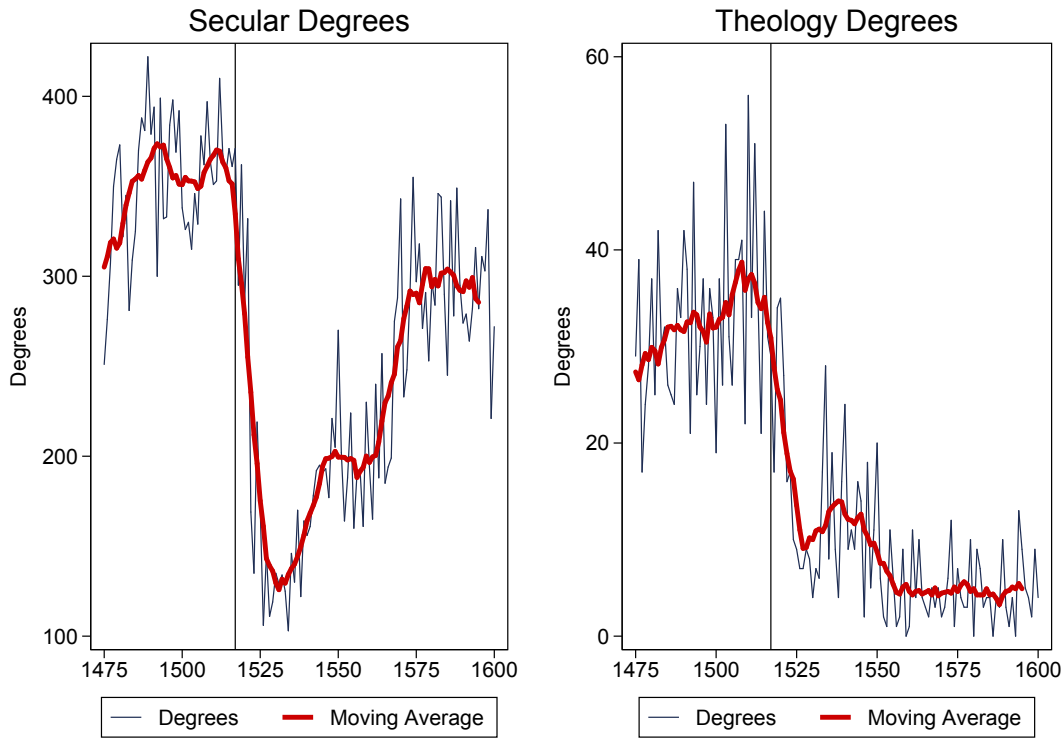

Figure 4: Number of theology and secular degrees granted (yearly data and 11-year moving average). Theology and secular (arts, law, and medicine) degree categories are exhaustive and mutually exclusive. Data come from the *Repertorium Academicum Germanicum* for degrees granted through 1550 and own data collection (consulting Bauch, 1897; Erler, 1895, 1897, 1909; Eulenburg, 1904; Kleineidam, 1983; Leinweber, 1991; Rüegg, 1996; Steinmeyer, 1912) for degrees granted from 1550 through 1600.

careers for 5,102 of 14,704 students receiving degrees between 1470 and 1550. The RAG provides over 400 different occupational titles in its database. For example, the top ten occupations in terms of frequency are: *Professor*, *Kanoniker* (Canon), *Domherr* (Canon, typically receiving a stipend), *Dekan* (Deacon), *Kleriker* (Priest), *Rektor* (Rector), *Pfarrer* (Pastor, typically at the parish level), *Priester* (Priest), *Mönch* (Monk), *Propst* (Provost or superior). Other occupations include judges, bakers, guild masters, mayors, city councillors, teachers, headmasters, goldsmiths, writers and orators. We divide the occupations into two categories: "church" (including priests, monks, etc.) and "secular" (including professors, judges, mayors, etc.). Many of the occupation titles are archaic; we thus rely on the *Thesaurus Professionum Forschungsstelle für Personalschriften* (Marburg, 2015), which categorizes historic occupations into seven one-digit categories with subcategories.

observe are not at all driven by smoothing across sources.

[22]The numbers of degrees granted by level and by individual subject can be seen in Table A1 in the Online Appendix.

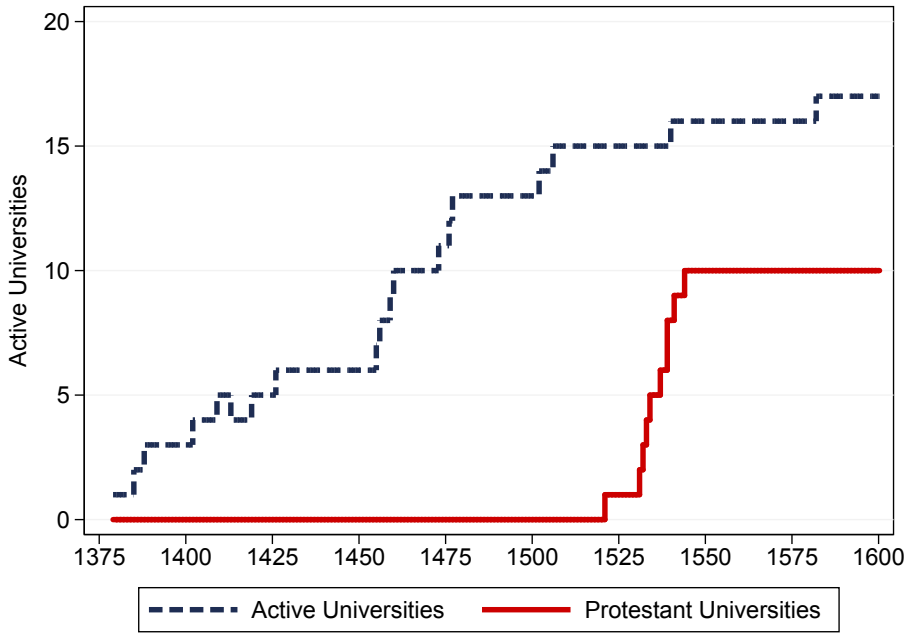

Figure 5: Number of German universities (total/Protestant only) within our sample. Adoption of Protestantism is coded based on Sehling (1902-2013), Spitz (1981), Grendler (2004), and Naragon (2006).

Below, we will examine the heterogeneous effects of the Reformation on degrees granted and occupations selected into depending on the denomination of the university at which an individual studied. We rely on Sehling (1902-2013), Spitz (1981), Grendler (2004), Naragon (2006) to identify the universities that adopted Protestantism: Basel, Erfurt, Frankfurt an der Oder, Greifswald, Heidelberg, Leipzig, Marburg, Rostock, Tübingen, and Wittenberg.[23] In Figure 5 we show the time series of the number of German universities as well as the number that adopted Protestantism. One can see in the figure that there was a sharp increase in the number of Protestant universities between 1520 and 1550.[24]

3.3 Construction events

We hand-coded approximately 27,000 unique, major construction "events" at the town level, described in the *Deutsches Städtebuch*. Each town's entry in the *Deutsches Städtebuch* includes a section (section 5) titled, "Die Stadt als Siedlung" ("The City as Settlement") within which exists a subcategory (5b) titled, "Markante Gebaude" ("Notable/Important Construction"). We plot the time

[23] Note that Erfurt university became Lutheran in 1521 and returned to Catholicism in 1530s. Thus, we treat Erfurt as a Catholic university.

[24] It is important to note that the adoption of Protestantism was rarely a discrete event, as we treat it here for convenience (see Spitz, 1981 and Seifert, 1996).

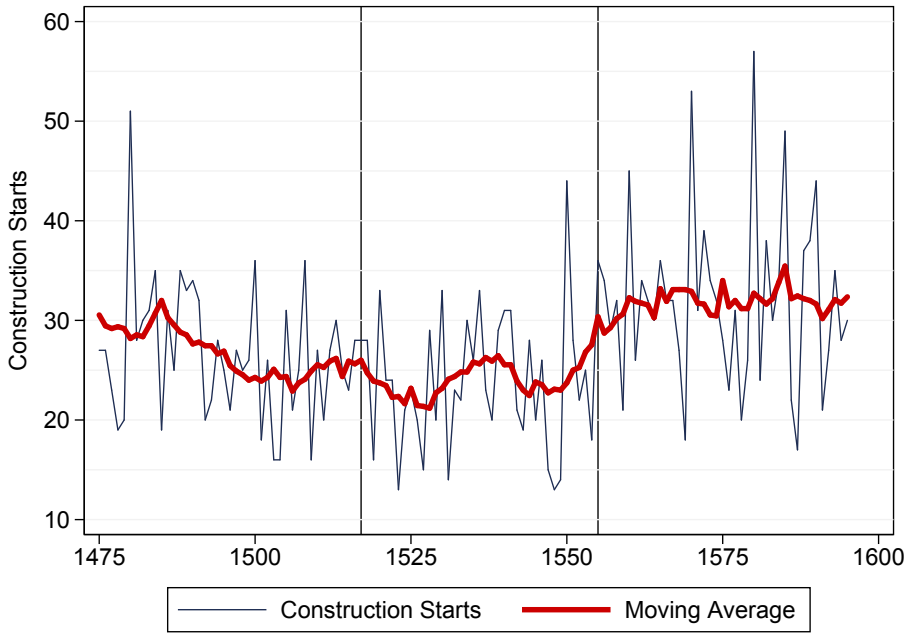

Figure 6: Number of new construction events in Germany (yearly counts and 11-year moving average). Data come from the *Deutsches Städtebuch*.

series of new construction events across Germany (the raw data and an 11-year moving average) between 1475 and 1600 in Figure 6, and one can see an average of 25–35 new events per year. In the figure we mark both the date when Luther posted his 95 theses (1517) and the data of the Peace of Augsburg (1555), which greatly reduced political instability. One can see that following the Peace of Augsburg there was, indeed, an increase in construction activity.

We code each construction event by start date and sector.[25] We assign the finely detailed construction events to "church construction" (e.g., churches or monasteries) and "secular construction" (e.g., town halls, bridges, malls, palaces, or schools) and examine these broad categories in much of our analysis; we examine more disaggregated categories of construction below, in Section 4.4.[26] Construction events are linked to Protestant or Catholic regions based on the town of the event. We assign towns to lords following the territorial mapping provided by Nüssli (2008)

[25]Not all construction events are associated with a precise year. For the purposes of our research here, we limit the analysis to those construction events with clearly-specified first years (i.e., "construction starts"). Note, too, that any potential differences in the original collection of data across volumes of the *Deutsches Städtebuch* will be accounted for in panel regressions with fixed effects.

[26]As noted above, we make a sharp distinction between the "church" or religious sector and the secular sector, when in practice there was certainly a grey area between the two. We do believe that our coding is generally accurate; for example, schools served both religious and secular purposes, but as Strauss (1988, p. 193) notes, post-Reformation compulsory schooling laws "placed the supervision of all educational institutions firmly in the hands of princes and magistrates, who were the owners and wielders of the instruments of public power."

and use information on the religion of territorial lords from Cantoni (2012), as described above.

4 Empirical analysis

We begin our empirical analysis by documenting patterns of monastery closure, which provide evidence of resource expropriation by secular authorities from the Catholic Church, and represent the first step of the political economy mechanism we outlined above. We next consider the consequences of the religious market and political economy shocks for the labor market, examining the reallocation of human capital from church to secular uses. Finally, we analyze construction activity, which we see as a summary statistic for the allocation of economic inputs toward secular or church purposes.

4.1 Monastery closure

Monasteries were ubiquitous in early modern Germany, with the average town having nearly 8 monasteries within 25 kilometers (a single day's walk) on the eve of the Reformation. These monasteries represented an immense stock of land, wealth, and human capital; the expropriation of monasteries during the Reformation thus marked a dramatic shock to the church sector (and the Catholic Church in particular). In most cases, expropriated property was taken by secular authorities.

