

RELIGIOUS COMPETITION AND REALLOCATION: THE POLITICAL ECONOMY OF SECULARIZATION IN THE PROTESTANT REFORMATION*

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Using novel microdata, we document an important, unintended consequence of the Protestant Reformation: a reallocation of resources from religious to secular purposes. To understand this process, we propose a conceptual framework in which the introduction of religious competition shifts political markets where religious authorities provide legitimacy to rulers in exchange for control over resources. Consistent with our framework, religious competition changed the balance of power between secular and religious elites: secular authorities acquired enormous amounts of wealth from monasteries closed during the Reformation, particularly in Protestant regions. This transfer of resources had significant consequences. First, it shifted the allocation of upper-tail human capital. Graduates of Protestant universities increasingly took secular, especially administrative, occupations. Protestant university students increasingly studied secular subjects, especially degrees that prepared students for public sector jobs, rather than church sector specific theology. Second, it affected the sectoral composition of fixed investment.

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Particularly in Protestant regions, new construction shifted from religious toward secular purposes, especially the building of palaces and administrative buildings, which reflected the increased wealth and power of secular lords. Reallocation was not driven by preexisting economic or cultural differences. Our findings indicate that the Reformation played an important causal role in the secularization of the West. *JEL* Codes: N13, N33, J24, P16, Z12.

I. INTRODUCTION

How does religious competition influence the allocation of resources between religious and secular uses? In this article, we study the paradigmatic case of the Protestant Reformation: the moment when the most powerful institution in Western Europe—the Catholic Church—experienced a profound competitive shock. We document how the introduction of religious competition during the Reformation transformed the European economy, sharply shifting the allocation of resources from religious to secular uses. We argue that the interaction between religious competition and politics was critical to this process.

Prior research on religious competition focuses on the relationship between producers and consumers of religion in a market for salvation (Iannaccone 1998; Ekelund, Hébert, and Tollison 2006; Iyer 2016). We argue that the introduction of religious competition crucially affects a second market—in which state authorities secure political legitimacy from religious elites (Rubin 2017). Introducing this missing market generates novel hypotheses. First, competition should induce resource reallocation away from the church sector and toward secular uses. Second, competition should drive resource reallocation toward uses specifically favored by secular rulers. We examine rich microdata on the allocation of resources in early modern Germany and find evidence supporting both hypotheses.¹ While the Reformation was a religious movement, we find that its unintended consequence was to promote economic secularization: a significant shift in the balance of power toward secular authorities and a sharp and immediate reallocation of resources toward secular purposes.

We present a conceptual framework that captures a core feature of religion in history: the role in legitimizing political elites (Weber 1978; North, Wallis, and Weingast 2009). Within

1. We use “Germany” as shorthand to refer to the German-speaking lands of the Holy Roman Empire.

our framework, the pre-Reformation era can be understood as an equilibrium in which a monopolist religious producer (the Catholic Church) provided political legitimacy to secular authorities at a high price—charged in the form of control over resources, tax exemptions, and some degree of political power.² The Reformation represented a competitive shock in the market for salvation, as studied by [Ekelund, Hébert, and Tollison \(2006\)](#): Protestant reformers offered a popular, lower-cost alternative to the Catholic Church. Crucially, this shock to the market for salvation also affected the market for political legitimacy. During the Reformation, the value of Catholic legitimacy fell and the bargaining power of secular rulers vis-à-vis religious elites rose. Protestant reformers' need to strike a bargain with secular lords meant they would accept a lower price in exchange for conferring legitimacy. Where Protestants were willing to grant secular authorities extensive control of church resources, the need to maintain doctrinal consistency restricted the bargains Catholics could offer.

The posited new equilibrium in the market for legitimacy has implications for the allocation of resources between secular and religious uses. Increased labor demand by enriched and empowered rulers, and the decline in clerical services required for salvation in Protestant theology, will reduce church sector labor demand relative to the secular sector. As a consequence, returns to investments in human capital specific to church careers will fall, and forward-looking students will shift their human capital investments accordingly. Shifts in resources toward secular authorities will also be reflected in fixed investments, such as large-scale urban construction, which embody a full set of factors of production. The new equilibrium will also have implications for the allocation of resources within the secular sector: specifically, resources will shift toward uses that reflect the enhanced bargaining power of secular rulers.

We begin to evaluate these hypotheses by documenting the new equilibrium in the market for political legitimacy in the years after 1517, when Martin Luther first circulated his famous 95 Theses. As indicators of the shifting bargain between

2. Even before the Reformation, rulers in early modern Europe were arguably less reliant on political legitimation by religious authorities than rulers in, for example, the Islamic world or in earlier periods in European history ([Rubin 2017](#)). We discuss the pre-Reformation equilibrium in the market for legitimacy in further detail below.

secular and religious authorities, we examine the expropriation of monasteries and wealth transfers from the Catholic Church to secular lords. Qualitative and quantitative evidence show sharp reallocations toward secular control of resources—not just a transfer from Catholic Church uses to Protestant ones. Transfers of resources from the control of church elites to secular lords occurred in both Catholic and Protestant territories but were particularly pronounced in the latter.

We directly test the implications of our framework for resource allocation using rich microdata. We assemble new, highly disaggregated data on the degrees received by and occupational outcomes of German university graduates and on construction events at the town-by-year level, across over 2,000 German towns. We distinguish between religious and secular human capital investments, occupations, and fixed capital investments. Specifically, we assign to the religious sector the study of theology; taking a position as a monk, priest, and so on; and the construction of a church. We assign to the secular sector, nontheological degrees; occupations in public administration and the private sector; and the construction of a palace, hospital, or merchant hall.³ Our data also allow us to test for shifts within the secular sector between uses favored by state authorities and other private uses.

To study the market for highly skilled labor, we examine individual-level data on the career choices of university graduates before and during 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 guild masters, rather than priests or monks).⁵ We find no pre-Reformation differences in occupational

3. Our classification of religious and secular sectors of the economy includes some areas of ambiguity: for example, hospitals were funded and staffed by both religious and secular agents. We discuss the implications of such ambiguity further below.

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), and Dittmar and Meisenzahl (forthcoming). 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 work by Murphy, Shleifer, and Vishny (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.

choice trends between universities that became Protestant and those that remained Catholic. Our results reflect the transmission of the shock to the market for religion into effects on the labor market.⁶ Reflecting the new political economy equilibrium, we specifically find an increase in administrative jobs among graduates from Protestant universities.

A second implication of the new equilibrium is the allocation of forward-looking students' human capital investments away from church-specific degrees, 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 became Protestant and those that remained Catholic. We also find significant shifts toward degrees in law and the arts, subjects that differentially prepared students for careers in public administration.

We finally consider a third measure of resource allocation: major construction events as summary statistics for the allocation of bundles of resources, embodying land, physical, financial, and human capital. During the Reformation, new construction events shifted from religious purposes toward secular ones (e.g., from churches to administrative buildings and lords' palaces). [Figure I](#), Panel A shows a pivot from church sector construction to secular sector construction precisely at the time of the Reformation. This sectoral reallocation away from church uses occurred differentially more in Protestant territories, as we document below. 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. Consistent with our conceptual framework, [Figure I](#), Panel B shows that within the category of secular construction, there was a sharp pivot precisely toward the uses favored by

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

7. See [Altonji, Blom, and Meghir \(2012\)](#) for a contemporary analysis of how students' college major choices are affected by expectations of future labor market outcomes.

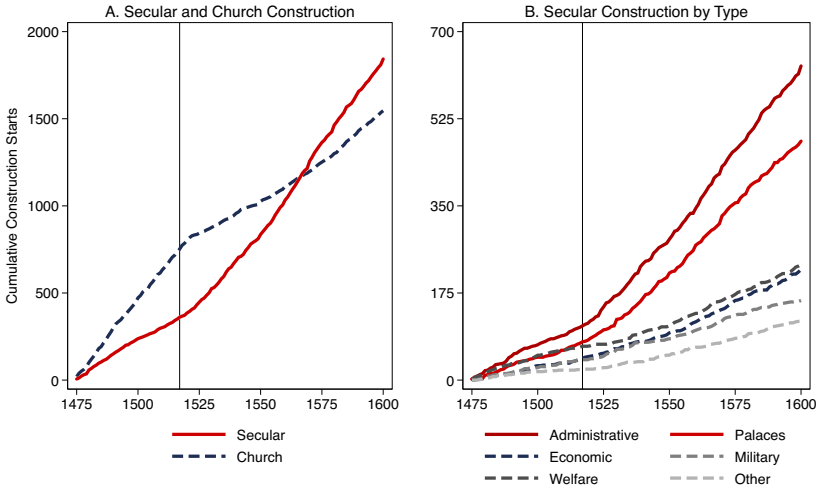


FIGURE I

Construction Activity Around the Time of the Reformation

Cumulative construction events by sector and subsector over time. Panel A shows the cumulative number of new construction events in the religious and secular sectors in Germany. Panel B disaggregates the secular sector construction events into mutually exclusive and exhaustive subsectors (color version available in the online article). The “Administrative” subsector includes courts, town halls, and customs houses. The “Palaces” subsector includes castles and hunting lodges. The “Welfare” subsector includes schools and hospitals. The “Economic” subsector comprises private sector construction, such as mills, restaurants, and breweries. The “Military” subsector includes barracks and arsenals. Town-level construction data come from 2,256 town entries in the *Deutsches Städtebuch* and are aggregated for all of Germany. Vertical line marks 1517, when Martin Luther circulated his 95 Theses.

empowered secular lords: the construction of palaces and administrative buildings.

The disaggregated nature of our construction data allows us to test an additional hypothesis: to the extent that the resource reallocation we observe was ultimately driven by religious competition, one would expect to observe larger differences in construction between Protestant regions and Catholic regions far from Protestant lands—the latter being exposed to less religious competition than Catholic lands on a Protestant border (Ekelund, Hébert, and Tollison 2006 emphasize the importance of such spatial variation in religious competition). Indeed, we find a larger shift toward secular construction in comparing Protestant regions to Catholic regions far from a Protestant border than in a comparison with Catholic regions close to a Protestant border.

Our construction data also allow us to rule out competing explanations for our findings. 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. For example, historical 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 potentially ambiguous social service provision during the Reformation; we see a shift in unambiguously secular construction (lords' palaces and administrative buildings, as suggested by [Figure I, Panel B](#)). 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.

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 explain our findings: territories and universities that would become Protestant exhibit no significant differences in human and physical capital investment trends prior to the Reformation.⁸

Another natural concern is that time-varying and territory-specific unobservables may have driven both the adoption of Protestantism and the reallocation of resources toward secular purposes. 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 the analysis to small towns. Another possibility is that changes in economic conditions drove

8. 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, occupational choices, human capital investments, and construction activity, discussed later, suggest that the sources of variation in adoption were generally not associated with our outcomes of interest prior to the Reformation.

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 these territories, where the timing of religious change was independent of underlying economic conditions, the same pattern of reallocation ensues.

Our findings provide new empirical evidence on the links among the Reformation, secularization, and economic change. [Ekelund, Hébert, and Tollison \(2006\)](#) link the Reformation to growth via secularization, focusing on the market for salvation and arguing that the Reformation shifted resources from the Catholic Church directly to the private sector in the sixteenth century.⁹ [Rubin \(2017\)](#) suggests another crucial dimension, arguing that the Reformation was associated with the emergence of a more secular political economy, particularly in Protestant regions. He specifically highlights the historic association between secularization and growth, contrasting Europe with the Islamic world (see also [Chaney 2008](#); [Kuran 2011](#)). Our work conceptually synthesizes [Ekelund, Hébert, and Tollison \(2006\)](#) and [Rubin \(2017\)](#), and quantitatively tests hypotheses from the resulting framework. Supporting both [Ekelund, Hébert, and Tollison \(2006\)](#) and [Rubin \(2017\)](#), we provide the first quantitative empirical evidence identifying the Reformation as playing a causal role in the emergence of a more secular society in Protestant Europe. Our finding that the Reformation in fact shifted resources to the state (i.e., territorial lords) underscores the interaction of religion and politics, as suggested by our conceptual framework and by [Rubin \(2017\)](#). It suggests a different (perhaps complementary) path leading from the Reformation to growth from that emphasized by [Ekelund, Hébert, and Tollison \(2006\)](#).¹⁰

More broadly, previous research has considered the long-run effects of the Reformation on the European economy through

9. Relatedly, [Heldring, Robinson, and Vollmer \(2017\)](#) argue that the dissolution of the monasteries during the English Reformation contributed to long-run economic modernization by enriching and strengthening a particular segment of English society—the gentry.

10. To be clear, although we do not observe reallocation of resources toward private secular purposes, the introduction of religious competition may have stimulated private sector economic activity along margins other than those we study.

its influence on culture (Weber 1904/05), education (Becker and Woessmann 2009), and politics (Rubin 2017).¹¹ Up to now, there has been little empirical work documenting the Reformation's economic consequences prior to the nineteenth century.¹² We shed light on the path from the Reformation to long-run economic change, identifying the causal impact of the Reformation on the emergence of a more secular society in Europe and in Protestant Europe in particular. The process of economic secularization that we document can be seen as having two components: first, the strengthening of territorial lords—promoting institutional secularization—and second, a reallocation of economic inputs toward secular purposes, specifically those favored by territorial lords—reflecting allocational secularization.¹³ Both components played an important role in producing a modern, secular West (Durkheim, 1893; Mills 1959; Saint-Simon 1975) and also—very early by global standards—produced conditions that have been linked by scholars to modern economic growth (Weber 1904/05; Kuran 2011; Rubin 2017).¹⁴

Although we do not focus on the Reformation's consequences for economic growth, our analysis complements existing work in this area in two ways. First, conceptually, our findings point to political changes—consequences of the Reformation outside of the traditional macroeconomic production function—as potentially important drivers of economic change in the long run. Consistent with this view, Dittmar and Meisenzahl (forthcoming) provide

11. This literature is itself closely related to a larger literature on the economic consequences of religion and culture (e.g., Barro and McCleary 2003; McCleary and Barro 2006; Guiso, Sapienza, and Zingales 2006; Nunn 2009; Kuran 2011; Alesina and Giuliano 2015).