To provide a sense of the pattern of monastery presence and closure around the time of the Reformation, in Figure 7, we plot the average number of monasteries within 25 kilometers of towns that would become Protestant and towns that would remain Catholic, respectively. One can see in the figure that prior to 1517, the average number of monasteries proximate to towns was quite steady. The number of monasteries near towns that would remain Catholic was somewhat higher than near towns that would become Protestant, a fact that can be explained by the location of Catholic cities—more likely to be in the "older," southern and western parts of the Empire. Importantly, however, trends are very similar in the two sets of towns prior to 1517.

Figure 7 shows that following the posting of Luther's 95 theses in 1517, the density of monasteries declined across Germany, but with important heterogeneity across territories. In towns whose territorial lords eventually adopted Protestantism, there were only three monasteries within 25 kilometers in 1550, and only two in 1600—this represents a reduction of over two-thirds. In towns whose lords remained Catholic, there was a smaller decline in monastery presence, from nine within 25 kilometers in 1517 to around seven in 1600.

In Table 2, we examine these patterns in a regression framework, studying variation across decades in the number of monasteries within 25 kilometers of a town, with the unit of observation the town$\times$decade. Specifically, we estimate:

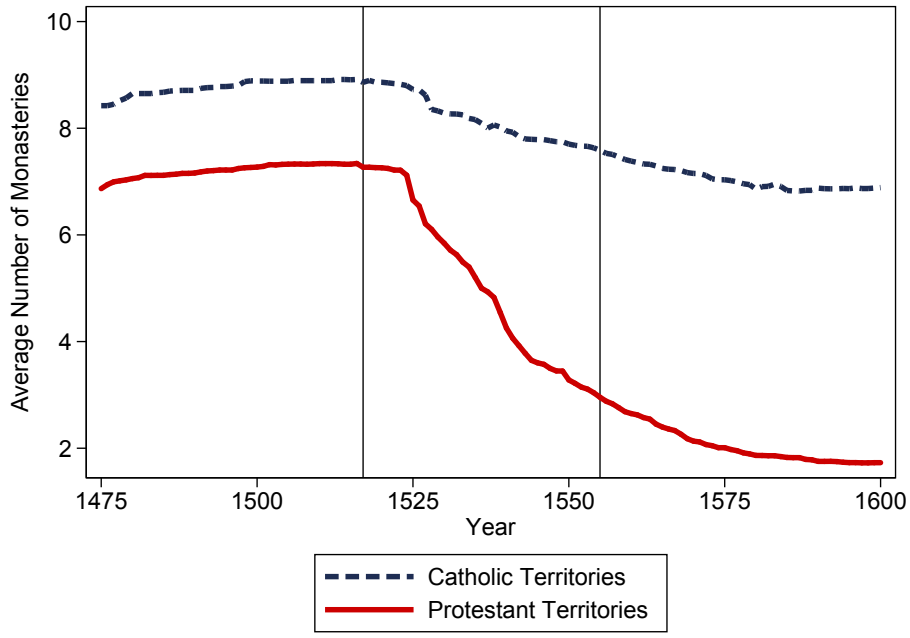

Figure 7: Average number of monasteries within 25 km of towns included in the *Deutsches Städtebuch*. Assignment of towns to religious denominations is done by matching each town to its territorial lord identified in the Euratlas for 1500, and using the territorial lord's religion as coded by Cantoni (2012).

$$monasteries_{it} = \alpha_i + \delta_t + \sum_{\tau=1470}^{1590} \beta_\tau (prot_i \times decade_\tau) + \epsilon_{it}, \tag{1}$$

where $monasteries_{it}$ is the number of monasteries in town i in decade t; α_i are a full set of town fixed effects; δ_t are a full set of decade fixed effects, and the explanatory variables of interest are the interactions between decade fixed effects and an "eventually Protestant town" dummy variable (1510–1519, just prior to the Reformation, is the omitted reference decade).

In Table 2, column 1, we present coefficient estimates from this baseline specification, and one can see results consistent with Figure 7: prior to 1520, there is no difference in the number of monasteries between eventually Protestant towns and towns that would remain Catholic (even accounting for fixed effects, as in the regression setup). Nor is there is any evidence of a trend toward fewer monasteries near eventually Protestant places, as evidenced by the coefficients relating to the interaction terms of "Protestant" and the pre-1517 decade dummies. One can also see a significant relative decline in monasteries near eventually-Protestant towns after 1517. The decline opens in the 1520s, and expands into the late 16th century. The magnitude of the effect, as suggested by Figure 7 is large: beyond the decline in monasteries near Catholic towns, Protestant

Table 2: The Effect of the Reformation on Monasteries

Dependent variable:	Number of monasteries within 25km of a town					
	(1)	(2)	(3)	(4)	(5)	(6)
Protestant × 1470	0.06	0.06	0.06	0.18	0.01	0.09
	(0.18)	(0.18)	(0.18)	(0.19)	(0.13)	(0.12)
Protestant × 1480	0.02	0.02	0.02	0.06	0.00	0.03
	(0.10)	(0.10)	(0.10)	(0.10)	(0.08)	(0.08)
Protestant × 1490	0.01	0.01	0.01	0.01	0.01	0.01
	(0.08)	(0.08)	(0.08)	(0.07)	(0.08)	(0.07)
Protestant × 1500	0.01	0.01	0.01	-0.00	0.01	0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
Protestant × 1520	-0.36	-0.36	-0.35	-0.15	-0.42	-0.26
	(0.18)	(0.18)	(0.18)	(0.16)	(0.19)	(0.13)
Protestant × 1530	-1.32	-1.33	-1.31	-0.75	-1.54	-1.13
	(0.55)	(0.56)	(0.55)	(0.54)	(0.54)	(0.38)
Protestant × 1540	-2.51	-2.53	-2.49	-1.59	-2.85	-2.16
	(0.80)	(0.81)	(0.79)	(0.71)	(0.87)	(0.57)
Protestant × 1550	-3.01	-3.03	-3.00	-1.98	-3.41	-2.66
	(0.85)	(0.85)	(0.84)	(0.78)	(0.95)	(0.60)
Protestant × 1560	-3.26	-3.28	-3.26	-2.10	-3.73	-2.91
	(0.86)	(0.87)	(0.85)	(0.81)	(1.00)	(0.59)
Protestant × 1570	-3.45	-3.47	-3.45	-2.16	-4.00	-3.12
	(0.87)	(0.88)	(0.87)	(0.87)	(1.02)	(0.58)
Protestant × 1580	-3.45	-3.48	-3.46	-2.12	-4.03	-3.14
	(0.89)	(0.90)	(0.88)	(0.94)	(0.98)	(0.54)
Protestant × 1590	-3.55	-3.58	-3.56	-2.21	-4.15	-3.27
	(0.89)	(0.90)	(0.88)	(0.94)	(1.01)	(0.58)
Observations	20033	20033	20033	20033	20033	20033
R^2	0.93	0.93	0.93	0.94	0.95	0.96
1400–1470 constr.×decade FE	N	Y	N	N	N	Y
1470 cumul. markets×decade FE	N	N	Y	N	N	Y
1460–1469 univ. grads×decade FE	N	N	N	Y	N	Y
1470 monastery stock×decade FE	N	N	N	N	Y	Y

Table presents differential numbers of monasteries within 25 kilometers of a town, comparing towns in territories that would become Protestant and towns in territories that would remain Catholic, by decade (i.e., interactions between an "eventually protestant town" dummy variable and decade fixed effects). The omitted category is Protestant×1510. The unit of observation is the town×decade, with the outcome variable calculated as the average number of monasteries open within 25 kilometers of a town in a particular decade. All regressions include town and decade fixed effects. Column 2 includes interactions between the total number of construction events in a town between 1400–1470 and decade fixed effects. Column 3 includes interactions between the cumulative number of market grants in a city as of 1470 and decade fixed effects. Column 4 includes interactions between the total number of students receiving degrees between 1460–1469 from universities within 150 kilometers of a city and decade fixed effects. Column 5 includes interactions between the total number of monasteries within 25 kilometers of a city in the year 1500 and decade fixed effects. Column 6 includes all controls in columns 2–5. Standard errors clustered at the territory level in parentheses (35 clusters). Mean of the dependent variable (pre-Reformation): 7.74.

towns experienced an additional three closed monasteries by the end of the 16th century.

Of course, cities that would become Protestant differed from cities that would remain Catholic along many dimensions. While city-specific, time-invariant characteristics are accounted for by the full set of town fixed effects in the regression, we consider the possibility that post-1520 divergences in the presence of monasteries reflect differences due to city characteristics other than the adoption of Protestantism *per se*. In Table 2, columns 2 and 3, we examine whether pre-Reformation economic differences may account for part of the post-1520 differential decline in monasteries near eventually-Protestant towns. In column 2, we include as controls interactions between the total number of construction events in a town between 1400 and 1470 and decade fixed effects. These controls have almost no effect on the estimated coefficients on interactions between the decade fixed effects and the "eventually Protestant town" dummy variable. In column 3, we include as controls interactions between the cumulative number of markets granted to a city as of 1470 and decade fixed effects.[27] Again, our main results are practically unaffected.

Another concern is that pre-existing differences in human capital may have shaped both the evolution of the Reformation and the closure of monasteries in a region. We thus, in Table 2, column 4, control for interactions between decade fixed effects and the total number of students receiving degrees from universities within 150 kilometers of a town in the 1460s (just prior to the start of our analysis). Accounting for human capital differences across towns (and allowing these differences to have decade-varying effects) has some effect on the estimated differences in monastery closure between Protestant and Catholic towns, but we still see a significant divergence during the Reformation, opening up in the 1540s.

A final issue is that the existing monasteries in a region themselves may have shaped both the evolution of the Reformation and the process of monastery closure. In Table 2, column 5, we thus control for the interaction of decade fixed effects and the total number of monasteries within 25 kilometers of a city in the year 1470. One can see that allowing initial stocks of monasteries to have time varying effects on post-Reformation closure of monasteries does not affect our results.

Finally, in Table 2, column 6, we include all of the interactions included in columns 2–5, and our results remain qualitatively unchanged: towns that eventually became Protestant experienced significantly more monastery closure than Catholic towns, even accounting for the time varying effects of initial economic, human capital, and monastery stock differences.

Monastery closure not only represented a direct shift of resources from the Church to secular lords—it was also a massive shock to the early modern high-skilled labor market. With two-thirds of monasteries closing in Protestant territories, a substantial fraction of the most common first job of university graduates—namely, becoming a monk—disappeared in the 16th century. Not only did labor demand in the "religious sector" fall, but labor supply to the religious sector may also have declined—because of increased uncertainty regarding church employment, and because

[27]The data on market grants to a city come from the *Deutsches Städtebuch* (see Cantoni and Yuchtman, 2014, for details).

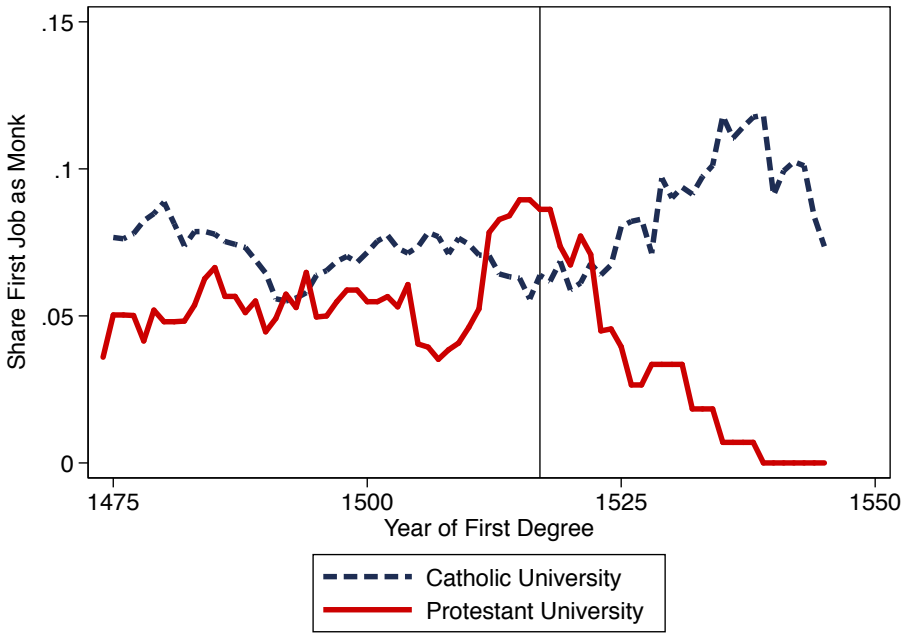

Figure 8: Shares of first job "monk" by (eventual) university denomination. Figure shows the share of first job "monk" among individuals with occupations listed in the *Repertorium Academicum Germanicum*, by an individual's year of first university degree attainment and by the degree-granting university's eventual denomination (smoothed using an 11-year moving average).

expropriated resources and greater administrative power among secular lords increased the demand for skilled labor in the "secular" sector. We thus turn next to differences in the occupational choices and human capital investments made by highly-skilled workers.

4.2 Occupational choice

We begin our analysis of the allocation of highly-skilled labor by examining the choice most directly affected by the Reformation and the consequent expropriation of monasteries: selection by the highly-skilled into becoming a monk. In Figure 8, we plot the share of university graduates in the RAG dataset whose first job is "monk"; we plot one series for individuals whose first university degree was earned at a university that would become Protestant during the Reformation and another series for individuals whose first university degree was earned at a university that would remain Catholic.

One can see in the figure that prior to the Reformation, universities that would become Protestant and those that would remain Catholic produced graduates that selected into becoming monks in similar shares: around 5–10% of students in both types of universities had first jobs as monks. Immediately after the Reformation, however, graduates of universities that would adopt Protes-

tantism became far less likely to have first jobs as monks, with the share dropping to zero in the 1540s. Among graduates of universities that would remain Catholic, we see no change in the fraction of graduates with first jobs as monks after the Reformation, and if anything the share slightly increases. It is worth noting that there is no evidence that the universities that would become Protestant were trending away from the others: the shares of graduates with first jobs as monks are broadly stable among the two groups of university graduates prior to 1517 (if anything, we observe a slight increase of graduates becoming monks close to 1517 among the universities that would later become Protestant).

We next test for differences in shares of graduates with first jobs as monks across universities, decade by decade, in a regression framework with the unit of analysis the university×decade. Of interest to us is whether the share of university graduates from universities that would adopt the Protestant religion differentially sort into first jobs as monks. Thus, we regress the share of graduates with first jobs as monks from a given university in a given decade on interactions between an "eventually protestant university" dummy variable and decade fixed effects (the omitted decade is 1510–1519).[28]

Specifically, we estimate:

$$share_{ut} = \alpha_u + \delta_t + \sum_{\tau=1470}^{1540} \beta_\tau (prot_u \times decade_\tau) + \epsilon_{ut}, \tag{2}$$

where $share_{ut}$ is the share of graduates from university u in decade t whose first occupation indicated in the RAG database is "monk". The α_u terms are a full set of university fixed effects; δ_t are a full set of decade fixed effects, and the explanatory variables of interest are the interactions between decade fixed effects and an "eventually Protestant university" dummy variable (1510–1519, just prior to the Reformation, is the omitted reference decade).

We present estimates from this specification in Table 3. The results in column 1 precisely match what was seen in Figure 8: prior to the Reformation, shares of graduates with first jobs as monks are not following different trends in universities that would eventually become Protestant compared to those that would remain Catholic. However, after the Reformation, particularly in the 1530s and 1540s, a significantly smaller share of Protestant university graduates have a first job as monks. Moreover, the sum of the post-Reformation interaction coefficients is significantly different from zero (p-value is 0.00).

We next attempt to account for differences across universities other than their eventual religious affiliations that might also affect the sorting of their graduates into careers. Because labor market opportunities might vary across space (particularly along the East-West gradient), and differentially so over time (thus affecting labor market outcomes of local university graduates),

[28] Because several universities have very small numbers of graduates in particular decades, we weight observations by the number of degrees in a university×decade cell. Alternatively, we can aggregate data to the "Protestant university"×decade level and our results are qualitatively identical.

Table 3: The Effect of the Reformation on the Share of First Jobs as Monks

Dependent variable:	Share of first jobs as monks			
	(1)	(2)	(3)	(4)
Protestant × 1470	-0.01	-0.03	-0.02	-0.03
	(0.03)	(0.03)	(0.03)	(0.03)
Protestant × 1480	0.00	-0.01	-0.00	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)
Protestant × 1490	-0.02	-0.03	-0.02	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)
Protestant × 1500	-0.03	-0.03	-0.03	-0.03
	(0.02)	(0.03)	(0.02)	(0.03)
Protestant × 1520	-0.05	-0.05	-0.05	-0.05
	(0.03)	(0.03)	(0.03)	(0.03)
Protestant × 1530	-0.10	-0.09	-0.10	-0.09
	(0.04)	(0.04)	(0.04)	(0.04)
Protestant × 1540	-0.10	-0.08	-0.09	-0.07
	(0.03)	(0.02)	(0.03)	(0.02)
Observations	104	104	104	104
R^2	0.46	0.49	0.47	0.49
p-value: sum of 1520–1540 interactions	0.00	0.00	0.00	0.00
Longitude×time	N	Y	N	Y
Univ. foundation date×time	N	N	Y	Y

Table presents differential first occupational shares as monks between graduates from universities that would become Protestant and graduates from universities that would remain Catholic, by decade (i.e., interactions between an "eventually protestant university" dummy variable and decade fixed effects). The omitted category is Protestant×1510. The unit of observation is the university×decade. All regressions weight by the number of degrees in a university×decade cell. Robust standard errors in parentheses. All columns include decade and university fixed effects. Column 2 controls for linear time trends that vary with the university's longitude; column 3 controls for university foundation date-varying linear time trends; and, column 4 controls for both longitude-varying linear time trends and university foundation date-varying linear time trends. The bottom row of the table presents the p-value from a test that the sum of the coefficients on the interactions between the "eventually protestant university" dummy variable and 1520, 1530, and 1540 decade fixed effects equals zero. Mean of the dependent variable (pre-Reformation): 0.06.

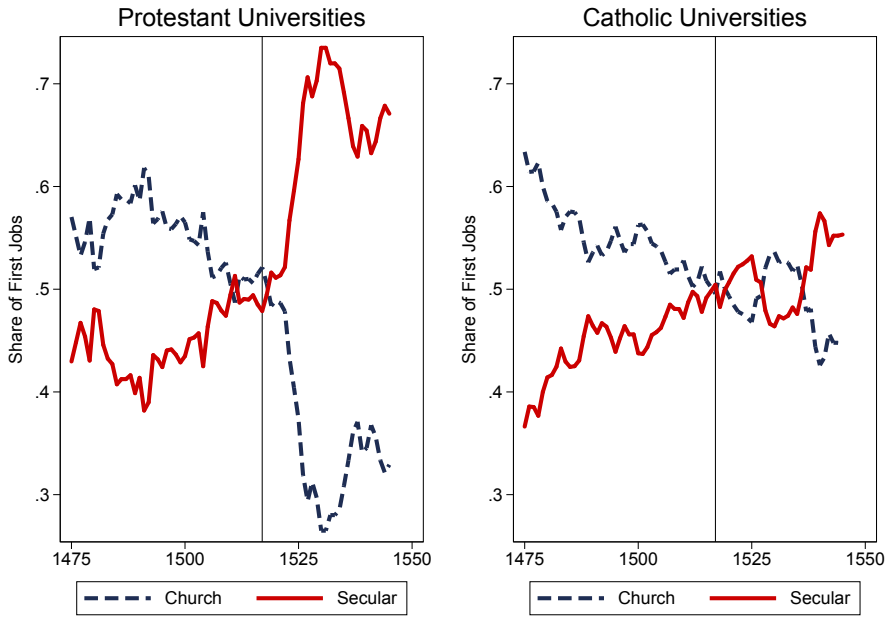

Figure 9: Shares of first job by sector by (eventual) university denomination. Figure shows the share of first jobs in secular and religious economic sectors among individuals with occupations listed in the *Repertorium Academicum Germanicum*, by an individual's year of first university degree attainment and by the degree-granting university's eventual denomination (smoothed using an 11-year moving average). Occupations are classified into economic sectors using the *Thesaurus Professionum* (Marburg University, 2015).

in column 2 we control for longitude-varying linear time trends. One can see that these controls do not affect our findings. Because newly formed universities might respond differently to the economic, social, and political changes accompanying the Reformation (and because many of the youngest universities in our sample were Protestant), in column 3 we control for university foundation date-varying linear time trends. Again, our results are unaffected. Finally, in column 4, we control for both longitude-varying linear time trends and university foundation date-varying linear time trends, again without significantly affecting our results.

We next broaden our analysis to study selection into first jobs in the entire "church sector"—not only monks. As discussed above, one might expect that greater uncertainty of employment in the church sector and greater demand for skilled labor by secular authorities would shift skilled labor toward secular occupations after 1517, particularly in Protestant territories.

In Figure 9, we plot the share of first jobs by sector—church and secular—by year, separately for universities that would adopt Protestantism and for those that would remain Catholic. One can see in the figure that in both types of universities, shares of jobs in the church and secular sectors converged on an even 50-50 split at the time of the Reformation. After the Reformation, the

patterns of occupational sorting look distinctly different, with a very clear break in trend toward secular sector first jobs among graduates of Protestant universities, and a slower, smoother continuation of the pre-existing trend toward secular first jobs in Catholic universities. Thus, looking across church- and secular-sector first jobs, we see a shift toward secular sector first jobs after the Reformation, specifically among graduates of Protestant universities.

We can again subject our graphical findings to a more careful regression analysis. In Table 4 replicate the specifications of Table 3, but instead studying selection into any first job in the church sector. One can see that the broad patterns observed for selection into first jobs as monks hold true for more general church-sector employment. Prior to the Reformation, we do not see evidence of differential patterns of first job sector of employment between graduates of universities that would become Protestant and those that would remain Catholic. Coefficient estimates on the interactions between the dummy variable for Protestant universities and decade fixed effects are variable in sign and quite small prior to 1520. After the Reformation, each interaction coefficient is negative, all around 0.10–0.15, and typically borderline statistically significant. The sum of the post-Reformation coefficients is statistically significantly different from zero at the 5% or 10% level across specifications. Broadly, there is a shift away from church-sector first jobs among Protestant university graduates after the Reformation.

4.3 Investment in Church-specific versus general human capital

An implication of the reduced employment prospects in the church sector is that forward-looking students should invest less in human capital that specifically has a high payoff in the church sector, and shift their investments toward more general human capital. In fact, while highly-skilled individuals entered church employment from a range of educational backgrounds, there was a particular human capital investment that was essentially church specific: the study of theology. As can be seen in Table 5, while 60% of students in the RAG database with some career information and without a theology degree had some church sector employment, this number jumps to 88% among individuals with a theology degree.