12. This gap in the literature has been noted by Becker, Pfaff, and Rubin (2016). Dittmar and Meisenzahl (forthcoming) provide evidence on both long- and short-run consequences of the Reformation operating through changes in city-level institutions that varied across Protestant cities, highlighting within-Protestant differences, as opposed to territory-level differences in religion we study here.

13. Our findings on resource reallocation in response to a shock to the religious sector complement a large contemporary literature on sectoral shocks and the allocation of economic inputs, particularly labor (e.g., Davis and Haltiwanger 2001; Autor, Dorn, and Hanson 2016; Charles, Hurst, and Notowidigdo 2016, forthcoming).

14. Surprisingly 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 (e.g., McLeod 1981; Norris and Inglehart 2004; Martin 2005; Becker and Woessmann 2013; Becker, Nagler, and Woessmann 2017).

evidence that ideological and political changes in a subset of Protestant cities resulted in the enactment of church ordinances establishing the local government as a provider of public goods, with important consequences for human capital and economic growth. Second, empirically, our work suggests that comparisons of geographically proximate Catholic and Protestant large cities may not fully capture Protestantism's long-run economic impact. The Reformation had effects outside of Protestant regions, particularly in Catholic regions bordering Protestant ones. The Reformation also had important effects in small towns as well as large cities.¹⁵

Our findings provide empirical evidence allowing us to contribute to classic debates in social science. In perhaps the most famous social science work on the Reformation, Max Weber argued that religious reform shaped economic behavior and thus contributed to the rise of capitalism.¹⁶ Subsequent research has tested for a causal effect of Protestantism on economic growth, finding mixed results (Becker and Woessmann 2009; Cantoni 2015; Dittmar and Meisenzahl forthcoming). Our evidence suggests a causal effect of the Reformation on economic activity—as suggested by the stylized Weberian view—but along a very different margin, and working through a different mechanism from that which is traditionally emphasized.

Tawney (1926) provides the classic response to Weber, emphasizing prior economic and institutional changes following Europe's commercial revolution that drove the Reformation. First, prior to the Reformation, European society was already characterized by important forms of secularization—including the separation of secular and religious power that is central to the political market that we emphasize in our conceptual framework. Second, growing commerce and economic change framed the religious critiques of the reformers themselves: Catholic Church corruption was attacked precisely in the commodification and marketization of salvation, as exemplified by Luther's critique of the sale of indulgences.

The rich data we assemble on the allocation of resources before and after the Reformation allow us to observe patterns of

15. Cantoni (2015) points to small towns as locations where Protestant-Catholic differences in economic outcomes may have been particularly pronounced.

16. To be fair, this is a simplification of the "Weberian" argument. In the original, Weber's focus is specifically on Calvinism and does not exclude reverse causality, i.e. economic factors shaping religious change (Weber 1904/05).

economic activity that might have foreshadowed the Reformation. In data on human capital and fixed investments, we do not observe any trends toward secularization prior to the Reformation. In occupational choice we do observe overall trends away from church employment, though we do not observe any differential pretrends toward secularization in regions that would adopt Protestantism. This suggests that the post-Reformation resource reallocation we observe was not previously in motion and was not inevitable.

Yet initial conditions were critical to the process that we document. Indeed, our conceptual framework highlights the conflict between lords and the Catholic Church that plays an important role in Tawney's thinking about the underlying causes of the Reformation. We thus emphasize that we identify a causal role for the Reformation on the allocation of resources, but we do not rule out economic factors driving the Reformation.¹⁷

In what follows, in [Section II](#) we present a historical overview of the Reformation viewed through a framework linking religion to Europe's political economy and the allocation of resources. In [Section III](#) we describe the data sets that we constructed to study the Reformation's economic consequences and document the reallocation of resources between the religious and secular sectors and across uses within the secular sector. In [Section IV](#) we offer concluding thoughts.

II. RELIGIOUS COMPETITION: CONCEPTUAL FRAMEWORK AND HISTORICAL EVIDENCE

We model the Reformation as a competitive shock to the Catholic Church, which had been a monopolist producer of salvation for believers and the sole source of religiously derived political legitimacy for secular rulers in Western Europe for hundreds of years. In this section, we first present our informal model of religious competition in Western Europe. We discuss the pre-Reformation equilibrium. Next we describe the Reformation as a shock to competition and discuss the post-Reformation equilibrium, providing historical evidence on the changed bargain between secular and religious elites. Finally, we discuss the

17. [Tawney's \(1926\)](#) analysis receives further support in our finding of unintended secularization produced by a religious movement; he writes that the Reformation's political economy consequences were "without design, and against the intention of most reformers" ([Tawney 1926](#), 88).

implications of the new equilibrium for the allocation of resources in Europe, laying out the hypotheses that we test in our empirical analysis later.

II.A. Overview

Much prior work on the economics of religion has considered churches as producers and believers as the consumers of salvation and perhaps other “club goods” (e.g. [Ekelund, Hébert, and Tollison 2006](#)). Believers pay a price, comprising financial, time, and other costs. This approach to the analysis of religious service provision provides a powerful lens through which to view religious monopoly and the entry of a competitor. A monopolist church will charge a price above marginal cost, as would any monopolist service provider, and a perfectly price discriminating monopolist will extract all of the surplus in the market. Entry by a competitor will reduce prices in the market for salvation, leaving consumers better off.

To understand the economy-wide effects of introducing religious competition, we believe that a model must also incorporate a second market: one where secular authorities pay a price to churches in exchange for political legitimacy, in the form of the church’s endorsement of a ruler. The price paid by the secular lord for the church’s endorsement is typically the lord’s own endorsement and protection of the church’s theology, as well as some set of temporal concessions: money, land, economic privileges, and political power. The bargains struck in this market for political legitimacy have been critical to the organization of human societies for millennia but have been relatively understudied by economists (see [Chaney 2013](#); [Belloc, Drago, and Galbiati 2016](#); [Rubin 2017](#), for important exceptions).

Entry of a competitor in a monopolistic religious environment will affect both markets. First, the entrant will charge a lower price than the incumbent in the market for salvation. The incumbent will lower its price of salvation as well, but will be constrained in changing the price too much: changes in price typically amount to a change in doctrine, which is extremely costly for a religion’s legitimacy.¹⁸ Thus, the prices in the market for salvation

18. The incumbent religion may attract believers despite a higher price of salvation because it is costly to change one’s faith. The incumbent might attract rulers despite a higher cost of legitimacy due to reasons of faith and geopolitical strategic interests.

will fall, particularly for believers purchasing salvation from the entrant. The market for legitimacy will in turn be affected through three channels. The entrant will reduce the ability of the incumbent church to confer legitimacy by questioning its theology. The attraction of believers to the entrant religion will also reduce the value of legitimacy conferred by the incumbent. Finally, the ability to bargain with two providers of religiously derived political legitimacy will allow secular rulers to bargain down the price paid to either entrant or incumbent. Thus, entry will unambiguously reduce the price paid by secular lords to religious authorities.

Our model delivers predictions that are not a feature of existing models that emphasize the market for salvation. By focusing on the political market, our model also predicts a shift in the bargain between secular and church elites. This shift—the lower price in the market for church-derived political legitimacy—could have first-order economic consequences, as we discuss below.

II.B. Before the Reformation: The Catholic Religious Monopoly in Western Europe

At the start of the sixteenth 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). It is unsurprising that the Church was so rich: as a monopolist producer of salvation for believers and religiously derived political legitimacy for rulers, it was able to extract enormous rents from tithes and sacramental fees, as well as from its huge land holdings.¹⁹

However, the Church's ability to extract rents was not unlimited. Its privileges and the monetization of salvation through the sale of indulgences produced discontent among some believers, thus threatening the Church's authority—this came to a head in Luther's circulation of his 95 Theses in 1517. The Church was also constrained in its ability to extract rents from secular

19. For example, the Catholic Church controlled approximately one-third of all farmland in the principality of Württemberg before the Reformation (Ocker 2010, 56), and approximately 26% of farmland in the lordship of Ruppın (Cohn 1987, 172).

lords, with whom there was continual conflict over the control of resources, jurisdiction over territory, and the authority to appoint individuals to positions of power (e.g., bishops).²⁰ Secular princes in Europe claimed their authority as derived directly from God, arguably making them less reliant on religious endorsements for their political legitimacy than rulers in, for example, the Islamic world. Rubin (2017) argues that this relatively limited reliance on religious elites by secular authorities in Europe, relative to the Islamic World, played a crucial role in shaping political economy in the two regions for centuries.

The pre-Reformation relationship between secular authorities and Church elites was one of continual bargaining over power and resources. Bargaining reflected the political structure of the Holy Roman Empire, which was an imperial federation of semi-autonomous principalities. At the highest level was conflict between the Holy Roman emperor and the pope over the “price” of endorsement of secular rulers—in particular, the Holy Roman emperor—by the Catholic Church. During the eleventh-century “Investiture Controversy,” the pope and emperor contested the right to appoint clerics to positions of immense power and wealth. Pope Gregory VII appeared to have succeeded in extracting a higher price for Church endorsement when he excommunicated Emperor Henry IV (withdrawing the emperor’s legitimacy), leading Henry to beg Gregory for reentry into communion, famously standing barefoot in the snow at Canossa in 1077. Yet the Church was far from being all powerful, and after further bargaining—often in the form of violent conflict—secular and Church authorities agreed to a compromise in the Concordat of Worms of 1122, which granted secular lords *de facto* power in the appointment of bishops, while respecting the Church’s *de jure* right to invest bishops with their spiritual symbols of power.²¹ However, conflict over resources continued: for example, just prior to the Reformation, the great defender of the Catholic Church, Emperor Charles V,

20. Evidence of shared rents before the Reformation can be seen in the cooperation and agreements between secular and church elites. For example, before the Reformation monasteries provided the majority of baggage carts used to supply the armies of lords and were obliged to provide food and hospitality for lords and their entourages when lords traveled through their domains. See Cohn (1987) for details.

21. See Berman (1983) for a discussion of the consequences of this conflict and the reforms of Pope Gregory VII for the development of legal institutions in Europe.

TABLE I
TIMELINE OF MAJOR REFORMATION EVENTS IN GERMANY, 1517–1648

Date	Event
1517	Luther circulates 95 Theses from Wittenberg
1521	Edict of Worms condemns Luther as a heretic
1530	Formation of Schmalkaldic League of Protestant princes
1546–1547	Schmalkaldic War
1555	Peace of Augsburg establishes <i>cuius regio, eius religio</i> principle
1618–1648	30 Years' War

took control of Catholic Church assets—for example, the domain of the bishop of Utrecht, as well as Arras and Cambrai (Ocker 2010, 60).

Analogous conflicts characterized the relationships between religious elites and the territorial lords we study in this article. Church institutions possessed numerous privileges (e.g., tax exemptions and monopoly rights) and controlled huge swathes of land within the principalities of the Holy Roman Empire. Secular lords were regularly engaged in attempts to claw back some of the revenues lost: passing laws eliminating tax exemptions and imposing obligations on the Church as landowner (Cohn 1987, 162).

II.C. The Reformation: The Introduction of Religious Competition

1. *Entry in the Market for Religion.* In October 1517, Martin Luther circulated his famous 95 Theses critiquing Church practices.²² Luther's critiques focused on the exorbitant price of salvation due to corruption in 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 (see Table I for a summary of the major events of the Reformation). Luther and his supporters responded by developing an agenda for religious reform. Protestant reformers disseminated their ideas widely, rapidly, and

22. The customary narrative tells of Luther posting his theses on the door of Wittenberg's Castle Church on October 31, 1517. While this specific event is disputed by historians, the dissemination of the theses beginning in October 1517 is undisputed.

relatively cheaply using the newly invented printing press (Rubin 2014; Dittmar and Seabold 2018).

Protestant innovations attracted believers and princes by lowering prices in the markets for salvation and for legitimacy. In the market for salvation, the key Protestant innovation was disintermediation between the believer and God, which significantly lowered the cost, and price, of salvation.²³ Luther emphasized the importance of an individual believer's relationship with God and salvation by faith alone; he also reduced the number of sacraments from seven to two. These innovations reduced the need for a priestly bureaucracy in Protestant regions. Cameron (1991, 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."

Protestants also developed a critique of monasticism and argued that monastic control over resources was unjustified. This message was popular with believers. A declaration from the 1520s captures the popular spirit: "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" (quoted in Cohn 1979, 28).

The wealth held by monasteries represented the largest share of the Catholic Church's income-producing real estate (Ocker 2010, 56) and was central to the Reformation-era bargain in the market for religiously derived political legitimacy. Expropriation of monastery wealth was enormously tempting to secular lords, but it required a legal and religious justification. Secular lords attempted to extract from Protestant theologians religious and legal arguments for the seizure of Catholic Church property; this was precisely an attempt to bargain down the price of religiously

23. We emphasize differences between Catholic and Protestant theology. Lutheranism was the predominant form of Protestantism in the territories we examine. However, it should be emphasized that Lutheran doctrine developed over the period we study and that there were multiple currents within Lutheranism and Protestantism more broadly—for example, Zwinglianism and Calvinism also offered low-cost salvation relative to Catholicism, but did not assign such centrality to salvation by faith alone (Pettegree 2004, 33). Similarly, while we emphasize the salience of material incentives, religious choices were clearly also shaped by beliefs (Cohn 1987).

derived political legitimacy at the center of our conceptual framework.²⁴

Secular rulers began expropriating monasteries in the 1520s and the Catholic Church responded by filing claims for restitution at the *Reichskammergericht*—the highest court of the Holy Roman Empire. Reflecting the “better bargain” secular rulers were offered by the religious entrant, Protestant theologians provided detailed legal support for the reallocation of resources in memoranda. These memoranda justified the property rights claims of Protestant rulers with arguments, “constructed around meticulous citations of Canon and Roman law” (Ocker 2010, 57). Thus, Protestant theologians based their arguments on the body of ecclesiastical law developed by Catholic jurists over previous centuries.²⁵ Protestant theologians argued that secular lords who adopted Protestantism and took control of church property were: (i) preventing misappropriation by (Catholic) church agents and (ii) acting in a manner consistent with their legally recognized role as lay administrators of church property (i.e., as church wardens or *Kirchenvögte*).