We thus examine whether there was not only a shift in employment from the church to the secular sector among the highly skilled during the Reformation, but also a shift in the type of human capital acquired. In Figure 10, we present evidence that this was indeed the case, particularly among students at Protestant universities (where we also observed the sharpest shift in occupations). One can see that prior to the Reformation, around 90% of degrees were awarded in secular fields (art, law, and medicine), while around 10% were awarded in theology (if anything universities that would become Protestant granted slightly more theology degrees than universities that would remain Catholic). After the Reformation, theology degrees granted fall nearly to zero in Protestant universities. While theology degrees granted fall in Catholic universities as well in the mid-16th century, by 1600, shares of theology degrees granted in Catholic universities are actually

Table 4: The Effect of the Reformation on the Share of First Jobs in the Church Sector

Dependent variable:	Share of first jobs in the church sector			
	(1)	(2)	(3)	(4)
Protestant × 1470	-0.13	-0.15	-0.13	-0.15
	(0.08)	(0.09)	(0.09)	(0.09)
Protestant × 1480	0.02	0.00	0.01	-0.00
	(0.07)	(0.07)	(0.06)	(0.07)
Protestant × 1490	-0.01	-0.03	-0.02	-0.03
	(0.05)	(0.05)	(0.05)	(0.05)
Protestant × 1500	-0.00	-0.01	-0.00	-0.01
	(0.08)	(0.08)	(0.08)	(0.08)
Protestant × 1520	-0.13	-0.12	-0.12	-0.12
	(0.07)	(0.07)	(0.07)	(0.07)
Protestant × 1530	-0.17	-0.16	-0.16	-0.16
	(0.08)	(0.08)	(0.08)	(0.07)
Protestant × 1540	-0.13	-0.10	-0.11	-0.10
	(0.11)	(0.12)	(0.11)	(0.12)
Observations	104	104	104	104
R^2	0.71	0.71	0.71	0.71
p-value: sum of 1520–1540 interactions	0.03	0.06	0.05	0.07
Longitude×time	N	Y	N	Y
Univ. foundation date×time	N	N	Y	Y

Table presents differential first occupational shares in church careers between graduates from universities that would become Protestant and graduates from universities that would remain Catholic, by decade (i.e., interactions between an "eventually protestant university" dummy variable and decade fixed effects). The omitted category is Protestant×1510. The unit of observation is the university×decade. All regressions weight by the number of degrees in a university×decade cell. Robust standard errors in parentheses. All columns include decade and university fixed effects. Column 2 controls for linear time trends that vary with the university's longitude; column 3 controls for university foundation date-varying linear time trends; and, column 4 controls for both longitude-varying linear time trends and university foundation date-varying linear time trends. The bottom row of the table presents the p-value from a test that the sum of the coefficients on the interactions between the Protestant university dummy variable and 1520, 1530, and 1540 decade fixed effects equals zero. Mean of the dependent variable (pre-Reformation): 0.59.

Table 5: The Association Between the Study of Theology and Church-Sector Occupations

Type of university graduate	No. of individuals	Fraction with at least one church job
At least one theology degree	906	88%
No theology degree	4,901	60%

Table examines the relationship between theology study and careers in the church sector among individuals earning degrees between 1475 and 1550 and who have at least one occupation recorded in the *Repertorium Academicum Germanicum* dataset. Careers in the church sector are determined using the *Thesaurus Professionum* (Marburg University, 2015).

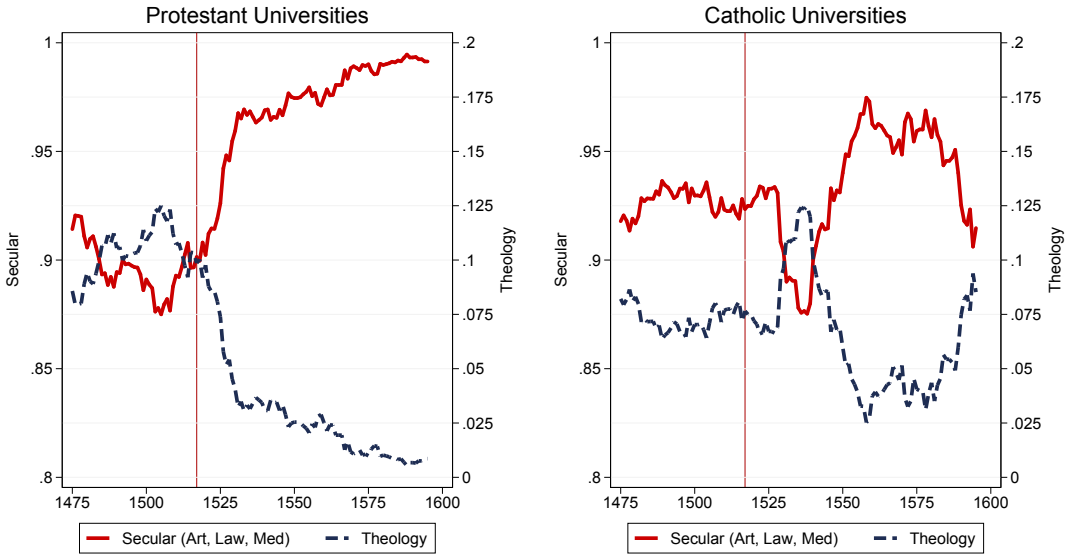

Figure 10: Shares of theology and secular degrees granted by (eventual) university denomination (smoothed using an 11-year moving average). Theology and secular degree categories are exhaustive and mutually exclusive. The secular degree category includes degrees in the arts, law, and medicine. Data come from the *Repertorium Academicum Germanicum*for degrees granted through 1550 and own data collection (consulting Bauch, 1897; Erler, 1895, 1897, 1909; Eulenburg, 1904; Kleineidam, 1983; Leinweber, 1991; Rüegg, 1996; Steinmeyer, 1912) for degrees granted from 1550 through 1600.

greater than they were prior to the Reformation.[29]

We next test for the statistical significance of this divergence in human capital investments, estimating the following model:

$$degree\ share_{ut} = \alpha_u + \delta_t + \sum_{p=pre,post} \beta_p (prot_u \times period_s) + \epsilon_{ut}. \quad (3)$$

The model is very similar to our examination of occupation shares, but instead considers as its outcome the share of degrees in theology among graduates of university u in decade t. Another difference is that the explanatory variables of interest are interactions between an "eventually Protestant university dummy" and *time period* (rather than decade) fixed effects.[30] The time periods are 1520–1549, i.e., after the start of the Reformation; 1490–1519, the omitted, pre-Reformation baseline period; and, 1470–1489, a "pre-baseline" period allowing us to test for differential pre-Reformation trends in human capital investments between Protestant and Catholic universities. Note that we aggregate decade-level data into longer, time-period-level tests in order to estimate more precise differences in a context with university×decade cells with very few theology degrees.

In Table 6, column 1, we present the estimated coefficients on the interactions between the "eventually Protestant university dummy" and time period fixed effects. One can see in the table that even controlling for fixed university and decade differences, there is a marginally statistically significant decline in the share of theology degrees in Protestant universities after 1520. One can also see that there was no pre-Reformation difference in human capital investment trends between universities that were eventually Protestant and those that would remain Catholic. In Table 6, columns 2–4, we control for the time varying effects of university characteristics as we did in Tables 3 and 4. We continue to see evidence of an economically meaningful divergence in human capital investments after the Reformation: a differential fall in Protestant universities of around 5 percentage points relative to a pre-Reformation mean share of theology degrees of 11%. Thus, not only did highly-skilled individuals shift their occupations in response to the Reformation, but they also shifted their human capital investments away from church-sector-specific theology study and toward more general human capital.

4.4 Construction activity

We view construction activity as approximating a summary statistic for the allocation of economic resources given the requirements of land and financial, human, and physical capital. We begin our analysis of construction activity across church and secular sectors by showing, in Figure 11, new construction events per town per year by sector (church and secular are exhaustive and mutually

[29] Note that these patterns appear within degree levels as well: both examining only bachelor's degrees, or examining only advanced degrees.

[30] We do always control for decade and university fixed effects.

Table 6: The Effect of the Reformation on the Share of Theology Degrees

Dependent variable:	Share of degrees in theology			
	(1)	(2)	(3)	(4)
Protestant × Pre-1490	-0.01	-0.01	-0.01	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)
Protestant × Post-1520	-0.06	-0.06	-0.05	-0.05
	(0.03)	(0.03)	(0.03)	(0.03)
Observations	189	189	189	189
R^2	0.41	0.41	0.41	0.41
Longitude×time	N	Y	N	Y
Univ. foundation date×time	N	N	Y	Y

Table presents differential degree shares in theology between universities that would become Protestant and universities that would remain Catholic, across three time periods: 1470–1489, 1490–1519, and 1520–1599. Differential shares are estimated using interactions between an "eventually protestant university" dummy variable and period fixed effects. The omitted period is 1490–1519. The unit of observation is the university×decade; all regressions weight by the number of degrees in a university×decade cell. All regressions control for university and decade fixed effects. Column 2 controls for linear time trends that vary with the university's longitude; column 3 controls for university foundation date-varying linear time trends; and, column 4 controls for both longitude-varying linear time trends and university foundation date-varying linear time trends. Robust standard errors in parentheses. Mean of the dependent variable (pre-Reformation): 0.08.

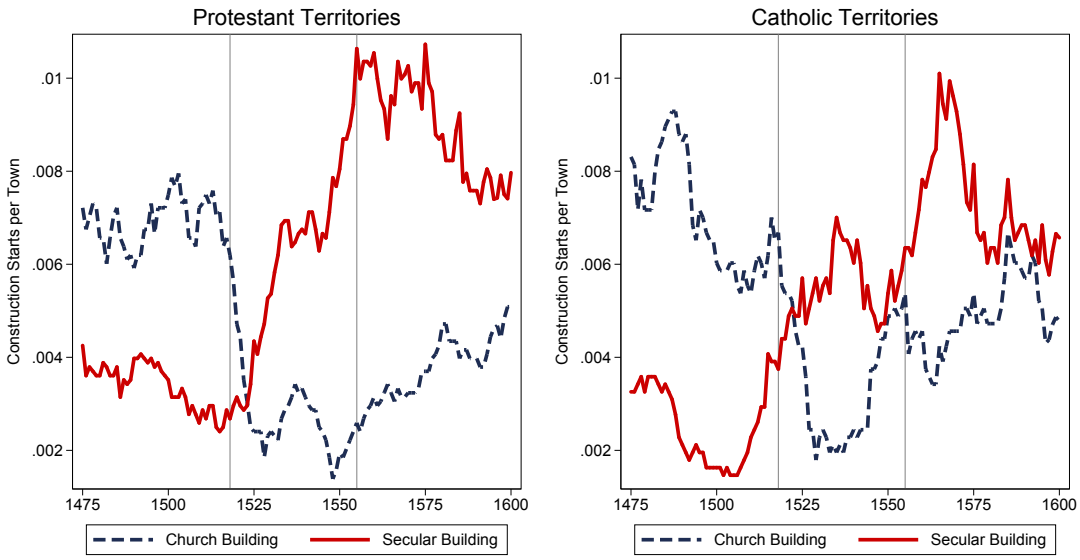

Figure 11: Construction starts per town×year disaggregated by sector for towns in (eventually) Protestant and (remaining) Catholic territories (smoothed using an 11-year moving average). Town-level construction data come from the *Deutsches Städtebuch*. Assignment of towns to religious denominations is done by matching each town to its territorial lord identified in the Euratlas for 1500, and using the territorial lord's religion as coded by Cantoni (2012).

exclusive categories of construction). We show the time series of construction separately for towns whose territorial lords eventually adopted Protestantism and for towns whose lords remained Catholic. Note that the likelihood of a major construction event is small for a given town×year observation: on average, German towns had one to two major construction events per century in the early-modern era.

Several clear facts emerge from Figure 11. First, in both territories adopting Protestantism and those that remained Catholic, church-sector construction predominated prior to the Reformation. Second, in both "eventually Protestant" and "always Catholic" towns, secular construction increased and church construction decreased just after Luther posted his 95 theses in 1517. Third, the shift in resources was much greater and more sustained in regions that adopted Protestantism: by the end of the 16th century, rates of new secular construction were nearly double rates of new church construction in Protestant towns. In Catholic towns, in contrast, church and secular construction were roughly equal at the end of the 16th century.

We next test whether the differences between Catholic and Protestant regions in secular and church sector construction were statistically significant, examining secular and church sector construction at the territory×decade level. We aggregate our town-level data into larger, territory-level units in order to more precisely estimate differences in a context in which the vast majority

of town×decade observations have zero construction events.