A purge of Protestant jurists from the *Reichskammergericht* threatening secular lords’ claims to formerly monastic wealth was followed by the formation of the Schmalkaldic League—a military defense alliance—in 1530. A key objective of the Schmalkaldic League was to maintain secular rulers’ control over former church property (Cohn 1987).²⁶

Given the legal and political uncertainty, some Protestant rulers proceeded with caution; the elector of Saxony only put confiscated properties under his own chancellery in the 1540s, following the suspension of the *Reichskammergericht* (Ocker 2010, 56, 60). The settlement after the Schmalkaldic War (1545–1546) effectively provided legal sanction to prior property transfers (Whaley 2011). Similar timing characterized the settlement of related property claims: for example, Protestants also moved to expropriate the assets of some bishoprics, in “a lengthy process

24. Note that some negotiation between lords and religious elites over lords’ rights to Church property also existed in regions that remained Catholic.

25. Ocker (2006, 13) describes these memoranda as “among the most overlooked works of the sixteenth century reformers.”

26. The importance of property rights to the league is apparent in negotiations between Protestant princes and the (Catholic) emperor: the official 1540 position paper of the Schmalkaldic League addresses the question of property rights first and religious doctrine second.

usually only completed after 1555” (Cohn 1987, 172). We study the implications of these evolving changes in lords’ control of property below.

It is important to note that Protestant theologians’ justification of the expropriation of Catholic property did not by itself establish a “low price” of legitimacy for secular rulers. There remained the question of how expropriated wealth could be used: would territorial lords be able to use confiscated resources for themselves—indicating a true reallocation of resources from the religious to the secular sphere? Or, would the allocation of resources simply shift from formerly Catholic religious purposes to Protestant ones (including social welfare)? We next investigate the details of the bargains struck between Protestant territorial lords and religious elites within this open-ended policy, presenting evidence on monastery closure and the reallocation of monastic resources during the Reformation.

2. *Monastery Closure and the Reallocation of Resources.* We first document patterns of closure, gathering data on 3,094 monasteries described in Jürgensmeier and Schwerdtfeger (2005–2008). For each monastery, we collect data on its location, date of foundation, and date of closure, if applicable.²⁷ In Figure II, we present a map of the monasteries open in the German lands of the Holy Roman Empire, highlighting those that closed in the sixteenth century.

Our analysis of monastery closure focuses on over 2,200 towns contained in the *Deutsches Städtebuch*.²⁸ For every town, we

27. The data include both monasteries and convents, and we use the term “monasteries” to include both. Closure dates are directly coded from Jürgensmeier and Schwerdtfeger (2005–2008). For over 67% of monasteries, Jürgensmeier and Schwerdtfeger (2005–2008) provide information on foundation 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 cross-check against individual monastery entries on www.wikipedia.de. In total, we identify foundation dates for 3,085 of 3,094 monasteries.

28. 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.

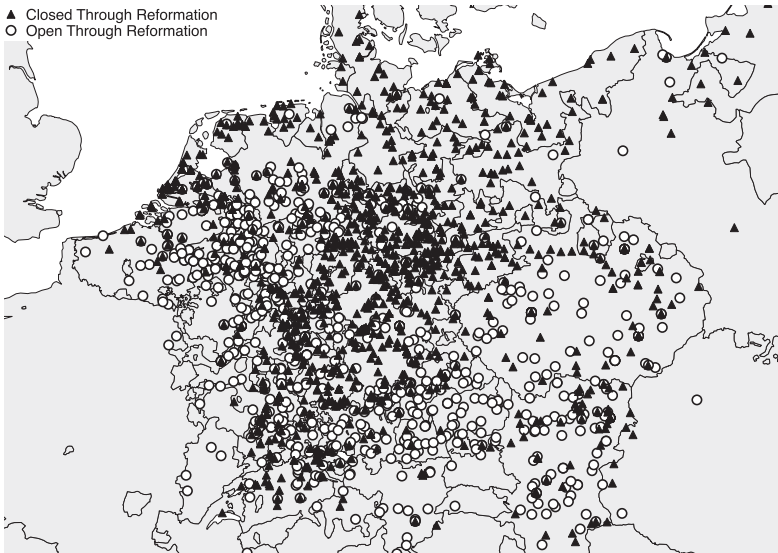


FIGURE II

Monasteries and Monastery Closure during the Reformation in Germany

Map of all 3,094 monasteries in [Jürgensmeier and Schwerdtfeger \(2005–2008\)](#). Circles indicate monasteries that remain open throughout the time period under study. Triangles indicate monasteries that were opened prior to the Reformation but closed between 1517 and 1600. Territorial boundaries come from [Nüssli \(2008\)](#).

calculate the number of monasteries within 25 km open in each year. We exploit cross-sectional variation in territorial religion, assigning each town to its secular lord following [Nüssli \(2008\)](#) for 1500 (we refer to this as the Euratlas coding of territories) and coding religion using [Cantoni \(2012\)](#).²⁹

We present the pattern of monastery closure during the Reformation in [Figure III](#). We plot the average number of

29. 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 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 [Online Appendix Table A1](#). Because not every city can be assigned a religion using 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.

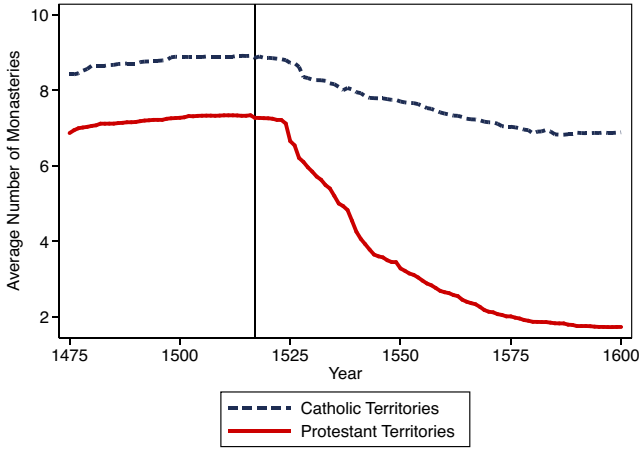


FIGURE III

Monastery Closure in Catholic and Eventually Protestant Germany

Average number of monasteries within 25 km of 1,541 towns (558 Catholic, 983 Protestant) included in the *Deutsches Städtebuch* that are matched to a religious denomination. 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 \(2012\)](#). Vertical line marks 1517, when Martin Luther circulated his 95 Theses.

monasteries within 25 km of towns that would become Protestant and that would remain Catholic. Prior to 1517, the average number of monasteries proximate to towns was quite steady. The number of monasteries near towns that remained Catholic was somewhat higher than near towns that became 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. Following the circulation of Luther's 95 Theses in 1517, the density of monasteries declined across Germany, but with notable heterogeneity across religions. In towns whose territorial lords adopted Protestantism, there was a sharp decline in the number of monasteries during the Reformation: a reduction of over two-thirds by 1600. In towns whose lords remained Catholic, the decline was significantly smaller.

The fundamental question we address next is whether the closure of monasteries produced intersectoral reallocation of resources or intrasectoral reallocation. The allocation of formerly Catholic resources would be determined by the bargain between

secular and church elites. The “price” Protestant theologians initially offered to secular rulers was high: formerly Catholic resources were to be devoted to religious uses. Ocker (2010, 54–55) writes that Protestant clergy proposed using confiscated monastic wealth to support Protestant pastors and establish a “common chest” for social welfare; he continues, “theologians only granted rulers a free hand in church property when property remained after the needs of schools, poor relief, and public welfare had been met.” Historical evidence suggests that some formerly Catholic resources were indeed used for church and social welfare purposes. In the electorate of Saxony (Luther’s home), monastic resources were transferred to a common chest that provided support for orphans and the poor. Incomes were also used to support former monks. For example, in Württemberg monks were offered annual pensions of 25 guilders, equivalent to 254 days of skilled wages (Wolgast 2014, 110).³⁰

Over time, however, the price fell, and Protestant theologians conceded a greater share of resources to lords. While the theologians advising the Schmalkaldic League drafted an agreement assigning confiscated lands to Protestant church uses, this agreement was rejected by the rulers of Pomerania and Württemberg and never adopted by the league (Wolgast 2014, 130).³¹ Historical evidence indicates that large-scale transfers of wealth to secular rulers became the norm; Wolgast (2014) provides numerous descriptions of secular lords seizing church property and enriching themselves, and we highlight several here. In Hesse, Landgrave Philipp received annual revenues of 16,500 guilders in 1532 from monastery lands and 25,000 guilders in 1565, equivalent to one-seventh of total state revenues and around 1,000 person-years of skilled wages. Overall, 40% of monastic wealth in Hesse went to the ruler—not to religious, educational, or social welfare purposes. In East Frisia, Count Enno II converted the monastery in Norden into a summer residence for himself and converted the monastery at Ihlow into a residence for his brother. In Württemberg, Duke Ulrich extracted 40,000 guilders’ income from monastery lands. In Brandenburg, monasteries were allowed to keep their

30. Guilders here and below (traditionally abbreviated as “fl.”) are converted to person-year equivalents using average wage data for skilled labor in Munich, Augsburg, and Leipzig, taken from Allen (2012).

31. The incumbent Catholic Church also made concessions over the control of resources to secular lords in territories that remained Catholic.

privileges following the adoption of Protestantism in exchange for a payment of 300,000 guilders. Protestant theologians provided legal justifications for these property transfers and thus served as “the technicians of religious legitimacy” (Ocker 2006, 13).

In Table II, we summarize the historical evidence on church property expropriation by secular lords in the Protestant regions we study. We find evidence of significant enrichment of territorial lords in 16 of 18 territories, indicating a shift in the bargain between secular and religious authorities and intersectoral resource allocation: lands and riches that once belonged to the Catholic Church were conceded by Protestant religious elites to secular lords’ control.

The shift of bargaining power from religious to secular elites transferred not only resources toward secular lords but also political power.³² Cohn (1987, 176) writes, “The acquisition of church property and the strengthened administration which it encouraged were bound up with many less tangible advantages gained by the means of the Reformation. Functions that had once been dispersed among several authorities became concentrated in the state. Officialdom penetrated more pervasively than before in towns, villages and families. Ecclesiastical jurisdiction was swept away.”

II.D. Implications of Religious Competition for the Broader Economy

During the Reformation, secular lords paid significantly less to church elites for the provision of legitimacy, especially in Protestant territories. Secular authorities retained greater political power, acquired new land, and gained control of wealth expropriated from the Catholic Church. Many of the resources acquired from the Catholic Church were not reallocated toward Protestant church purposes but were retained by secular lords, as shown already. The change in the market for church-derived political legitimacy suggests the following hypotheses regarding resource reallocation during the Reformation.

1. *The Allocation of Human Capital.* Enriched and empowered lords across Germany, particularly in Protestant regions,

32. By closing monasteries, rather than reorienting monastic energy toward new activities, secular lords ensured that the shift in political power was difficult to reverse.

TABLE II
 MONASTERY CLOSURE AND EXPROPRIATION IN PROTESTANT TERRITORIES

Territory	Year Reformed	% Monasteries Closed	Transfer to Lord	Evidence from Wolgast (2014)
Anhalt	1537	83	Yes	Monasteries expropriated, e.g., Ballenstedt and Mehringen (76)
Baden	1555	32	No	—
Brandenburg	1539	74	Yes	Treasures taken to Berlin, covering 300,000 fl. state debt (71–72, 150)
Brunswick-Calenberg	1584	46	Yes	Expropriation and taxation to pay for ruler's servants and horses (161)
Brunswick-Lüneburg	1529	80	Yes	Expropriation of monasteries, churches (57)
Brunswick-Wolfenbüttel	1568	55	Yes	Expropriation of monasteries (230)
Denmark	1536	64	Yes	Expropriation, monastery at Husum converted to palace (see note)
East Frisia	1535	92	Yes	Conversion of monasteries to palaces and stone quarries (114–115)
Hesse	1526	76	Yes	Diversion of monastic incomes (47)
Mecklenburg	1549	75	Yes	Monastery expropriation, conversion to palace at Güstrow (195)
Nassau	1542	42	Yes	New taxes on monasteries and palace construction (see note)
Palatinate	1546	60	Yes	Expropriation of monasteries, income of 100,000 fl./year (177, 220)
Pomerania	1534	94	Yes	Monastery expropriation (101)
Ruppin	1539	56	Yes	Ruler doubles land ownership appropriating monastery lands (see note)
Saxony (ducal)	1539	96	Yes	Property seizure and sale revenues of 150,000 fl. (141–142)
Saxony (electorate)	1527	92	No	—
Upper Palatinate	1546	45	Yes	Expropriation of monasteries, income of 50,000 fl./year (220)
Württemberg	1534	67	Yes	Expropriations, silver melted down, gold seized (107)

Notes. Table lists Protestant territories and the year of territorial reform as in [Cantoni \(2012\)](#). Data on monasteries and monastery closures are from [Jürgensmeier and Schwedtfeger \(2005–2008\)](#). Evidence on the transfer of church resources and property to secular lords is from [Wolgast \(2014\)](#). We calculate the percentage of monasteries closed as the mean town-level closure rate in a territory, with town-level closures measured by the closure rate of monasteries within 25 km of each town. Towns are located in territories using [EurAtlas \(Nüssli 2008\)](#). In Nassau, new taxes were imposed on monasteries starting in 1525 and helped fund construction of the castle at Weilburg from 1533 to 1549 ([Schliephake, 1884, 235–236](#)). In Ruppin, the ruler's share of territorial lands rose from 21% to 39% between 1500 and 1600 due to the appropriation of church lands ([Cohn 1987, 172](#)). In historic Denmark, monastery resources were diverted. For example, the monastery at Husum was converted into a palace ([Christian-Albrechts-Universität zu Kiel 2017](#)). For Denmark, we only examine monasteries in the Schleswig-Holstein region.

demanded more labor for their own aggrandizement and for the administration of their territory. An ordinance from Württemberg from 1546 notes that “Men [we]re needed to serve in preaching offices, governments, temporal posts, [and] administrative offices” (Strauss 1988). In addition, in Protestant regions, the church sector demanded significantly less labor owing to the lower-cost salvation production function in Protestant theology. This freed labor for uses other than salvation. There was a supply-side effect of the Reformation as well: Ocker (2010, 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.”