We estimate the following model:

$$construction_{jt} = \alpha_j + \delta_t + \sum_{d=1470}^{1590} \beta_d (prot_j \times decade_d) + \epsilon_{jt}, \quad (4)$$

where $construction_{jt}$ is a count of the construction events in territory j, in decade t; α_j is a set of territory fixed effects; δ_t is a set of decade fixed effects; and the explanatory variables of interest are the interactions between an "eventually protestant territory" dummy variable and decade fixed effects (1510–1519 is the omitted reference decade). Because of the presence of territory×decade cells with zero total construction, rather than examine the share of total construction in the church sector, we separately predict counts of construction events ($construction_{jt}$) in the church sector and the secular sector.

In Table 7, column 1, we present the estimated coefficients on the interactions between the "eventually Protestant territory" dummy and decade fixed effects in a model predicting church construction events at the territory×decade level. One can see that prior to the 1520s, territories that would become Protestant and those that would remain Catholic did not follow different trends in the level of church construction. In contrast, all of the eight post-Reformation interaction terms indicate less church construction in Protestant territories than in Catholic territories (significantly so in the decades following 1520, 1550, 1570, and 1580). We test whether the sum of the post-Reformation coefficients is significantly different from zero, and in the second from the bottom row of the table we present the p-value from this test. Indeed, we find an overall significantly lower level of church sector construction in Protestant territories throughout the 1520–1600 period.

Because the 1520–1550 era was one of political instability and violent conflict (the Peasants' War and the Schmalkaldic War), and because such political instability is particularly likely to affect fixed capital investments like construction, we also test whether the sum of the post-Schmalkaldic War coefficients is significantly different from zero. In the bottom row of the table we present the p-value from this test. One can see that in the 1550–1600 period of greater stability there remains a significantly reduced level of church construction in Protestant territories compared to Catholic ones.

In Table 7, column 2, we examine whether our results from column 1 were driven by differences between Protestant and Catholic towns in the pre-existing level of construction activity (though the absence of pre-1520 differences in trends is reassuring in that respect). We thus estimate the same specification as in column 1, but control for the interaction between decade fixed effects and the total amount of construction in a town between 1400 and 1470. One can see that including these controls does not meaningfully affect our results.

We also consider the possibility that while the *count* of church building in Protestant territories shrank after the Reformation, perhaps church building *sizes* increased. We collect data on

Table 7: The Effect of the Reformation on Construction Activity

Dependent variable:	Number of construction events			
	Church		Secular	
	(1)	(2)	(3)	(4)
Protestant × 1470	-1.08	-1.07	0.75	0.74
	(0.78)	(0.81)	(0.61)	(0.59)
Protestant × 1480	-1.38	-1.46	0.55	0.50
	(1.00)	(0.95)	(0.42)	(0.40)
Protestant × 1490	-0.56	-0.51	1.16	1.20
	(0.75)	(0.74)	(0.57)	(0.55)
Protestant × 1500	-0.34	-0.38	1.15	1.23
	(0.69)	(0.70)	(0.41)	(0.38)
Protestant × 1520	-2.08	-1.80	-0.01	-0.15
	(0.85)	(0.60)	(0.66)	(0.58)
Protestant × 1530	-0.94	-0.63	1.06	0.72
	(0.90)	(0.61)	(1.16)	(0.95)
Protestant × 1540	-1.44	-1.11	1.37	1.15
	(1.08)	(0.81)	(0.92)	(0.73)
Protestant × 1550	-2.39	-2.27	3.00	2.58
	(0.97)	(1.05)	(1.33)	(0.97)
Protestant × 1560	-1.18	-0.99	1.32	0.90
	(0.84)	(0.76)	(1.23)	(0.85)
Protestant × 1570	-1.75	-1.59	2.46	2.06
	(0.87)	(0.83)	(1.22)	(0.87)
Protestant × 1580	-1.85	-1.82	2.25	1.83
	(0.79)	(0.83)	(1.19)	(0.79)
Protestant × 1590	-1.21	-1.14	1.30	1.02
	(1.01)	(1.10)	(1.12)	(0.92)
Observations	455	455	455	455
R^2	0.73	0.79	0.71	0.80
p-value: sum of 1520–1590 interactions	0.04	0.05	0.09	0.03
p-value: sum of 1550–1590 interactions	0.05	0.07	0.07	0.02
1400–1470 constr.×decade FE	N	Y	N	Y

Table presents differential numbers of construction events, by sector, comparing territories that would become Protestant and territories that would remain Catholic across decades (i.e., examining interactions between an "eventually protestant territory" dummy variable and decade fixed effects). The omitted category is Protestant×1510. The unit of observation is the territory×decade, with the outcome variable calculated as the sum of construction events in a territory×decade for a particular sector. The sectors are: church, in columns 1 and 2 and secular, in columns 3 and 4. All specifications include territory and decade fixed effects. Columns 2 and 4 include interactions between the total number of construction events in a territory between 1400 and 1470 and decade fixed effects. Standard errors clustered at the territory level in parentheses (35 clusters). Means of the dependent variable (pre-Reformation): 3.10 (Church), 1.36 (secular).

church sizes from the 124-volume series *Denkmaltopographie Bundesrepublik Deutschland* (Dellwing, 1988/2011) and its various predecessor series,[31] which provides us with information on the area of 14% of the new church buildings we observe in eventually-Protestant territories between 1470 and 1600. We find that church areas increased slightly, but statistically insignificantly from the pre-Reformation era to the post-Reformation era: from around 450 square meters to around 495 in the sample of churches for which we have data (see Online Appendix Table A4).

The decline in church construction during the Reformation, particularly in Protestant territories, raises the question of whether there was there resource destruction or rather reallocation to other types of constructions. In Table 7, columns 3 and 4, we estimate the same specifications as in columns 1 and 2, but examine *secular* sector construction by town$\times$ decade. One can see in the table that there are were broadly similar trends of secular construction in eventually Protestant territories and territories that would remain Catholic prior to the Reformation. If anything, there is a slight relative decline in secular construction in (eventually) Protestant territories in 1510 (as seen in the positive, significant coefficients on the 1490 and 1500 interactions). During the Reformation, and particularly during the relative stability of the post-Schmalkaldic War era (1550–1600) one can see a significant relative increase in secular construction in the Protestant territories. That is, there was significant *reallocation* of resources away from construction activity for church purposes and toward construction for secular purposes.

A basic question about the pattern we observe is whether our results reflect a mis-categorization of construction events. For certain categories of construction the distinction between religious and secular may be ambiguous or even improper. For example, schools and hospitals may have been attached to churches and were staffed by church personnel. To address this question, we exploit the highly disaggregated nature of our underlying construction data. Figure 12 presents evidence on secular construction by purpose for Protestant territories and shows that the post-Reformation increase predominantly comes from the construction of new administrative buildings and lords' palaces. This evidence indicates that the overall pattern of secularization is not driven ambiguous categories of construction and is driven by reallocation in precisely the categories that our political economy framework predicts: buildings reflecting the increased power and wealth of secular authorities. This evidence also reveals that the reallocation is not driven by military expenditures that might appear secular but serve religious purposes.

4.5 The causal effects of the Reformation

One might wonder whether the reallocation we observe reflects a causal effect of the Reformation or merely the effects of unobserved differences across territories. Perhaps territories that became Protestant were already economically or culturally different prior to the Reformation, with this underlying difference driving both the Reformation and the economic secularization we docu-

[31] A full set of references is provided in the Online Appendix.

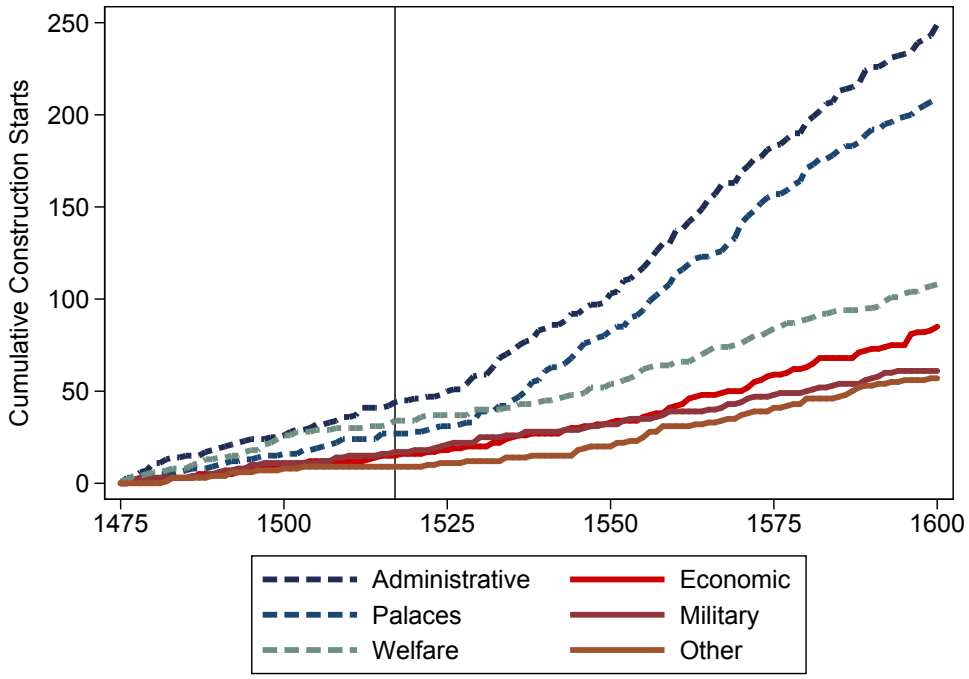

Figure 12: Cumulative number of new secular sector construction events, disaggregated by specific purpose, for towns in (eventually) Protestant territories. Town-level construction data come from the *Deutsches Städtebuch*. Assignment of towns to religious denominations is done by matching each town to its territorial lord identified in the Euratlas for 1500, and using the territorial lord's religion as coded by Cantoni (2012).

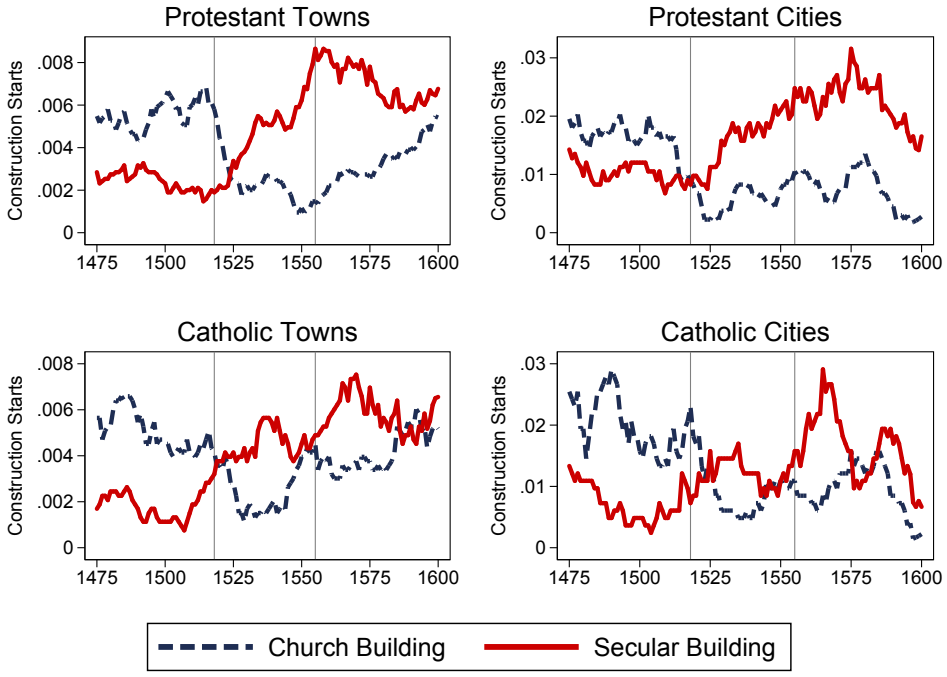

Figure 13: Construction starts per city×year or town×year disaggregated by sector for cities and towns in (eventually) Protestant and (remaining) Catholic territories (smoothed using an 11-year moving average). Town-level construction data come from the *Deutsches Städtebuch*. Assignment of towns to religious denominations is done by matching each town to its territorial lord identified in the Euratlas for 1500, and using the territorial lord's religion as coded by Cantoni (2012). "Cities" for the purpose of this figure are the subset of towns in the dataset with population data available in Bairoch et al. (1988); "towns" for the purpose of this figure are the complementary subset.

ment. Evidence presented thus far supports a causal interpretation: territories and universities that would become Protestant and those that would remain Catholic exhibit *no* significant differences in human and physical capital investment prior to the Reformation. We observe no indication that these territories would have diverged had the Reformation not occurred.

One might remain concerned about time-varying, territory-specific unobservables that drove both the adoption of Protestantism and economic secularization. A large literature documents a wave of urban support for the Reformation across Germany and that cities (as opposed to towns) were the locations where reformist ideas and constituencies developed (Ozment, 1975; Hamm, 1994).[32] However, our findings are *not* driven by large cities. In Figure 13, one can see a pattern of reallocation from church to secular construction in both small Protestant towns and large Protes-

[32] As Brady (2009, p. 161) observes, "cities became the nurseries and schoolhouses of religious change, it is hardly going too far to say that the Protestant reformation was, at least in its youth, 'an urban event'."

tant cities. In the online Appendix, we replicate Table 7 restricting the analysis to small towns and we find nearly identical results (see Online Appendix Table A3).

A final concern could be that economic shocks hit particular regions, shifting the both likelihood of the adoption Protestantism and the incentives for economic secularization. To explore this possibility, we narrow our focus to three territories where the timing of religious change was unrelated to local economic conditions. To be precise, we study three settings in which the timing of religious change was driven by the exogenous timing of of ruler change. We examine evidence on the change of rulers and religion in the Electorate of Brandenburg, the Duchy of Saxony, and the Duchy of Württemberg. In these three territories, an unobserved territory-by-time economic shock does not explain the timing of the adoption of Protestant, but we observe the same pattern of economic secularization coinciding with religious change that we observe throughout Germany.

Electorate of Brandenburg — The Electorate of Brandenburg at the time of the Reformation was ruled by Joachim I (Nestor), who, with his brother Albert, personified the corrupt practices that Luther criticized in his theses. In particular, Joachim I and his Hohenzollern family purchased the archbishopric of Mainz for Albert using loans guaranteed by future sales of indulgences. A staunch Catholic, Joachim I had his son, Joachim II (Hector) sign an inheritance contract in which Joachim II promised to remain Catholic. One can see in the top panel of Figure 14 that during the period of Catholic rule (until the death of Joachim I, in 1535), the Electorate of Brandenburg experienced very few monastery closures and saw very little increase in secular construction.

However, after the death of Joachim I in 1535, Joachim II reneged on his pledge to remain Catholic. In the top panel of Figure 14, one can see that shortly after Joachim II took power, the political shock produced a sharp increase in monastery closure, and, as measured by construction activity, a shift of resources toward secular and away from church uses.

Duchy of Saxony — The Duchy of Saxony was ruled in the early 16th century by Duke Georg, an ardent Catholic. In 1539, Georg's last remaining (Catholic) son, Frederick died. Knowing that his Protestant brother Heinrich was in line to inherit the Duchy if he died, Georg attempted to secure the inheritance for the Catholic Ferdinand (who would eventually become Holy Roman Emperor). Georg initiated the legal process necessary to transfer his inheritance Ferdinand; however, before this could be completed, Georg himself died in 1539, leading to the accession of Heinrich and the conversion of the Duchy to Lutheranism.

In the middle panel of Figure 14, one can see some monastery closure and some shift in construction away from the church sector during the Reformation era even under the Catholic Georg. However, at precisely the moment when the Protestant Heinrich took power (marked by a vertical red line), monastery closure sharply accelerated, and resources were allocated differentially toward secular and away from church uses.

Duchy of Württemberg — In 1519, Duke Ulrich was exiled from the Duchy of Württemberg after killing the husband of his mistress. Control of the Duchy was given to the Catholic future emperor Ferdinand. In 1523, Ulrich adopted the Protestant faith and attempted to retake the Duchy on the

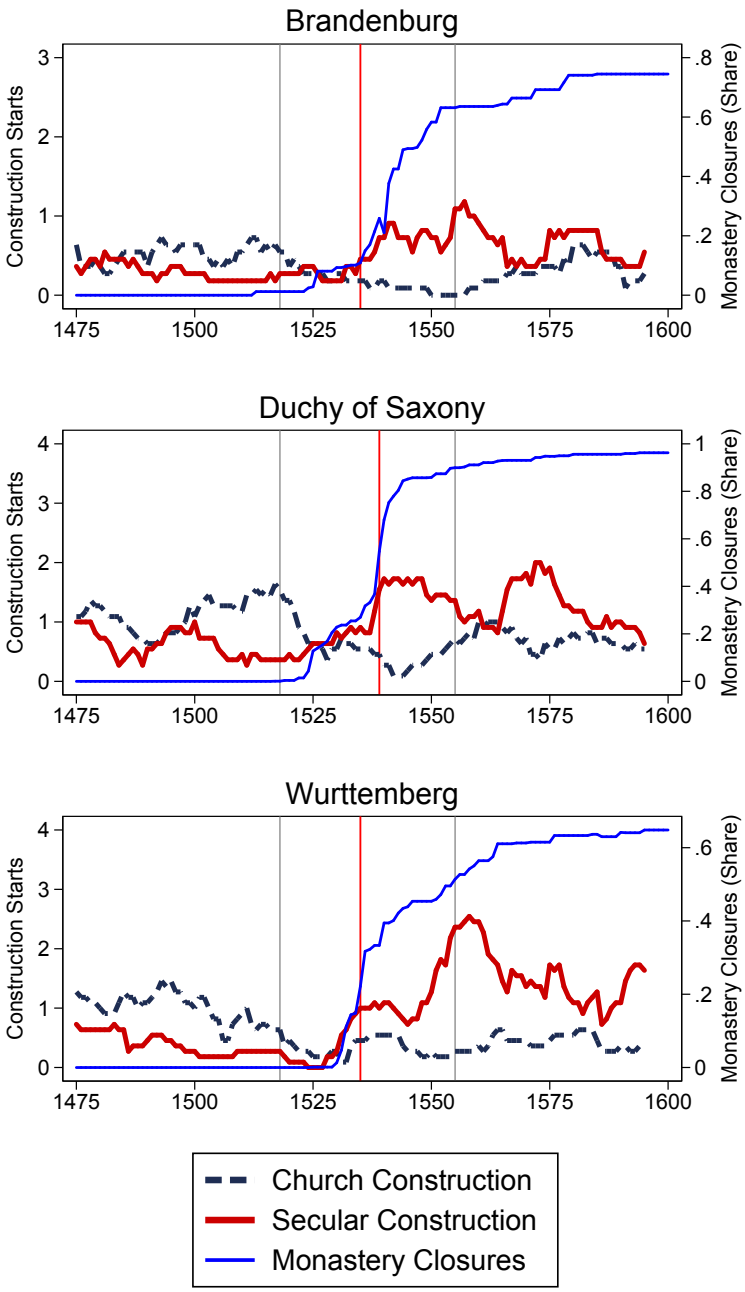

Figure 14: Monastery closure and construction in three territories: Brandenburg, Ducal Saxony, and Württemberg. Each figure shows the fraction of monasteries closed and the number of construction events in the church and secular sectors (construction events are shown as 11-year moving averages). The posting of Luther's theses in 1517 and the Peace of Augsburg in 1555 are marked in all figures, as are the dates of each change in territorial lord leading to the adoption of Protestantism: 1535 for Electorate of Brandenburg, 1539 for the Duchy of Saxony, and 1534 for the Duchy of Württemberg.

back of the Peasants' Revolt, but this attempt failed. One can see in the bottom panel of Figure 14 that in the first decade after the Reformation, under the Catholic Frederick, there is almost no monastery closure in the Duchy of Württemberg, and very little shifting of construction toward secular purposes.

But in 1534, supported by his friend, the Protestant Philip of Hesse, the Duchy was restored to Ulrich. Immediately thereafter, Ulrich expropriated many of the Duchy's monasteries; by 1535, one-third of the Duchy's farmland was transferred from the monasteries into Ulrich's possession (Ocker, 2010, pp. 55–56). One can see in the botton panel of Figure 14 that exactly at this time secular construction begins to rise and overtakes religious construction in the Duchy.

5 Conclusion

Religious organizations have been among the most *economically* important institutions in human societies throughout history (Finer, 1999). These organizations historically have accumulated financial capital, possessed land, attracted human capital, and ruled regions. Shocks to the market for religion thus have the potential to affect the underlying structure of economies. We find that the Protestant Reformation marked both a challenge to the incumbent monopolist in the market for religion and a broader economic shock. Not only did the Reformation result in a decline in the economic power of Europe's most powerful institution at the time—the Catholic Church—it also produced a sharp shift in the allocation of economic resources toward secular uses.

Secular lords exploited the ideological shock to the Catholic Church to confiscate monastery resources. Highly skilled labor moved from church careers toward secular careers, including in expanding secular administrations, particularly in regions that adopted the Protestant religion. Consistent with economic theory, university students, anticipating lower and more uncertain returns to church-career-specific training in theology, began to accumulate more general human capital, studying the arts, law, and medicine. The shift in resources toward secular activity was made tangible in the new construction occurring in 16th century Germany, which shifted sharply toward secular purposes, particularly in Protestant regions.

While the Reformation's effects would reverberate across Europe for centuries, and the culmination of Europe's cultural secularization was centuries away, our findings suggest that the first steps toward the rise of a secular West were taken immediately after the Reformation, with the weakening of the Catholic Church and the strengthening of the secular state.

References

Acemoglu, Daron, Simon Johnson, and James A. Robinson, "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth," *American Economic Review*, June 2005, *95* (3), 547–579.

_ , _ , _ , and Pierre Yared, "Reevaluating the modernization hypothesis," *Journal of Monetary Economics*, 2009, *56*, 1043–1058.

Allen, Robert C., *The British Industrial Revolution in Global Perspective*, Cambridge: Cambridge University Press, 2009.

Altonji, Joseph G., Erica Blom, and Costas Meghir, "Heterogeneity in Human Capital Investments: High School Curriculum, College Major, and Careers," *Annual Review of Economics*, 2012, *4* (1), 185–223.

Autor, David H., David Dorn, and Gordon H. Hanson, "The China Shock: Learning from Labor-Market Adjustment to Large Changes in Trade," *Annual Review of Economics*, 2016, *8*, 205–240.

Bairoch, Paul, Jean Batou, and Pierre Chèvre, *La population des villes européennes, 800-1850: Banque de données et analyse sommaire des résultats*, Geneva: Droz, 1988.

Barro, Robert J., "The determinants of democracy," *Journal of Political Economy*, 1999, *107,* (S6), S158–S183.

_ and Rachel M. McCleary, "Religion and Economic Growth across Countries," *American Sociological Review*, October 2003, pp. 760–781.

Basten, Christoph and Frank Betz, "Beyond Work Ethic: Religion, Individual, and Political Preferences," *American Economic Journal: Economic Policy*, August 2013, *5* (3), 67–91.

Bauch, Gustav, *Das älteste Decanatsbuch der philosophischen Facultät an der Universität zu Frankfurt a.O*, Breslau: Marcus in Komm., 1897.

Becker, Sascha O. and Ludger Woessmann, "Luther and the Girls: Religious Denomination and the Female Education Gap in 19th Century Prussia," *Scandinavian Journal of Economics*, December 2008, *110* (4), 777–805.

_ and _ , "Was Weber Wrong? A Human Capital Theory of Protestant Economic History," *Quarterly Journal of Economics*, May 2009, *124* (2), 531–596.

_ and _ , "Not the Opium of the People: Income and Secularization in a Panel of Prussian Counties," *American Economic Review*, May 2013, *103* (3), 539–544.