Hypotheses: We expect a shift in occupations from the church sector to the secular sector during the Reformation, particularly in regions that became Protestant. We also expect a shift toward occupations supporting the aims of secular lords—for example, administrative and military positions—following the Reformation, particularly in regions that became Protestant.

2. *Human Capital Investments.* Forward-looking students should have perceived the sectoral shift in labor demand and adjusted their human capital investments accordingly, away from church sector specific theology study and toward studies in more general fields.³³

Hypotheses: We expect a shift in degrees granted from theology toward secular subjects (the arts, law, and medicine) during the Reformation, particularly in universities that became Protestant. The empowering of secular lords suggests a shift specifically toward degrees that led to jobs in public administration—law and the arts—during the Reformation, particularly in regions that became Protestant.

3. *Fixed Capital Investments.* The increase in power and resources controlled by secular lords during the Reformation, particularly in Protestant regions, should also have been reflected in

33. Reflecting their increased demand for skilled labor, secular princes provided support for investments in university education. It is important to note, however, that university degrees initially fell following 1517 before increasing again with the institutionalization of the Reformation and formal support provided by princes (Seifert 1996). This can be seen in our data presented in [Online Appendix](#) Figure A1, Panels B and C.

fixed investments. Construction activity—reflecting the allocation of land and physical, financial, and human capital—can be seen as a summary statistic that characterizes the allocation of resources in early modern Europe. In our context, empowered and enriched secular rulers used their new wealth to construct palaces that provided consumption value and signaled their power and built new administrative buildings from which their expanded authority was projected.

Hypotheses: We expect new construction activity to shift toward secular purposes during the Reformation, particularly in Protestant regions. Reflecting the enhanced powers of secular lords, one would expect the shift in construction to reflect the aims and desires of secular lords, for example, the construction of palaces, military, and administrative structures. The historical evidence also suggests that secular construction should have increased with some lag, reflecting the insecurity of secular lords' property rights claims to newly appropriated assets prior to the mid-sixteenth century. Finally, prior research (Ekelund, Hébert, and Tollison 2006) suggests that the heightened intensity of religious competition in Catholic border regions could lead resource allocation in these regions to resemble those in Protestant territories. We thus expect that the most pronounced differences in construction between Protestant and Catholic regions should be found between Protestant regions and Catholic regions away from borders.

We test these hypotheses in our empirical work below.

III. REALLOCATION OF RESOURCES

III.A. *Data Sources*

Our analysis is focused on two sets of data: (i) German university graduates' degrees and careers, which provide evidence on the consequences of the Reformation for the allocation of skilled labor and investments in human capital; and (ii) construction activity across Germany over time, providing evidence on the allocation of land, labor, and capital in fixed investments. In this section, we describe the sources from which these data are drawn. We discuss our assignment of towns, territories, and universities to religious denominations.

1. *University Graduates: Degrees and Careers*. Our main source of information on German university graduates is the *Repertorium Academicum Germanicum* (Schwinges and Hesse 2015, henceforth RAG), a research program (and online database) developed by historians at the Universities of Berne and Giessen, collecting individual-level information on the universe of recipients of academic degrees from German universities through 1550. The German universities are Basel, Erfurt, Frankfurt an der Oder, Freiburg, Greifswald, Heidelberg, Ingolstadt, Köln, Leipzig, Mainz, Marburg, Rostock, Trier, Tübingen, Wittenberg, and Würzburg.³⁴

RAG 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 doctoral degrees. 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 between 1540 and 1600, consulting Bauch (1897), Erler (1895, 1897, 1909), Eulenburg (1904), Kleineidam (1983), Leinweber (1991), Rüegg (1996), and Steinmeyer (1912).³⁵ We thus have two data sets on university degrees: one covering the years through 1600 at the university \times year level, and one covering the years through 1550 at the individual level. In our empirical analysis, we present results based on both datasets.

Degrees were granted by one of the four traditional faculties that universities of the time featured: the arts, law, medicine, and theology. We classify degrees in the arts, law, and medicine

34. 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.

35. [Online Appendix](#) Figure A1 presents the overall pattern of degrees in the RAG data and in our data collection. It is important to note that data on degrees granted by one of the largest Catholic universities, Cologne, are not available after 1550, which is reflected in the lower counts of degrees granted after 1550 in our complete data set (Panel A). One can see the pattern of degrees granted by universities other than Cologne in Panel B and the pattern of degrees granted by eventually Protestant universities in Panel C. Importantly, when we examine shares of degrees granted in theology or secular subjects, the inclusion or exclusion of Cologne has no impact on our results (as we discuss later). The numbers of degrees granted by level and by individual subject can be seen in Table A2 in the [Online Appendix](#).

as “secular” to distinguish them from more church sector specific training in theology. We also focus more narrowly on the arts and law degrees, which were more likely to lead to careers in the service of territorial lords. Evidence on career paths associated with degrees in different fields is provided in [Section III.C](#).

In addition to information on degrees received, the [RAG](#) contains information on careers for around one-fourth of students earning degrees between 1480 and 1550. Unfortunately, we are unable to extend the coverage to individuals earning degrees after 1550, so we rely on a single careers data set at the individual level, covering the years through 1550. The [RAG](#) provides over 400 different occupational titles in its database. For example, the top five occupations in terms of frequency are: Professor, *Kanoniker* (canon), *Domherr* (canon, typically receiving a stipend), *Dekan* (deacon), and *Kleriker* (priest). Other occupations include judges, bakers, guild masters, mayors, city councillors, teachers, headmasters, and goldsmiths. Many of the occupation titles are archaic; we thus rely on the *Thesaurus Professionum Forschungsstelle für Personalschriften* ([Marburg Universität 2015](#)), which categorizes historic occupations into seven one-digit categories with subcategories. In our empirical analysis, we divide the occupations into two broad categories: “church” (including priests, monks, etc.) and “secular” (including professors, judges, mayors, etc.). We also examine the specific subset of secular occupations that were administrative.

Next we study the heterogeneous effects of the Reformation on degrees received and occupations selected depending on the religious denomination of the university at which an individual studied. We rely on [Sehling \(1902–2013\)](#), [Spitz \(1981\)](#), [Grendler \(2004\)](#), and [Naragon \(2006\)](#) to identify the universities that adopted Protestantism: Basel, Erfurt, Frankfurt an der Oder, Greifswald, Heidelberg, Leipzig, Marburg, Rostock, Tübingen, and Wittenberg. The adoption of Protestantism occurred in a wave between 1520 and 1550, and the choice was nearly always permanent.³⁶

36. Note that one university, the University of Erfurt, became Lutheran in 1521 and returned to Catholicism in the 1530s. We thus treat Erfurt as a Catholic university. In [Online Appendix](#) Figure A2 we show the time series of the number of German universities as well as the number that adopted Protestantism.

2. *Construction Events.* We hand code several thousand 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 Gebäude” (Notable/Important Construction).

We code each construction event by location, start date, and sector.³⁷ 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.³⁸ We also specifically study secular administrative buildings and palace construction as indicators of fixed investments for purposes favored by secular lords. Construction events are linked to Protestant or Catholic regions based on the town of the event: as we did in the analysis of monastery closure, we assign towns to territorial lords following the Euratlas mapping provided by Nüssli (2008) and use information on the religion of territorial lords from Cantoni (2012).

III.B. Occupational Choice

We begin our analysis of the allocation of highly skilled labor by examining the occupational choices of university graduates. Our conceptual framework and historical evidence suggested that the Reformation should have immediately reduced the demand for skilled labor in the religious sector and increased the demand for skilled labor for secular purposes, with effects being concentrated in Protestant territories. We compare the rates at which university graduates took jobs in the church sector and the secular sector

37. 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.

38. As noted already, we make a sharp distinction between the “church” or religious sector and the secular sector, when in practice there was certainly a gray 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, 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.”

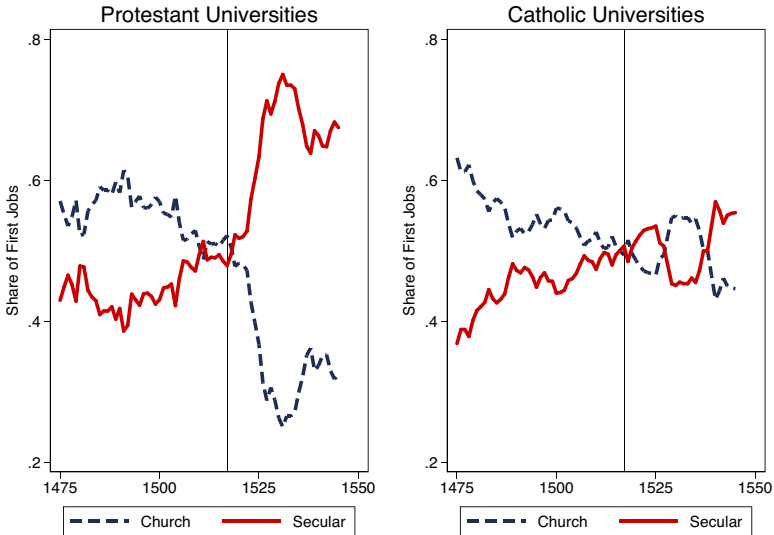


FIGURE IV

Careers among Eventually Protestant and Catholic University Graduates

Shares of first job by sector by (eventual) university denomination. Figure shows the share of first jobs in secular and religious economic sectors (which are exhaustive and mutually exclusive) 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 Universität 2015). Vertical line marks 1517, when Martin Luther circulated his 95 Theses.

across time and depending on the religious denomination of the university from which they graduated.

In Figure IV, we present the shares of first jobs by sector—church and secular—by year, separately for graduates of universities that would adopt Protestantism and for those that would remain Catholic. One can see 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. Although there is an overall trend toward secular occupations observed prior to the Reformation in both universities that would adopt Protestantism and those that would remain Catholic, it is important to note that there is not a differential pre-Reformation trend depending on eventual religious denomination.

After the Reformation, the patterns of occupational sorting look distinctly different across university denominations, with a break in trend toward first jobs in the secular sector among graduates of Protestant universities, and a smooth continuation of the preexisting trend toward secular first jobs among graduates of Catholic universities. Thus we see in the raw data a shift toward secular sector first jobs after the Reformation, specifically among graduates of Protestant universities, as predicted. It is important to emphasize that [Figure IV](#) reveals a post-1517 reduction in religious employment overall, not only a decline in monastic jobs, which mechanically resulted from monastery closure, and which could have been offset by increases in other religious occupations.

We next more formally test for differences in the likelihood that university graduates would take first jobs in the church sector (rather than the secular sector), comparing graduates from universities that remained Catholic and graduates from universities that adopted Protestantism, decade by decade. Specifically, we estimate the following flexible difference-in-differences model:

$$(1) \quad church_{iut} = \alpha_u + \delta_t + \sum_{\tau=1480}^{1540} \beta_{\tau} (prot_u \times decade_{\tau}) + \epsilon_{iut},$$

where $church_{iut}$ is an indicator capturing whether student i graduating from university u in decade t took a first occupation in the church sector.³⁹ 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 (the omitted reference decade is 1510–1519, just prior to the Reformation).⁴⁰

We estimate standard errors allowing for clustering at the university \times decade level.

In addition to the more flexible decade-by-decade model, we estimate a more aggregated difference-in-differences model with

39. The subscript t indicates the first year of the decade from 1480 through 1540, inclusive.

40. Our empirical analysis treats the Reformation era coarsely, and does not rely on variation in a university’s or territory’s date of adoption of Protestantism. We consider the precise timing of a territory’s adoption of Protestantism in three case studies presented in [Section III.D](#).

three time periods: first, the three decades from 1480 to 1509; next, the omitted reference decade from 1510 to 1519; finally, the three decades following the omitted decade, from 1520 to 1549. In this specification, the interaction between the “eventually Protestant university” dummy variable and the 1480–1519 time period dummy allows for a formal test of differential pre-Reformation trends between graduates of universities that became Protestant and those that remained Catholic. The interaction between the “eventually Protestant university” dummy variable and the post-Reformation (1520–1549) dummy variable allows us to identify the differential shift in occupations among graduates from Protestant universities in the Reformation era. That model is as follows:

$$(2) \quad church_{iut} = \alpha_u + \delta_t + \sum_{\tau=1}^3 \beta_{\tau}(prot_u \times period_{\tau}) + \epsilon_{iut},$$

where the only change relative to [equation \(1\)](#) is that instead of seven decade dummies interacted with the “eventually Protestant university” dummy variable, we now have three time periods (1480–1509, 1510–1519, and 1520–1549).

[Figure V](#), Panel A, presents all of our estimates from [equations \(1\)](#) and [\(2\)](#) graphically. We plot dots indicating the decade-by-decade “eventually Protestant university” interaction estimates (and bars indicating their 90% confidence intervals). These estimates show the difference between Protestant and Catholic university graduates’ likelihood of having a first job in the church sector in a particular decade, relative to the difference in 1510–1519. One can see that prior to 1510, the difference in first jobs between Protestant and Catholic university graduates was small, and was not strongly trending. Then, beginning in 1520, Protestant university graduates became significantly less likely than Catholic university graduates to have first jobs in the church sector. Each Protestant \times decade interaction is negative from 1520, and two of the three are statistically significantly less than zero.

[Figure V](#), Panel A, also shows the estimated coefficients on the interactions between the more aggregated time period dummy variables and the “eventually Protestant university” dummy from estimating the pooled specification. The point estimates are drawn in as horizontal lines, and their 90% confidence intervals are

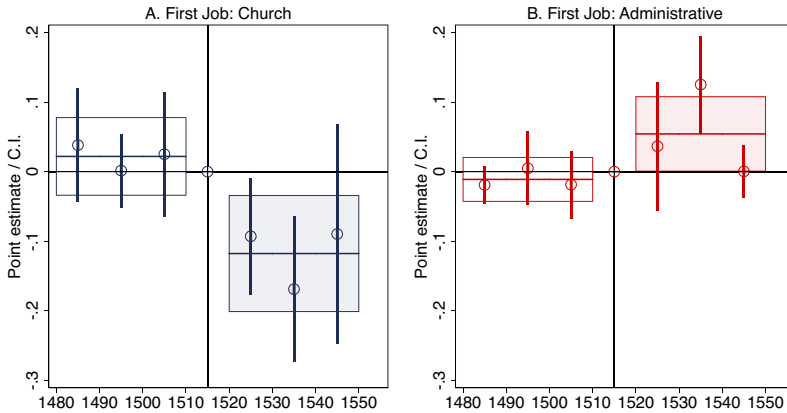


FIGURE V

Effects of the Reformation on Careers (Difference-in-Differences Estimates)

Regression estimates of sorting into occupational sectors over time and by university denomination. Panel A presents the differential probability that graduates from eventually Protestant universities take a first job in church occupations, relative to graduates from universities that remain Catholic. Panel B presents the differential probability that graduates from eventually Protestant universities take a first job in administrative occupations, relative to graduates from universities that remain Catholic. Regressions are estimated using OLS at the student level, for 2,408 students and include university and decade fixed effects. Decadal regression coefficients of interest are interactions between an “eventually Protestant university” dummy variable and decade fixed effects and are estimated relative to the omitted interaction with the 1510–1519 decade. In the aggregate specification, coefficients of interest are interactions between an “eventually Protestant university” dummy variable and a 1480–1509 dummy (Panel A: $\beta = 0.02$, $p = .52$; Panel B: $\beta = -0.01$, $p = .56$), and between an “eventually Protestant university” dummy variable and a 1520–1549 dummy (Panel A: $\beta = -0.12$, $p = .02$; Panel B: $\beta = 0.05$, $p = .10$), estimated relative to the omitted interaction with the 1510–1519 decade. Coefficient estimates on the decade interactions are plotted as dots with their 90% confidence intervals indicated with vertical lines. Coefficient estimates on the aggregate interactions are shown with horizontal lines, and their 90% confidence intervals are indicated as boxes. Standard errors are clustered at the university \times decade level.

depicted as boxes. One can see in the figure that prior to the Reformation there were small, statistically insignificant differences in occupational sectors between graduates of universities that would eventually be Protestant and those that would remain Catholic. There was no differential pre-Reformation trend. One also can see a statistically significant fall in the likelihood of Protestant university graduates having a first job in the church sector during the Reformation era of around 11.8 percentage points. This

represents a large decline relative to the pre-Reformation mean of around 57% of students taking a job in the church sector, and supports the prediction of our conceptual framework.

While we document an unambiguous reallocation of upper-tail human capital across sectors, an important question about the patterns seen in [Figure V](#) is whether the decline in church sector employment among university graduates was offset by increases in the employment of nonuniversity graduates in the religious sector in Protestant territories.⁴¹ However, abundant historical evidence indicates that religious sector employment sharply declined across the board in Protestant regions. For example, [McLaughlin \(2003, 70\)](#) observes:

The Protestant preachers in German cities represented only a small fraction of the number of Catholic priests found there during the later Middle Ages. ... The abolition of religious orders and the suppression of non-parochial shrines and pilgrimage churches released their attendant clergy. The elimination of minor orders—subdeacons, acolytes, exorcists, doorkeeper—contributed to the decline, as did the dismantling of the higher ranks of bishop and archbishop. The numerous clergy who had staffed episcopal courts and offices disappeared as well. In fact, the enormous bureaucratic structure, developed in the Catholic Church during its long history, simply disappeared.

In addition to changes in the sector of employment, a second prediction arising from our conceptual framework is that within the secular sector, university graduates should specifically have sorted into secular occupations in the service of territorial lords in the Reformation era, particularly in Protestant regions. We use administrative occupations as a proxy for occupations in the service of secular lords. For illustration, the five most common administrative occupations in our data are procurator (*Prokurator*), notary (*Notar*), city councillor (*Ratsherr*), councillor (*Rat*), and public notary (*Öffentlicher Notar*).⁴² To test whether there

41. It is important to note, however, that educational standards for Protestant clergy were relatively high—if anything, higher than for Catholic clergy. Still, only a minority of priests had obtained a degree from a university. The requirement that simple priests would have to attend or obtain a degree from a university was enforced only later, in the seventeenth century ([Kaufmann 2003](#), 125–30).

42. Note that because education and health occupations (e.g., professors and doctors) were less clearly linked to the service of territorial lords, we do not include them in our proxy. We do include the very small number of military occupations in our classification of careers in the service of territorial lords (this is inconsequential

was a differential shift toward administrative occupations among graduates of Protestant universities during the Reformation, we estimate regressions analogous to those presented in [Figure V](#), Panel A, but now considering as the outcome variable a dummy indicating that an individual's career was administrative. That is, we estimate [equations \(1\) and \(2\)](#), but substitute $admin_{iut}$ for $church_{iut}$.

One can see in [Figure V](#), Panel B, suggestive evidence consistent with our conceptual framework's prediction. Although there was essentially no difference in the probability of (eventually) Protestant or Catholic university graduates taking administrative jobs before the Reformation, a gap emerged in the first decades of the Reformation.⁴³ This gap should be interpreted cautiously because only one of the three decade interactions is significantly different from zero, and over the entire Reformation era, we find a marginally statistically insignificant effect ($p = .126$). Still, the estimated five percentage point increase in the likelihood of Protestant university graduates sorting into administrative positions is economically large relative to the baseline rate of administrative employment: prior to the Reformation, only around 10% of students took jobs in administration.

III.C. Investments in Church-Specific versus More 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. In addition, increased demand for labor by secular lords should lead students to invest in human capital that is associated with administrative career paths.

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 III](#), while 53% of students in the [RAG](#) database without a theology degree had some church sector employment in their careers, this number jumps to

for our findings). For concision, we use the label "administrative" for the slightly broader set of occupations.

43. [Kim and Pfaff \(2012\)](#) show that Protestant university graduates also affected the political economy of Germany by shaping the spread of the Reformation itself; this would have tended to reinforce the processes we document.

TABLE III
THE ASSOCIATION BETWEEN FIELDS OF STUDY AND OCCUPATIONS

Type of university graduate	No. of individuals	% with church job	% with administration job
Panel A: Theology students relative to others			
At least one theology degree	527	90	33
No theology degree	2,716	53	25
Statistical significance (<i>p</i> -value)		<0.01	<0.01
Panel B: Arts and Law students relative to others			
At least one arts or law degree	3,099	58	27
No arts or law degree	144	92	11
Statistical significance (<i>p</i> -value)		<0.01	<0.01

Notes. This table examines the relationship between field of study and occupational sector among 3,243 individuals earning degrees between 1480 and 1550, inclusive, and who have at least one occupation recorded in the *Repertorium Academicum Germanicum* data set. Careers in the church and administrative sectors are determined using the *Thesaurus Professionum* (Marburg Universität 2015).

90% among individuals with a theology degree (the difference in proportions is highly statistically significant).⁴⁴ Thus, one would expect a shift away from the study of theology in Protestant regions during the Reformation.

There was no human capital investment that was specific to careers in administration; however, one can see in Table III that individuals with degrees in law or the arts were more than twice as likely to take administration jobs than individuals without these degrees (e.g., individuals who only studied theology or medicine—note that some would have studied in multiple fields). One might therefore also expect a shift toward the study of the arts and law in Protestant regions during the Reformation.

We thus examine whether there was not only a shift in the occupations of the highly skilled during the Reformation but also a shift in the type of human capital they acquired. We begin in Figure VI by presenting the shares of students investing in church-specific human capital (studying theology) and in general secular human capital over time, by the denomination of the university attended. One can see in the figure that indeed,

44. Note that we include in Table III university students with a first job that was not readily classified by sector and hence are not included in our regression analysis of first job outcomes. Restricting our analysis of associations between degrees and career paths to individuals included in our regression analysis does not affect our findings.

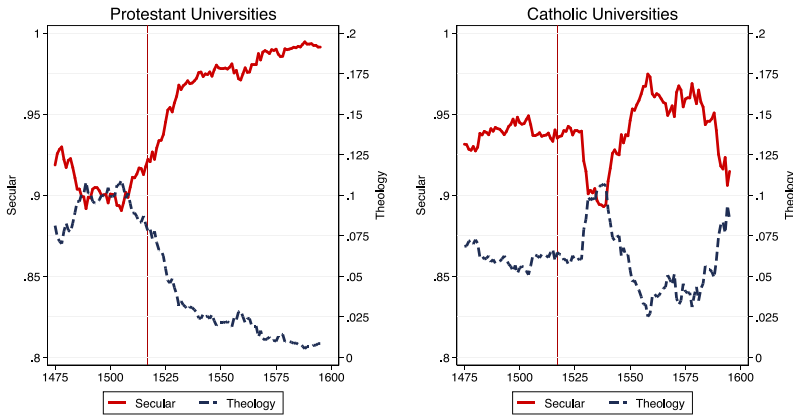


FIGURE VI

Degrees Granted in Eventually Protestant and Catholic Universities

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 authors' data collection (consulting [Erler, 1895, 1897, 1909](#); [Bauch, 1897](#); [Eulenburg 1904](#); [Steinmeyer 1912](#); [Kleineidam 1983](#); [Leinweber 1991](#); [Rüegg 1996](#)) for degrees granted from 1550 through 1600. Vertical line marks 1517, when Martin Luther circulated his 95 Theses.

following the Reformation, particularly among students at Protestant universities, there was a striking shift away from the study of theology. Prior to the Reformation, around 10% of degrees were awarded in theology, and, if anything, universities that would become Protestant granted a slightly higher share of theology degrees than universities that would remain Catholic. After the Reformation, the share of theology degrees granted fell below 2% in Protestant universities; in Catholic universities, the share of theology degrees granted fell in the middle of the sixteenth century, but by 1600 the share had returned to the level observed prior to the Reformation.⁴⁵

45. The increase in theology degrees in Catholic regions coincides with the Counter-Reformation. Note that these patterns appear within degree types as well: both examining only bachelor's degrees, or examining only advanced degrees. The patterns observed are also very similar if we exclude Cologne from the entire period of analysis. Finally, it is worth noting that degree counts in secular subjects increased markedly in universities that became Protestant (see [Online Appendix Figure A1, Panel C](#)).

We next formally test for the statistical significance of this divergence in human capital investments, estimating models analogous to those from our analysis of university graduates' careers, but now considering as our outcome the subject of an individual's degree. Specifically, we estimate:

$$(3) \quad \textit{theology}_{iut} = \alpha_u + \delta_t + \sum_{\tau=1480}^{1540} \beta_{\tau}(\textit{prot}_u \times \textit{decade}_{\tau}) + \epsilon_{iut},$$

where $\textit{theology}_{iut}$ is an indicator capturing whether student i graduating from university u in decade t earned a theology degree. As in [equation \(1\)](#), 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 (and the omitted reference decade is 1510–1519, just prior to the Reformation). As was done before, standard errors will be estimated allowing for clustering at the university \times decade level.

In addition to the more flexible decade-by-decade estimates, we estimate a more aggregated difference-in-differences model with three time periods, analogous to [equation \(2\)](#). Specifically, we estimate:

$$(4) \quad \textit{theology}_{iut} = \alpha_u + \delta_t + \sum_{\tau=1}^3 \beta_{\tau}(\textit{prot}_u \times \textit{period}_{\tau}) + \epsilon_{iut},$$

where the only change relative to [equation \(3\)](#) is that instead of seven decade dummies interacted with the “eventually Protestant university” dummy variable, we now have three time periods (1480–1509, 1510–1519, and 1520–1549). As was the case in the analysis of careers, the interaction between the “eventually Protestant university” dummy variable and the 1480–1519 time period dummy allows for a formal test of pre-Reformation trends. The interaction between the “eventually Protestant university” dummy variable and the post-Reformation (1520–1549) dummy variable allows us to identify the differential shift in degrees among graduates from Protestant universities in the Reformation era.

[Figure VII](#), Panel A, presents all of our estimates from [equations \(3\)](#) and [\(4\)](#) graphically, in a manner analogous to our analysis of careers. One can see in the figure that during the

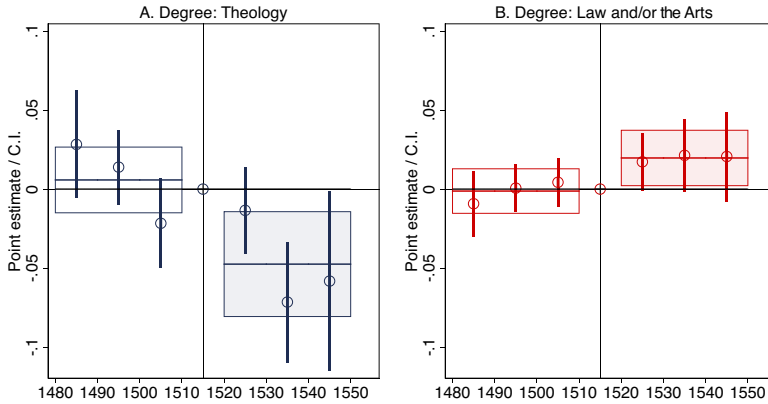


FIGURE VII

Effects of the Reformation on University Degrees (Difference-in-Differences Estimates)

Regression estimates of human capital investments across fields over time and by university denomination. Panel A presents the differential probability that graduates from eventually Protestant universities earned a degree in theology, relative to graduates from universities that remain Catholic. Panel B presents the differential probability that graduates from eventually Protestant universities earned degrees in law or the arts, relative to graduates from universities that remain Catholic. Regressions are estimated using OLS at the student level, for 10,022 students, and include university and decade fixed effects. Decadal regression coefficients of interest are interactions between an “eventually Protestant university” dummy variable and decade fixed effects and are estimated relative to the omitted interaction with the 1510–1519 decade. In the aggregate specification, coefficients of interest are interactions between an “eventually Protestant university” dummy variable and a 1480–1509 dummy (Panel A: $\beta = 0.01$, $p = .65$; Panel B: $\beta = -0.00$, $p = .89$), and between an “eventually Protestant university” dummy variable and a 1520–1549 dummy (Panel A: $\beta = -0.05$, $p = .02$; Panel B: $\beta = 0.02$, $p = .07$), estimated relative to the omitted interaction with the 1510–1519 decade. Coefficient estimates on the decade interactions are plotted as dots with their 90% confidence intervals indicated with vertical lines. Coefficient estimates on the aggregate interactions are shown with horizontal lines, and their 90% confidence intervals are indicated as boxes. Standard errors are clustered at the university \times decade level.