_ , Markus Nagler, and Ludger Woessmann, "Education and religious participation: City-level evidence from Germany's secularization period 1890–1930," 2017. Forthcoming, Journal of Economic Growth.

_ , Steven Pfaff, and Jared Rubin, "Causes and Consequences of the Protestant Reformation," *forthcoming, Explorations in Economic History*, 2016, pp. –.

Berger, Peter, *The Sacred Canopy*, Anchor, Doubleday, 1967.

Blickle, Peter, *The Revolution of 1525: The German Peasants' War from a New Perspective*, Baltimore: Johns Hopkins University Press, 1981.

Boppart, Timo, Josef Falkinger, Volker Grossmann, Ulrich Woitek, and Gabriela Wüthrich, "Under Which Conditions Does Religion Affect Educational Outcomes?," *Explorations in Economic History*, April 2013, *50* (2), 242–266.

Brady, Thomas A., *Communities, Politics, and Reformation in Early Modern Europe*, Leiden: Brill, 1998.

_ , *German Histories in the Age of Reformations, 1400-1650*, Cambridge: Cambridge University Press, 2009.

Cameron, Euan, *The European Reformation*, Oxford: Oxford University Press, 1991.

Cantoni, Davide, "Adopting a New Religion: The Case of Protestantism in 16th Century Germany," *Economic Journal*, May 2012, *122* (560), 502–531.

_ , "The Economic Effects of the Protestant Reformation: Testing the Weber Hypothesis in the German Lands," *Journal of the European Economic Association*, August 2015, *13* (4), 561–598.

_ **and Noam Yuchtman**, "Medieval Universities, Legal Institutions, and the Commercial Revolution," *Quarterly Journal of Economics*, May 2014, *129* (2), 823–887.

Chaney, Eric, "Tolerance, Religious Competition and the Rise and Fall of Muslim Science," November 2008. Unpublished, Harvard University.

_ , "Revolt on the Nile: Economic Shocks, Religion, and Political Power," *Econometrica*, September 2013, *81* (5), 2033–2053.

Charles, Kerwin Kofi, Erik Hurst, and Matthew J. Notowidigdo, "Housing Booms and Busts, Labor Market Opportunities, and College Attendance," November 2016. Unpublished, Northwestern University.

_ **,** _ **, and** _ , "The Masking of Declining Manufacturing Employment by the Housing Bubble," *Journal of Economic Perspectives*, May 2016, *30* (2), 179–200.

Clark, Gregory, *A Farewell to Alms; A Brief Economic History of the World*, Princeton, N.J.: Princeton University Press, 2007.

Cohn, Henry J., "Anticlericalism in the German Peasants' War 1525," *Past and Present*, May 1979, *83*, 3–31.

Curuk, Malik and Sjak Smulders, "Malthus Meets Luther: The Economics Behind the German Reformation," July 2016. CESifo Working Paper 6010.

Davis, Steven J. and John Haltiwanger, "Sectoral job creation and destruction responses to oil price changes," *Journal of Monetary Economics*, 2001, *48*, 465–512.

Dellwing, H., *Denkmaltopographie Bundesrepublik Deutschland*, Schwann, 1988/2011.

Dittmar, Jeremiah and Ralf Meisenzahl, "State Capacity and Public Goods: Institutional Change, Human Capital, and Growth in Early Modern Germany," *Centre for Economic Performance Paper Series*, March 2016, *1418*.

_ **and Skipper Seabold**, "Media, Markets, and Radical Ideas: Evidence from the Protestant Reformation," 2016. LSE working paper.

Durkheim, Émile, *De la division du travail social: Étude sur l'organisation des sociétés supérieures*, F. Alcan, 1893.

_ , *The elementary forms of the religious life: A study in religious sociology*, London: G. Allen & Unwin, 1912.

Dykema, Peter A. and Heiko A. Oberman, *Anticlericalism: in late medieval and early modern Europe*, Leiden: E.J. Brill, 1993.

Ekelund, Robert B., Robert F. Hébert, and Robert D. Tollison, *The Marketplace of Christianity*, Cambridge, Mass.: MIT Press, 2006.

Erler, Georg, *Die Matrikel der Universität Leipzig, Band 1: Die Immatrikulationen von 1410–1599*, Leipzig: Giesecke & Devrient, 1895.

_ , *Die Matrikel der Universität Leipzig, Band 2: Die Promotionen von 1410–1599*, Leipzig: Giesecke & Devrient, 1897.

_ , *Die iüngere Matrikel der Universität Leipzig, Band 1: Die Immatrikulationen vom Wintersemester 1559 bis zum Sommersemester 1634*, Leipzig: Giesecke & Devrient, 1909.

Eulenburg, Franz, *Die Frequenz der deutschen Universitäten von ihrer Gründung bis zur Gegenwart.*, Leipzig: Teubner, 1904.

Finer, Samuel Edward, *The History of Government from the Earliest Times*, Oxford: Oxford University Press, 1999.

Galor, Oded and David N. Weil, "Population, Technology, and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond," *American Economic Review*, September 2000, *90* (4), 806–828.

Gorski, Philip S., "Historicizing the Secularization Debate: Church, State, and Society in Late Medieval and Early Modern Europe, ca. 1300 to 1700," *American Sociological Review*, February 2000, *65* (1), 138–167.

Grendler, Paul F., "The Universities of the Renaissance and Reformation," *Renaissance Quarterly*, Spring 2004, *57* (1), 1–42.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, "Does Culture Affect Economic Outcomes?," *Journal of Economic Perspectives*, Spring 2006, *20* (2), 23–48.

Hamm, Berndt, "The Urban Reformation in the Holy Roman Empire," in Thomas A. Brady, Heiko A. Oberman, and James D. Tracy, eds., *Handbook of European history, 1400-1600 : Late Middle Ages, Renaissance and Reformation, v. 2: Visions, Programs and Outcomes*, Leiden: Brill, 1994.

Heldring, Leander, James A. Robinson, and Sebastian Vollmer, "Monks, Gents and Industrialists: The Long-Run Impact of the Dissolution of the English Monasteries," August 2015. NBER Working Paper 21450.

Hölscher, Lucian, *Geschichte der protestantischen Frömmigkeit in Deutschland*, München: C.H. Beck, 2005.

Iannaccone, Laurence R., "Introduction to the Economics of Religion," *Journal of Economic Literature*, September 1998, *36* (3), 1465–1495.

Jürgensmeier, Friedhelm and Regina Elisabeth Schwerdtfeger, *Orden und Klöster im Zeitalter von Reformation und katholischer Reform, 1500-1700*, Münster: Aschendorff, 3 vols., 2005–2008.

Kleineidam, Erich, *Universitas studii Erffordensis: Überblick über die Geschichte der Universität Erfurt, Band 3: 1521–1632, Die Zeit der Reformation und Gegenreformation*, Leipzig: St.-Benno-Verlag, 1983.

Kuran, Timur, *The Long Divergence: How Islamic Law Held Back the Middle East*, Princeton, N.J.: Princeton University Press, 2011.

Leinweber, Josef, *Verzeichnis der Studierenden in Fulda von 1574 bis 1805*, Frankfurt am Main: Knecht, 1991.

Lipset, Seymour Martin, "Some Social Requisites of Democracy: Economic Development and Political Legitimacy," *The American Political Science Review*, 1959, *53* (1), 69–105.

Marburg, Universität, "Thesaurus Professionum Forschungsstelle für Personalschriften," http://www.online.uni-marburg.de/fpmr/thepro/cs.php , 2015.

Martin, David, *On Secularization: Towards a Revised General Theory*, Aldershot: Ashgate, 2005.

McCleary, Rachel M. and Robert J. Barro, "Religion and Economy," *Journal of Economic Perspectives*, Spring 2006, *20* (2), 49–72.

McLeod, Hugh, *Religion and the People of Western Europe 1789–1990*, Oxford, New York: Oxford University Press, 1981.

Mills, C. Wright, *The Sociological Imagination*, Oxford: Oxford University Press, 1959.

Moeller, Bernd, *Imperial Cities and the Reformation*, Philadelphia: Fortress Press, 1972.

Mokyr, Joel, "The Intellectual Origins of Modern Economic Growth," *Journal of Economic History*, 2005, *65* (2), 285–351.

_ , *The Enlightened Economy: An Economic History of Britain, 1700-1850*, New Haven: Yale University Press, 2009.

Murphy, Kevin M., Andrei Shleifer, and Robert W. Vishny, "The Allocation of Talent: Implications for Growth," *The Quaterly Journal of Economics*, May 1991, *106* (2), 503–530.

Naragon, Steve, "Brief Descriptions of 18th Century German Universities," http://users.manchester.edu/FacStaff/SSNaragon/Kant/universities/UnivBriefHistories.htm , 2006.

Norris, Pippa and Ronald Inglehart, *Sacred and Secular: Religion and Politics Worldwide*, Cambridge: Cambridge University Press, 2004.

Nüssli, Christos, "Periodical Historical Atlas of Europe," www.euratlas.com , 2008.

Ocker, Christopher, *Church Robbers and Reformers in Germany, 1525–1547: Confiscation and Religious Purpose in the Holy Roman Empire*, Leiden: Brill, 2006.

_ , "The birth of an Empire of Two Churches: church property, theologians, and the League of Schmalkalden," *Austrian History Yearbook*, 2010, *41*, 48–67.

Ozment, Steven E., *The Reformation in the Cities: The Appeal of Protestantism to Sixteenth Century Germany and Switzerland*, New Haven: Yale University Press, 1975.

Paldam, Ella and Martin Paldam, "The political economy of churches in Denmark, 1300-2015," March 2017. Unpublished, Aarhus University.

Rubin, Jared, "Printing and Protestants: An Empirical Test of the Role of Printing in the Reformation," *Review of Economics and Statistics*, May 2014, *96* (2), 270–286.

Rüegg, Walter, *Geschichte der Universität in Europa, Band 2: Von der Reformation zur Französischen Revolution*, Munich: C.H. Beck, 1996.

Saint-Simon, Henri de, *Selected Writings on Science, Industry, and Social Organization*, New York: Holmes and Meier, 1975.

Schwinges, Rainer Christoph and Christian Hesse, "Repertorium Academicum Germanicum," http://www.rag-online.org , 2015.

Sehling, Emil, *Die evanglischen Kirchenverordnungen des XVI. Jahrhunderts*, Leipzig: O.R. Reisland, 1902-2013.

Seifert, Arno, "Das höhere Schulwesen: Universitäten und Gymnasien," in Nothker Hammerstein, ed., *Handbuch der deuschen Bildungsgeschichte*, Vol. 1, Munich: C.H. Beck, 1996.

Spenkuch, Jörg L., "The Protestant Ethic and Work: Micro Evidence from Contemporary Germany," May 2016. Unpublished, Northwestern University.

Spitz, Lewis, "The Impact of the Reformation on the Universities," in Leif Grane, ed., *Universities in the Reformation: Lectures from the University of Copenhagen Symposium*, Leiden: E.J. Brill, 1981.

Squicciarini, Mara P. and Nico Voigtländer, "Human Capital and Industrialization: Evidence from the Age of Enlightenment," *Quarterly Journal of Economics*, November 2015, *130* (4), 1825–1883.

Steinmeyer, Elias von, *Die Matrikel der Universität Altdorf (1576-1809)*, Würzburg: Stürtz, 1912.

Strauss, Gerald, "The Social Function of Schools in the Lutheran Reformation in Germany," *History of Education Quarterly*, Summer 1988, *28* (2), 191–206.

Taylor, Charles, *A Secular Age*, Cambridge, Mass.: Harvard University Press, 2007.

Troeltsch, Ernst, "Die Bedeutung des Protestantismus für die Entstehung der modernen Welt," *Historische Zeitschrift*, 1906, *97* (1), 1–66.

Weber, Max, "Die protestantische Ethik und der 'Geist' des Kapitalismus," *Archiv für Sozialwissenschaften und Sozialpolitik*, 1904/05, *20-21*, 17–84; 1–110. English Translation: *The Protestant Ethic and the Spirit of Capitalism,* London: Allen & Unwin, 1930.