Reformation, there was an economically and statistically significant decline in the likelihood of Protestant university graduates receiving a degree in theology. The coefficient on the more aggregated post-Reformation interaction shows around a 4.5 percentage point decline in theology degrees—large relative to the pre-Reformation mean share of theology degrees of around 6%—and statistically significant at the 5% level as well. Prior to the Reformation there was no significant difference between graduates of

Catholic and (eventually) Protestant universities in the likelihood of an individual receiving a theology degree: individual decade-level interactions are insignificantly different from zero, and the coefficient on the more aggregated pre-Reformation interaction is tiny. There is, admittedly, some evidence of a differential decline in the likelihood of theology study in (eventually) Protestant universities from 1480 to 1509, but this was reversed in the last decade before the Reformation, suggesting that pre-Reformation trends do not drive the post-Reformation patterns we observe.

We next test whether there was a differential shift toward degrees that were more likely to lead to administrative occupations among graduates of Protestant universities during the Reformation. To do so, we estimate regressions analogous to those presented in Figure VII, Panel A, but now considering as the outcome variable a dummy indicating that an individual's degree was in law or the arts. That is, we estimate equations (3) and (4), but substitute $law\ or\ arts_{iut}$ for $theology_{iut}$. One can see in Figure VII, Panel B, evidence consistent with our prediction. While there was essentially no difference in the probability of (eventually) Protestant or Catholic university graduates earning degrees in law or the arts before the Reformation (and no differential trend), a gap emerged between Protestant and Catholic university graduates' degrees in the first decades of the Reformation. The coefficient on the more aggregated post-Reformation interaction shows around a two percentage point increase in the likelihood of a Protestant university graduate earning a degree in law or the arts after 1520 (marginally statistically significant, with $p = .09$).

III.D. Construction Activity

We view construction activity as approximating a summary statistic for the allocation of economic resources due to the requirements of land and financial, human, and physical capital.⁴⁶ Our highly disaggregated data on construction activity allow us to test a rich set of hypotheses that arise from our conceptual framework.

46. Note that the physical capital embodied in monasteries was typically not destroyed during the (largely peaceful) process of closure and expropriation. Thus, new construction events are not simply restoring previously existing but destroyed real property.

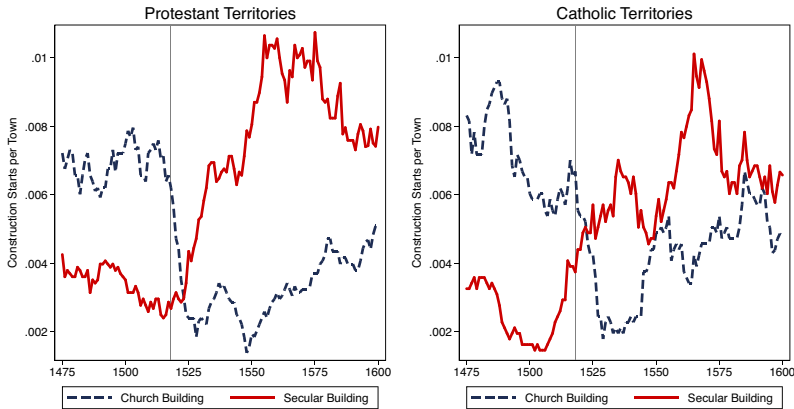


FIGURE VIII

Religious and Secular Construction in Eventually Protestant and Catholic Germany

Construction starts per town \times year disaggregated by sector for 983 towns in (eventually) Protestant and 558 towns in (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 \(2012\)](#). Vertical line marks 1517, when Martin Luther circulated his 95 Theses.

1. Construction Activity Across Territories Around the Time of the Reformation. Our conceptual framework and historical evidence lead us to expect a shift in resources—and thus construction activity—toward secular purposes during the Reformation, particularly toward uses favored by secular lords and in territories that adopted Protestantism. Because lords' expropriation of church resources was not consolidated in the initial decades of the Reformation, we expect reallocation reflected in construction starts to be particularly pronounced beginning in the 1550s. We also expect to observe differences between Protestant and Catholic territories reflecting variation in the intensity of religious competition in Catholic areas—which prior research suggests was more intense in the border regions of Catholic territories ([Ekelund, Hébert, and Tollison 2006](#)).

We begin our analysis of construction activity across church and secular sectors by showing, in [Figure VIII](#), new construction events per town per year by sector (church and secular are exhaustive and mutually 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 \times 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 VIII. 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 circulated 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 sixteenth 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 sixteenth century.

We next more formally examine the Reformation-era differences in construction between Catholic and Protestant regions using a regression framework. We aggregate our construction event data to territory \times decade-level units to more precisely estimate differences in a context in which the vast majority of towns have zero construction events in a given year. In addition, we examine counts of construction events by sector (rather than a sector’s share of events) due to the presence of cells with zero total construction.

We estimate the following “flexible” difference-in-differences model separately for the church sector and the secular sector:

$$(5) \quad construction_{jt} = \alpha_j + \delta_t + \sum_{\tau=1480}^{1590} \beta_{\tau}(prot_j \times decade_{\tau}) + \epsilon_{jt},$$

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 (with 1510–1519 the omitted reference decade). Standard errors are estimated allowing for clustering at the territory level.

In addition, we estimate models with four more aggregate time periods that we interact with the “eventually Protestant territory” dummy. First, the three decades from 1480 to 1509; next, the omitted reference decade from 1510 to 1519; third, the three decades of political instability following the omitted decade, from 1520 to 1549; finally, the post-Schmalkaldic War era decades from 1550 to 1599. In this specification, the interaction between the “eventually Protestant territory” dummy variable and the 1480–1519 time period dummy allows for a formal test of differential pre-Reformation trends in construction activity between territories that would become Protestant and those that would remain Catholic. The interaction between the “eventually Protestant territory” dummy variable and the first post-Reformation (1520–1549) dummy allows us to identify the differential shift in construction in Protestant territories in the early Reformation era. The interaction with the second post-Reformation (1550–1599) dummy variable allows us to identify the differential shift in construction in Protestant territories after territorial lords’ seizures of church property were consolidated and after political stability was established. This more aggregated difference-in-differences model, again estimated separately for construction in the church and in the secular sector, is as follows:

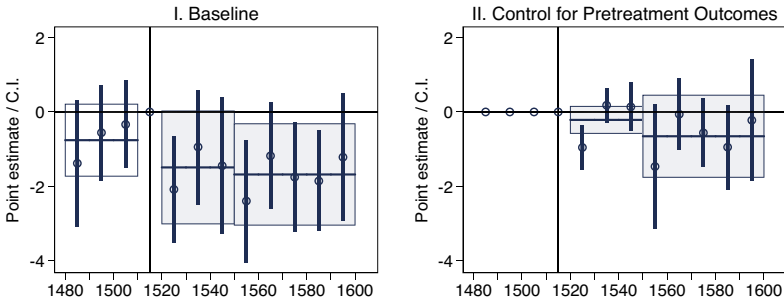
$$(6) \quad \text{construction}_{jt} = \alpha_j + \delta_t + \sum_{\tau=1}^4 \beta_{\tau} (\text{prot}_j \times \text{period}_{\tau}) + \epsilon_{jt},$$

where the only change relative to [equation \(5\)](#) is that instead of 12 decade dummies interacted with the “eventually Protestant territory” dummy variable, we now have four time periods (1480–1509, 1510–1519, 1520–1549, and 1550–1599).

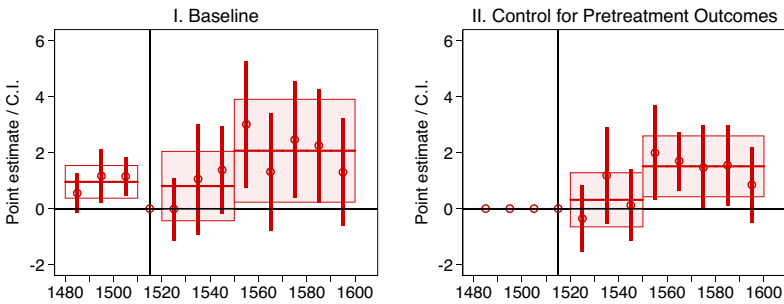
In the left frame of [Figure IX](#), Panel A, we present all of our estimates from [equations \(5\)](#) and [\(6\)](#) for the church sector. One can see in the decade-level interaction estimates that prior to the Reformation, (eventually) Protestant territories saw somewhat fewer church sector construction events than (remaining) Catholic territories. The gap between them was closing in the early sixteenth century, then opens widely in the Reformation era, with Protestant territories experiencing statistically significantly less church sector construction than Catholic territories.

When we examine the more aggregate interactions, these patterns are reinforced: prior to 1510, there was less church sector

A. Church Construction



B. Secular Construction



C. Palace, Administrative, and Military Construction

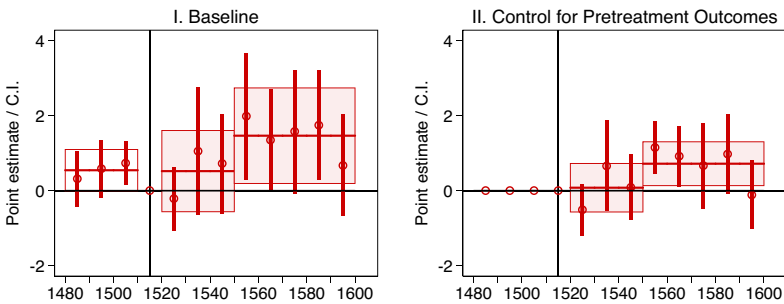


FIGURE IX

Effects of the Reformation on Construction (Difference-in-Differences Estimates)

Regression estimates of construction events in a territory \times decade by sector over time and by territorial religious denomination for 35 territories. Panel A presents differential counts of church sector construction events in eventually Protestant territories, relative to territories that remain Catholic. Panel B presents differential counts of secular sector construction events in eventually Protestant territories, relative to territories that remain Catholic. Panel C presents

construction in territories that would adopt Protestantism, but not significantly so, and if anything the trend was toward eliminating the difference just before the Reformation. Then, after the Reformation, both before and after the Schmalkaldic War, there was statistically significantly less church sector construction in Protestant than Catholic regions.

Next, in the left frame of [Figure IX](#), Panel B, we present all of our estimates from [equations \(5\) and \(6\)](#) for the secular sector. This is nearly an inverted image of Panel A (note that this is not mechanical, as we do not study construction shares). The decade-level interaction estimates show that prior to the Reformation, (eventually) Protestant territories saw somewhat more secular sector construction events than (remaining) Catholic territories; this difference was statistically significant for the decades from 1490 to 1509, indicating a move toward less secular construction in (eventually) Protestant territories just prior to the Reformation, in the 1510–1519 decade. One can see that in the Reformation era, there is again greater secular sector construction in Protestant territories than in Catholic ones, and this gap is particularly pronounced in the decades after the Schmalkaldic War (1550–1599).

Figure IX (*Continued*)

differential counts of palace or administrative building construction events in eventually Protestant territories, relative to territories that remain Catholic. Regressions are estimated using OLS at the territory \times decade level and include territory and decade fixed effects. The right frames include interactions between the stock of a territory's construction in 1470 and a full set of decade dummies, as well as interactions between each territory's level of construction in each pre-Reformation decade and a full set of decade dummies. Decadal regression coefficients of interest are interactions between an "eventually Protestant territory" dummy variable and decade fixed effects and are estimated relative to the omitted interaction with the 1510–1519 decade. In the aggregate specification, coefficients of interest are interactions between an "eventually Protestant territory" dummy variable and (i) a 1480–1509 dummy (Panel A: $\beta = -0.76$, $p = .20$; Panel B: $\beta = 0.96$, $p = .01$; Panel C: $\beta = 0.54$, $p = .11$); (ii) a 1520–1549 dummy (Panel A, left: $\beta = -1.49$, $p = .11$; Panel A, right: $\beta = -0.21$, $p = .33$; Panel B, left: $\beta = 0.81$, $p = .28$; Panel B, right: $\beta = 0.32$, $p = .58$; Panel C, left: $\beta = 0.52$, $p = .42$; Panel C, right: $\beta = 0.08$, $p = .84$); and, (iii) a 1550–1599 dummy (Panel A, left: $\beta = -1.68$, $p = 0.05$; Panel A, right: $\beta = -0.65$, $p = .33$; Panel B, left: $\beta = 2.06$, $p = .07$; Panel B, right: $\beta = 1.51$, $p = .02$; Panel C, left: $\beta = 1.47$, $p = .06$; Panel C, right: $\beta = 0.72$, $p = .05$), estimated relative to the omitted interaction with the 1510–1519 decade. Coefficient estimates on the decade interactions are plotted as dots with their 90% confidence intervals indicated with vertical lines. Coefficient estimates on the aggregate interactions are shown with horizontal lines, and their 90% confidence intervals are indicated as boxes. Standard errors are clustered at the territory level.

Examining the aggregated interactions, one first sees a statistically significant pre-1510 interaction. It is worth discussing this in some detail: first, this result does not imply that the post-1520 patterns we observe were merely the continuation of a pre-Reformation trend. Just the opposite: just prior to the Reformation—moving from the 1480–1509 interaction to the omitted 1510–1519 decade—shows a negative pre-Reformation trend in secular construction in (eventually) Protestant territories relative to Catholic ones. Instead, the major concern raised by the significant pre-1510 interaction is that the post-Reformation results simply reflect a reversion to the pre-Reformation mean. The interaction for 1520–1549 of similar magnitude to the aggregated pre-Reformation interaction does not alleviate this concern. However, observing an interaction for 1550–1599 that is nearly twice as large as the other two suggests that the post-Reformation increase in secular sector construction in Protestant territories far exceeds mean reversion. We further consider concerns about pre-Reformation differences in construction between (eventually) Protestant and Catholic regions in the analyses presented in the right frames of [Figure IX](#).

Finally, in the left frame of [Figure IX](#), Panel C, we present all of our estimates from [equations \(5\) and \(6\)](#), but examining construction that specifically reflected the interests of secular lords: namely, new palaces and administrative buildings.⁴⁷ One can see that the patterns qualitatively match those in the left frame of [Figure IX](#), Panel B: somewhat greater construction of palaces and administrative buildings in (eventually) Protestant territories prior to the Reformation (in this case not statistically significantly so); a negative differential trend in palace and administrative construction in the last decade before the Reformation in (eventually) Protestant territories; a reversion to earlier differences in the 1520–1549 period; finally, a much larger, statistically significant difference after 1550.

The left frames of [Figure IX](#) thus broadly confirm the predictions of our conceptual framework: following the Reformation, resources were differentially shifted away from church purposes in Protestant territories (Panel A). Political power and control of resources shifted toward secular lords, a process which was

47. These estimates simply use counts of palaces and administrative buildings—a subset of secular construction—as outcomes in [equations \(5\) and \(6\)](#).

consolidated after the Schmalkaldic War; this is reflected in the significant increase in secular construction, specifically the construction of palaces and administrative buildings, after 1550 (Panels B and C).

Still, the left frames of Figure IX, Panels A–C, raise several questions. First, one might be concerned with the pre-Reformation differences in construction levels between Catholic and (eventually) Protestant territories. Although there was not a trend toward the Reformation-era patterns of construction activity just before 1520, it seems possible that some of the difference between denominations in construction post-1520 reflects mean reversion to pre-Reformation differences (or other unobserved territory differences associated with differential pre-Reformation construction patterns). To address this concern, we introduce controls that allow pre-Reformation construction levels in a territory to affect post-Reformation outcomes very flexibly.

We first allow for different construction patterns during the Reformation depending on the stock of construction just prior to our analysis, including interactions between the total construction observed in a territory in our data up to the 1470s and a full set of decade dummy variables. We also allow pre-Reformation construction flows to affect Reformation-era construction, including interactions between each territory's level of construction in each pre-Reformation decade and a full set of decade dummies. This absorbs all of the pre-Reformation differences in construction in our analyses, and some of the post-Reformation variation, but makes our post-Reformation comparisons close to *ceteris paribus*.

In the right frames of Figure IX, Panels A–C, we replicate the analyses from the left frames including these very flexible controls for pre-Reformation differences in territories' construction. As noted, by design there are no pre-Reformation differences in either construction levels or trends between (eventually) Protestant and Catholic territories. Reassuringly, the Reformation-era patterns of reallocation observed in the left frames are qualitatively preserved even including this very demanding set of controls. Most strikingly, secular construction exhibits a statistically significant differential increase in Protestant regions during the 1550–1599 period. The 1.5 additional secular construction events per territory \times decade and 0.75 palace or administrative building in Protestant regions between 1550 and 1599 represent a large increase relative to pre-Reformation means of 2.2 and 1.4,

respectively, and even relative to total construction, which averaged 4.7 events per territory \times decade prior to 1520.

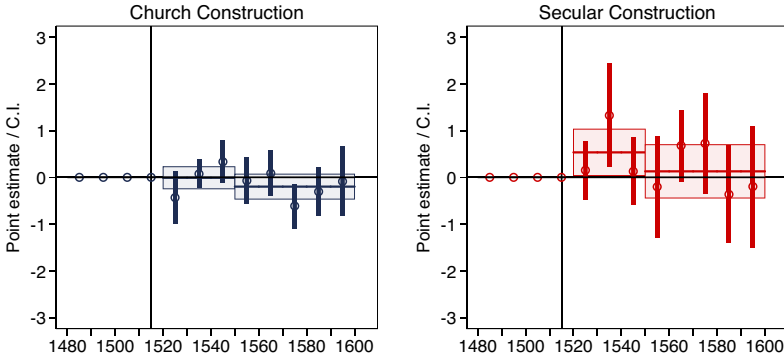
Up to now, our analysis has focused on the “extensive margin” of religious competition: comparing Protestant territories—where religious competition produced successful entry—with Catholic territories. However, historical evidence suggests that within Catholic regions, religious competition was more intense along borders with Protestant territories (Ekelund, Hébert, and Tollison 2006); that is, there was an “intensive margin” of religious competition as well.⁴⁸ To the extent that the resource reallocation we observe following the Reformation was ultimately driven by religious competition affecting the bargain between religious and secular elites, one would expect that the differences between Protestant and Catholic regions seen in Figure IX should have primarily been driven by differences between Protestant territories and Catholic regions far from Protestant lands (i.e., those Catholic regions experiencing less religious competition).

To examine this hypothesis, we conduct empirical exercises analogous to those presented in the right-hand frames of Figure IX, panels A and B, but comparing Protestant territories to a split sample of Catholic regions. The first, “high competition,” subsample comprises the set of Catholic towns whose nearest town is known to have had a Protestant territorial lord. The second, “low competition,” subsample comprises the set of Catholic towns whose nearest town is known to have had a Catholic territorial lord. Note that we restrict this analysis to towns (whether Protestant or Catholic) that do not border territories whose lord and religion are unknown to us. Hence this analysis does not precisely aggregate to the results in Figure IX.

In Figure X, Panel A, one can see that comparing Protestant regions’ construction patterns with those in “high competition” Catholic regions, there is only a small difference in Reformation-era construction activity, with secular construction being slightly higher in the 1520–1549 period in Protestant regions. In Figure X, Panel B, one can see that Reformation-era construction for secular purposes was far greater in Protestant regions than in “low

48. Although there was variation in religious market contestability within Catholic regions, in Protestant regions all markets were (ex post successfully) contested.

A. Catholic Border Towns: High Competition



B. Catholic Towns Not on Border: Low Competition

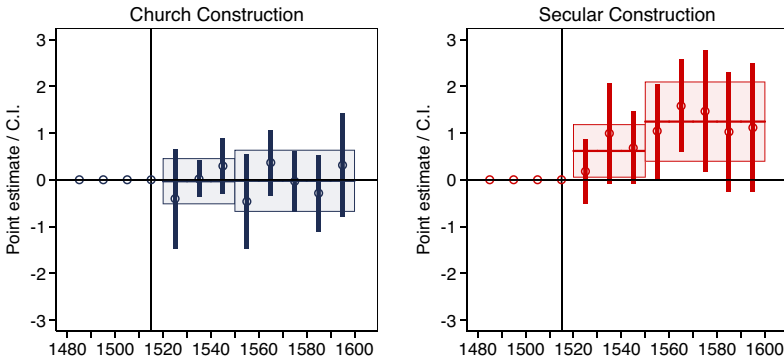


FIGURE X

Heterogeneous Effects of the Reformation: Intensity of Religious Competition

Regression estimates of construction events in a territory \times decade by sector, over time, by territorial religious denomination, and by intensity of religious competition. Panel A includes 26 territories, and Panel B includes 29 territories. The left frame of Panel A presents differential counts of church sector construction events in eventually Protestant regions, relative to regions that remain Catholic and are on the border with Protestant territories. The right frame of Panel A presents differential counts of secular sector construction events in eventually Protestant regions, relative to regions that remain Catholic and are on the border with Protestant territories. Panel B presents analogous analyses, but presenting differential counts of construction events in eventually Protestant regions, relative to regions that remain Catholic and that are not on the border with Protestant territories. Catholic regions are defined at the town level based on the religious denomination of the nearest town (Protestant nearest town implies border region, Catholic nearest town implies nonborder regions, and a nearest town

competition” Catholic regions far from Protestant territories (particularly after 1550). These results suggest that religious competition was indeed important both on the “extensive margin” of successful entry and on the “intensive margin” of more contestable religious markets.

Another question about the pattern of reallocation we observe in [Figure IX](#) is whether our results are explained by the misclassification of construction events. Two types of misclassification are of particular concern: first, although we assign construction for social welfare purposes to the “secular” category, hospitals and schools were often attached to churches and were staffed by church personnel, making their assignment ambiguous. Second, military construction, which makes up a component of our secular category and a component of our count of events reflecting the interests of secular lords, may have served religious purposes in an era of religious conflict.

To more closely examine the types of construction events that drive the observed reallocation, [Figure XI](#) presents evidence on secular construction by specific purpose in Protestant territories. One can see that the overall pattern of secularization in Protestant regions is not driven by the ambiguous social welfare or military construction events. Rather, the increased

Figure X (*Continued*)

with religion unknown is excluded from the analysis). Regressions are estimated using OLS at the territory \times decade and include territory and decade fixed effects, interactions between the stock of a territory’s construction in 1470 and a full set of decade dummies, and interactions between each territory’s level of construction in each pre-Reformation decade and a full set of decade dummies. Decadal regression coefficients of interest are interactions between an “eventually Protestant territory” dummy variable and decade fixed effects and are estimated relative to the omitted interaction with the 1510–1519 decade. In the aggregate specification, coefficients of interest are interactions between an “eventually Protestant territory” dummy variable and (i) a 1520–1549 dummy (Panel A, left: $\beta = -0.01$, $p = .95$; Panel A, right: $\beta = 0.53$, $p = .08$; Panel B, left: $\beta = -0.03$, $p = .92$; Panel B, right: $\beta = 0.62$, $p = .07$) and (ii) a 1550–1599 dummy (Panel A, left: $\beta = -0.20$, $p = .22$; Panel A, right: $\beta = 0.13$, $p = .70$; Panel B, left: $\beta = -0.02$, $p = .96$; Panel B, right: $\beta = 1.24$, $p = .02$), estimated relative to the omitted interaction with the 1510–1519 decade. Coefficient estimates on the decade interactions are plotted as dots with their 90% confidence intervals indicated with vertical lines. Coefficient estimates on the aggregate interactions are shown with horizontal lines, and their 90% confidence intervals are indicated as boxes. Standard errors are clustered at the territory level.

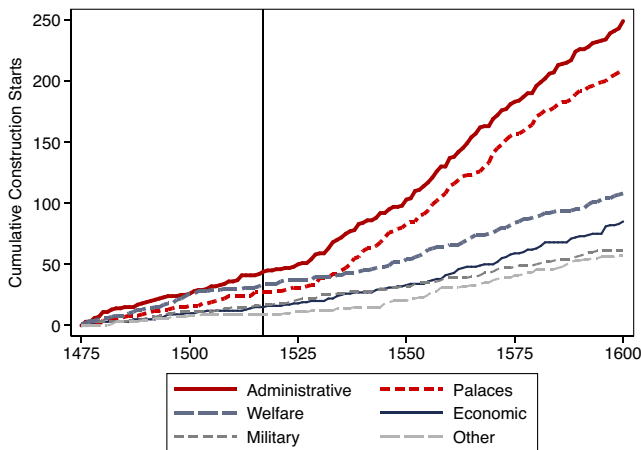


FIGURE XI

Secular Construction by Purpose in Eventually Protestant Germany

Cumulative number of new secular sector construction events, disaggregated by specific purpose, for 983 towns in (eventually) Protestant territories. Secular sector construction events are disaggregated into mutually exclusive and exhaustive subsectors. The “Administrative” subsector includes courts, town halls, and customs houses. The “Palaces” subsector includes castles and hunting lodges. The “Welfare” subsector includes schools and hospitals. The “Economic” subsector comprises private sector construction, such as mills, restaurants, and breweries. The “Military” subsector includes barracks and arsenals. 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 \(2012\)](#). Vertical line marks 1517, when Martin Luther circulated his 95 Theses.

construction in the secular sector is driven by palaces and administrative buildings, precisely the categories that reflect the increased power and wealth of secular authorities.⁴⁹

49. 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 church sizes from the 124-volume series *Denkmal-topographie Bundesrepublik Deutschland* ([Dellwing 1988/2011](#)) and its various predecessor series (a full set of references is provided in the [Online Appendix](#)) 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 A3](#)).

2. *Interpretation of Cause and Effect.* An overarching question regarding our analysis is 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 the Reformation and the reallocation of resources we document. Evidence presented thus far supports a causal interpretation: territories and universities that would become Protestant exhibit no significant differences in human and physical capital investment trends 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 resource reallocation. For example, 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).⁵⁰ This suggests a possible alternative theory: just at the time of the Reformation, urban areas may have experienced socioeconomic change that drove both the Reformation and the economic change we observe. However, our findings are not driven by large cities. In Figure XII, one can see a pattern of reallocation from church to secular construction in small Protestant towns and large Protestant cities.

A final concern could be that economic shocks hit particular regions, shifting both the likelihood of the adoption of Protestantism and the incentives for reallocating resources toward secular purposes. 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 ruler change. We examine evidence on the change of rulers and religion in the electorate of Brandenburg,

50. As Brady (2009, 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’.” This is also consistent with the Tawney hypothesis (Tawney 1926).