Supplementary Appendix – For Online Publication

Additional references

The *Denkmaltopographie Bundesrepublik Deutschland* cited in the main text (Dellwing 1988/2011) was preceded by separate series of volumes listing and describing all historical buildings in the single states of Germany. We looked up sizes of church buildings in these volumes as well, to extend and complement the analysis based on the *Denkmaltopographie Bundesrepublik Deutschland*.

Die Kunstdenkmäler des Grossherzogtums Baden, 15 volumes, Tübingen: Mohr, 1887–1913.

Die Kunstdenkmäler von Bayern, 112 volumes, München: Oldenbourg, 1892–1972.

Berlin und seine Bauten, 3 volumes, Berlin: Ernst, 1877–1896.

Die Kunstdenkmäler der Provinz Brandenburg, 6 volumes, Berlin: Dt. Kunstverlag, 1907–1921.

Bau- und Kunstdenkmäler des Herzogthums Braunschweig, 5 volumes, Wolfenbüttel: Zwissler, 1896–1910.

Die Kunstdenkmäler der Provinz Hannover, 26 volumes, Hannover: Provinzialverwaltung, 1899–1939.

Kunstdenkmäler im Großherzogthum Hessen, 5 volumes, Darmstadt: Bergstraesser, 1885–1898.

Die Baudenkmäler des Regierungsbezirks Wiesbaden, 6 volumes, Frankfurt am Main: Keller, 1902–1921.

Die Bau- und Kunstdenkmäler in den Hohenzollern'schen Landen, Stuttgart: Neff, 1896.

Kunst- und Geschichts-Denkmäler des Großherzogthums Mecklenburg-Schwerin, 5 volumes, Schwerin: Bärensprung, 1896–1902.

Kunst- und Geschichts-Denkmäler des Freistaates Mecklenburg-Strelitz, 2 volumes, Neubrandenburg: Brünslow, 1921–1934.

Bau- und Kunstdenkmäler des Herzogtums Oldenburg, 5 volumes, Oldenburg, 1896–1909.

Die Bau- und Kunstdenkmäler der Provinz Ostpreußen, 9 volumes, Königsberg, 1891–1899.

Die Baudenkmale in der Pfalz, Ludwigshafen, 1884–1897.

Bau- und Kunstdenkmäler der Provinz Pommern, 24 volumes, Stettin, 1881–1909.

Die Kunstdenkmäler der Rheinprovinz, 20 volumes, Düsseldorf, 1891–1937.

Die Kunstdenkmäler der Provinz Sachsen, 33 volumes, Leipzig, 1838–1850.

Denkmalverzeichnis Sachsen-Anhalt, 33 volumes, Halle a. d. Saale, 1879–1923.

Verzeichniss der Kunstdenkmäler der Provinz Schlesien, 6 volumes, Breslau, 1886–1902.

Die Bau- und Kunstdenkmäler der Provinz Schleswig-Holstein, 6 volumes, Kiel, 1887–1925.

Bau- und Kunstdenkmäler Thüringens, 24 volumes, 1888–1928.

Die Bau- und Kunstdenkmäler von Westfalen, 38 volumes, Münster, 1881–1913.

Die Bau- und Kunstdenkmäler der Provinz Westpreußen, 14 volumes, Danzig, 1884–1919.

Die Kunst- und Altertums-Denkmale im Königreich Württemberg, 4 volumes, 1893–1928.

Appendix figures and tables

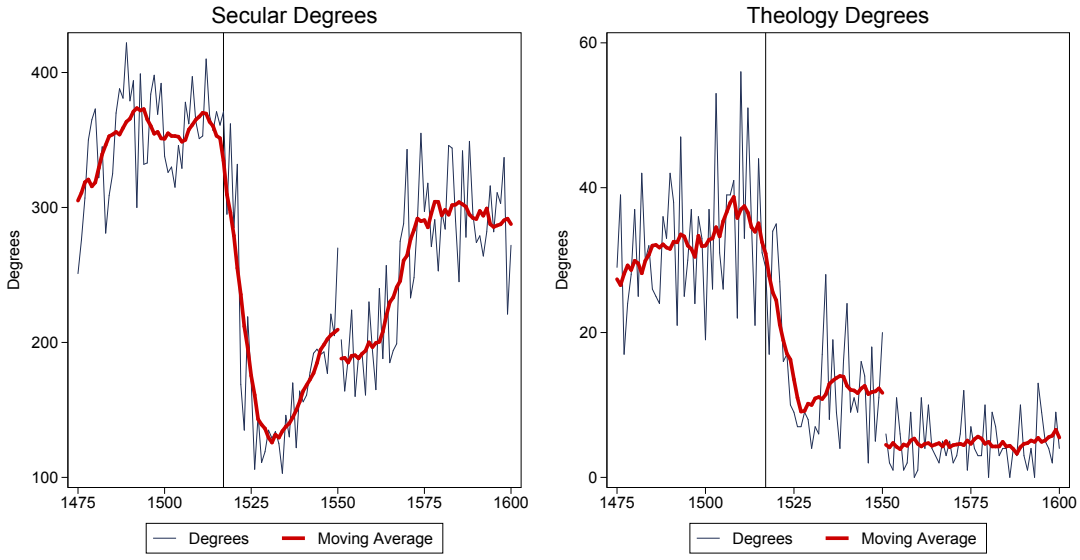

Figure A1: Number of theology and secular degrees granted. Figure shows the number of degrees in theology and in secular subjects by year, and an 11-year moving average. Theology and secular degree categories are exhaustive and mutually exclusive. The secular degree category includes degrees in the arts, law, and medicine. Data come from the *Repertorium Academicum Germanicum* for degrees granted through 1550 and own data collection (consulting Bauch, 1897; Erler, 1895, 1897, 1909; Eulenburg, 1904; Kleineidam, 1983; Leinweber, 1991; Rüegg, 1996; Steinmeyer, 1912) for degrees granted from 1550 through 1600. This figure differs from Figure 4 in that data are *not* smoothed across the 1550 breaking point between sources.

Table A1: Degrees awarded by level and subject

Subject	Bachelor's	License	Master's	Doctor	Total
Arts	17608	4163	15179	450	37400
Law	1210	892	1	896	2999
Medicine	239	211	7	486	943
Theology	2085	767	38	898	3788
Across subject total	21142	6033	15225	2730	45130

Data come from the *Repertorium Academicum Germanicum*.

Table A2: Territories and assignment to (eventual) religion

Territory	Protestant	Territory	Protestant
Anhalt	1537	Lorraine	—
Baden	1555	Mainz	—
Bavaria-Landshut	—	Mecklenburg	1549
Bavaria-Munich	—	Nassau	1542
Bohemia	—	Palatinate	1546
Brandenburg	1539	Passau	—
Brunswick-Calenberg	1584	Poland	—
Brunswick-Lüneburg	1529	Pomerania	1534
Brunswick-Wolfenbüttel	1568	Ruppin	1539
Burgundian Netherlands	—	Salzburg	—
Cleves-Mark	—	Saxony (Ducal)	1539
Cologne	—	Saxony (Electorate)	1527
Denmark	1536	Small States of the HRE	.
East Frisia	1535	Swiss Confederacy	.
Guelders	—	Trier	—
Habsburg Monarchy	—	Upper Palatinate	1546
Hesse	1526	Württemberg	1534
Jülich-Berg	—		

Table lists territories present in the Euratlas (Nüssli, 2008) for 1500, and their assignment to the territorial lord's (eventual) religion through the dates of introduction of the Reformation as in Cantoni (2012). Note: Cities matched by the Euratlas digital maps to "Small States of the HRE" and to the "Swiss Confederacy" are discarded in our analysis. Territories, and their names, reflect borders as of 1500: Bavaria-Landshut and Bavaria-Munich, e.g., merge after the War of the Succession of Landshut (1503–1505).

Table A3: The Effect of the Reformation on Construction Activity Outside Large Cities

Dependent variable:	Number of construction events			
	Church		Secular	
	(1)	(2)	(3)	(4)
Protestant × 1470	-1.10	-0.94	0.57	0.56
	(0.77)	(0.80)	(0.35)	(0.39)
Protestant × 1480	-1.54**	-1.56**	0.84*	0.77*
	(0.75)	(0.73)	(0.41)	(0.40)
Protestant × 1490	-0.89	-0.75	0.88*	0.92*
	(0.58)	(0.55)	(0.48)	(0.51)
Protestant × 1500	-0.79	-0.76	0.86**	0.92**
	(0.50)	(0.50)	(0.40)	(0.42)
Protestant × 1520	-1.73**	-1.39***	0.29	0.10
	(0.72)	(0.44)	(0.56)	(0.46)
Protestant × 1530	-1.40**	-1.08**	0.98	0.58
	(0.66)	(0.41)	(0.89)	(0.66)
Protestant × 1540	-1.50*	-1.12*	0.92	0.76
	(0.83)	(0.56)	(0.56)	(0.46)
Protestant × 1550	-2.54***	-2.33***	2.47**	2.00**
	(0.74)	(0.73)	(1.06)	(0.76)
Protestant × 1560	-1.57**	-1.38**	1.39	0.99*
	(0.65)	(0.61)	(0.86)	(0.58)
Protestant × 1570	-1.98***	-1.80***	1.67	1.21
	(0.66)	(0.63)	(1.01)	(0.75)
Protestant × 1580	-1.58**	-1.54**	1.58	1.10
	(0.61)	(0.69)	(0.98)	(0.66)
Protestant × 1590	-1.30	-1.29	0.97	0.63
	(0.87)	(0.98)	(0.87)	(0.68)
Observations	455	455	455	455
R^2	0.70	0.76	0.67	0.78
P-value: sum of 1520–1590 interactions	0.01	0.01	0.08	0.05
P-value: sum of 1550–1590 interactions	0.01	0.02	0.07	0.05
1400–1470 constr.×decade FE	N	Y	N	Y

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Table presents differential numbers of construction events, by sector, comparing territories that would become Protestant and territories that would remain Catholic across decades (i.e., examining interactions between an "eventually protestant territory" dummy variable and decade fixed effects). Sample is limited to towns in the *Deutsches Städtebuch* too small to be included in the population data collected in Bairoch et al. (1988). The omitted category is Protestant×1510. The unit of observation is the territory×decade, with the outcome variable calculated as the sum of construction events in a territory×decade for a particular sector. The sectors are: church, in columns 1 and 2 and secular, in columns 3 and 4. All specifications include territory and decade fixed effects. Columns 2 and 4 include interactions between the total number of construction events in a territory between 1400 and 1470 and decade fixed effects.Standard errors clustered at the territory level in parentheses (35 clusters).

Table A4: The Size of Church Construction Projects in Protestant Territories

	Pre: 1470-1517			Post: 1518-1600			p-value
	n	Mean	SD	n	Mean	SD	diff. in means
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
All New Church Construction							
Indicator: Church Size Recorded	125	0.18	0.38	88	0.08	0.27	0.03
Where Church Size is Recorded							
Church Size in Square Meters	22	453.24	302.43	7	494.93	196.42	0.68

This table presents summary statistics on physical sizes of new churches built in German territories that ultimately adopted Protestantism. We study new church construction in cities and towns recorded over the period 1470–1600 in the *Deutsches Städtebuch*. We obtain data on church sizes by finding each new church in the 124-volume series *Denkmaltopographie Bundesrepublik Deutschland* (Dellwing, 1988/2011), which provides a record of cultural monuments in Germany. The first row provides summary statistics for the binary outcome indicating whether a given church construction event mentioned in the *Deutsches Städtebuch* is recorded with original floor dimensions in the *Denkmaltopographie Bundesrepublik Deutschland* (1 = 'yes', 0 = 'no'). The second row provides summary statistics on church sizes for construction events on which the *Denkmaltopographie Bundesrepublik Deutschland* provides information on the original size of church buildings. Church sizes are measured in square meters, calculated as the sum of the church nave area and church choir area, using data on floor plan widths and lengths.

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