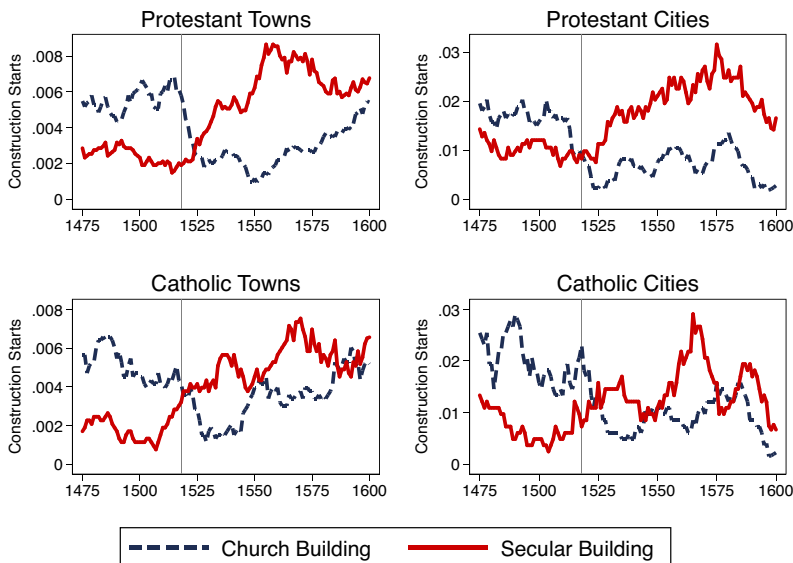


FIGURE XII

Heterogeneous Effects of the Reformation: Town Size

Construction starts per city \times year or town \times 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 data set (75 Catholic, 121 Protestant) with population data available in [Bairoch, Batou, and Chèvre \(1988\)](#); "towns" for the purpose of this figure are the complementary subset of towns (483 Catholic, 862 Protestant). Vertical line marks 1517, when Martin Luther circulated his 95 Theses.

the duchy of Saxony, and the duchy of Württemberg.⁵¹ In these territories, an unobserved territory-by-time economic shock does not explain the timing of the adoption of Protestantism, but we observe the same pattern of resource reallocation 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),

51. Note that these territories are not unusual in the intensity of monastery closure or the timing of the adoption of the Reformation, as can be seen in [Table II](#).

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 XIII](#) 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 XIII](#), 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 sixteenth 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 eventually became Holy Roman Emperor). Georg initiated the legal process necessary to transfer his inheritance to Ferdinand; however, before this could be completed, Georg died in 1539, leading to the accession of Heinrich and the conversion of the duchy to Lutheranism.

In the middle panel of [Figure XIII](#), 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 line; red online), 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 back of the Peasants' Revolt, but this attempt failed. One can see in the bottom panel of [Figure XIII](#) that in the first decade after the Reformation, under the Catholic Frederick, there is almost no monastery closure in

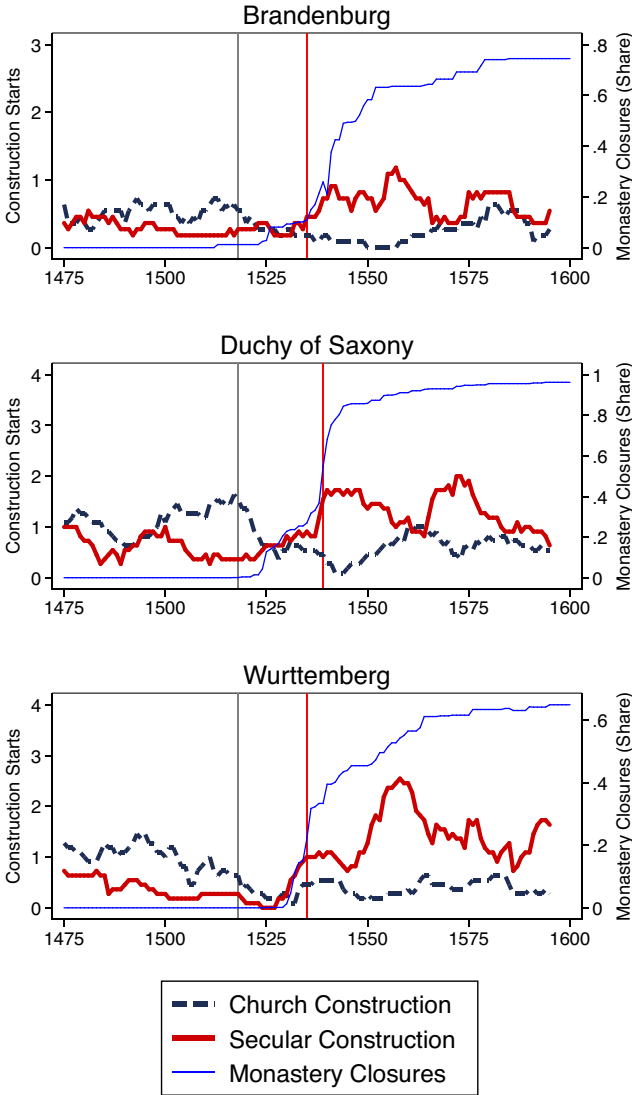


FIGURE XIII

Effects of Reformation: Territorial Case Studies

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 circulation of Luther's theses in 1517 is marked in all figures, as are the dates of each change in territorial lord leading to the adoption of Protestantism: 1535 for the electorate of Brandenburg, 1539 for the duchy of Saxony, and 1534 for the duchy of Württemberg.

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, 55–56). One can see in the bottom panel of [Figure XIII](#) that exactly at this time secular construction begins to rise and overtakes religious construction in the duchy.

IV. CONCLUSION

We find that the introduction of religious competition during the Protestant Reformation had an unintended consequence: the reallocation of economic resources from religious uses to secular ones. We argue that to understand how economic secularization resulted from the rise of a religious movement, one must consider the interaction of religious and political elites in a market for religiously derived political legitimacy. Considering this market, one indeed expects that the introduction of religious competition will shift political and economic power from religious elites to secular rulers, producing the secularization we observe.

Our analysis brings rich empirical evidence to some of the major intellectual debates in the social sciences. First, we reinforce Tawney's (1926) emphasis on important preconditions for the Reformation: specifically, the relative independence of secular rulers from religious institutions, and conflict between secular and religious elites over Europe's growing wealth play a crucial role in our conceptual framework. However, we also provide evidence that the Reformation marked a decisive break from existing patterns of resource allocation: far from being a continuation of preexisting trends, the Reformation played a causal role in reshaping Europe's political economy. We identify a significant resource reallocation resulting from the Reformation but provide a very different mechanism for long-run economic consequences from the cultural channel emphasized by [Weber \(1904/05\)](#).

Our findings provide the beginnings of an empirical bridge between the Reformation and consequences for long-run growth studied by numerous scholars ([Weber 1904/05](#); [Becker and Woessmann 2009](#); [Kuran 2011](#); [Rubin 2017](#)). Several extensions of this bridge are plausible. First, the shifting of power to secular lords

and the weakening of religious elites—particularly in Protestant regions—may have affected policy choices and legal institutions; this mechanism has been emphasized with respect to corporate law and usury restrictions (Kuran 2011; Rubin 2017). Both allocational and institutional secularization strengthened territorial rulers and might have contributed to the development of early modern states with greater state capacity (Besley and Persson 2009, 2010; Gennaioli and Voth 2015). Finally, both the reallocation of resources (particularly upper-tail human capital) and the weakening of religious elites might have set in motion a process of cultural and intellectual change that culminated in the Enlightenment, the scientific revolution, and modern economic growth (Mokyr 2005, 2017). Although these links extend beyond the scope of our study, we believe they deserve further attention.

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SUPPLEMENTARY MATERIAL

An Online Appendix for this article can be found at *The Quarterly Journal of Economics* online. Data and code replicating the tables and figures in this article can be found in Cantoni et al. (2018), in the Harvard Dataverse, doi:10.7910/DVN/QULALN.

REFERENCES

- Alesina, Alberto, and Paola Giuliano, "Culture and Institutions," *Journal of Economic Literature*, 53 (2015), 898–944.
- Allen, Robert C. "Craftsmen's Relative Wages & Laborers' Relative Wages," <http://gpih.ucdavis.edu/Datafilelist.htm>, 2012.
- Altonji, Joseph G., Erica Blom, and Costas Meghir, "Heterogeneity in Human Capital Investments: High School Curriculum, College Major, and Careers," *Annual Review of Economics*, 4 (2012), 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*, 8 (2016), 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., and Rachel M. McCleary, "Religion and Economic Growth across Countries," *American Sociological Review*, 68 (2003), 760–781.

- 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, "Was Weber Wrong? A Human Capital Theory of Protestant Economic History," *Quarterly Journal of Economics*, 124 (2009), 531–596.
- , "Not the Opium of the People: Income and Secularization in a Panel of Prussian Counties," *American Economic Review*, 103 (2013), 539–544.
- Becker, Sascha O., Markus Nagler, and Ludger Woessmann, "Education and Religious Participation: City-Level Evidence from Germany's Secularization Period 1890–1930," *Journal of Economic Growth*, 22 (2017), 273–311.
- Becker, Sascha O., Steven Pfaff, and Jared Rubin, "Causes and Consequences of the Protestant Reformation," *Explorations in Economic History*, 62 (2016), 1–25.
- Belloc, Marianna, Francesco Drago, and Roberto Galbiati, "Earthquakes, Religion, and Transition to Self-Government in Italian Cities," *Quarterly Journal of Economics*, 131 (2016), 1875–1926.
- Berman, Harold, *Law and Revolution: The Formation of the Western Legal Tradition* (Cambridge, MA: Harvard University Press, 1983).
- Besley, Timothy, and Torsten Persson, "The Origins of State Capacity: Property Rights, Taxation, and Politics," *American Economic Review*, 99 (2009), 1218–44.
- , "State Capacity, Conflict, and Development," *Econometrica*, 78 (2010), 1–34.
- Brady, Thomas A., *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*, 122 (2012), 502–531.
- , "The Economic Effects of the Protestant Reformation: Testing the Weber Hypothesis in the German Lands," *Journal of the European Economic Association*, 13 (2015), 561–598.
- Cantoni, Davide, and Noam Yuchtman, "Medieval Universities, Legal Institutions, and the Commercial Revolution," *Quarterly Journal of Economics*, 129 (2014), 823–887.
- Cantoni, Davide, Jeremiah Dittmar, and Noam M. Yuchtman, "Replication Data for: 'Religious Competition and Reallocation: The Political Economy of Secularization in the Protestant Reformation,'" 2018 (Harvard Dataverse, 2018), doi:10.7910/DVN/QULALN.
- Chaney, Eric, "Tolerance, Religious Competition and the Rise and Fall of Muslim Science," unpublished manuscript, Harvard University, 2008.
- , "Revolt on the Nile: Economic Shocks, Religion, and Political Power," *Econometrica*, 81 (2013), 2033–2053.
- Charles, Kerwin Kofi, Erik Hurst, and Matthew J. Notowidigdo, "Housing Booms and Busts, Labor Market Opportunities, and College Attendance," *American Economic Review*, forthcoming.
- , "The Masking of Declining Manufacturing Employment by the Housing Bubble," *Journal of Economic Perspectives*, 30 (2016), 179–200.
- Christian-Albrechts-Universität zu Kiel, "Klöster, Stifte und Konvente in Schleswig-Holstein und Hamburg," <https://www.klosterprojekt.uni-kiel.de/Uebersicht/ordensniederlassungen.html>, 2017.
- Cohn, Henry J., "Anticlericalism in the German Peasants' War 1525," *Past and Present*, 83 (1979), 3–31.
- , "Church Property in the German Protestant Principalities," in *Politics and Society in Reformation Europe — Essays for Sir Geoffrey Elton on his Sixty-Fifth Birthday* (Hampshire: Macmillan, 1987).
- Curuk, Malik, and Sjak Smulders, "Malthus Meets Luther: The Economics behind the German Reformation," CESifo Working Paper 6010, 2016.

- Davis, Steven J., and John Haltiwanger, "Sectoral Job Creation and Destruction Responses to Oil Price Changes," *Journal of Monetary Economics*, 48 (2001), 465–512.
- Dellwing, H., *Denkmaltopographie Bundesrepublik Deutschland* (Schwann, 1988/2011).
- Dittmar, Jeremiah, and Ralf Meisenzahl, "Public Goods Institutions, Human Capital, and Growth: Evidence from German History," *Review of Economic Studies*, forthcoming.
- Dittmar, Jeremiah, and Skipper Seabold, "New Media and Competition: Printing and Europe's Transformation After Gutenberg," unpublished manuscript, London School of Economics, 2018.
- Durkheim, Émile, *De la division du travail social: Étude sur l'organisation des sociétés supérieures* (F. Alcan, 1893).
- Ekelund, Robert B., Robert F. Hébert, and Robert D. Tollison, *The Marketplace of Christianity* (Cambridge, MA: 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 jüngere 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).
- Gennaioli, Nicola, and Hans-Joachim Voth, "State Capacity and Military Conflict," *Review of Economic Studies*, 82 (2015), 1409–1448.
- Grendler, Paul F., "The Universities of the Renaissance and Reformation," *Renaissance Quarterly*, 57 (2004), 1–42.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales, "Does Culture Affect Economic Outcomes?," *Journal of Economic Perspectives*, 20 (2006), 23–48.
- Hamm, Berndt, "The Urban Reformation in the Holy Roman Empire," in *Handbook of European History, 1400–1600: Late Middle Ages, Renaissance and Reformation, v. 2: Visions, Programs and Outcomes* Thomas A. Brady, Heiko A. Oberman, and James D. Tracy (Leiden: Brill, 1994).
- Heldring, Leander, James A. Robinson, and Sebastian Vollmer, "The Long-Run Impact of the Dissolution of the English Monasteries," unpublished manuscript, University of Chicago, 2017.
- Iannaccone, Laurence R., "Introduction to the Economics of Religion," *Journal of Economic Literature*, 36 (1998), 1465–1495.
- Iyer, Sriya, "The New Economics of Religion," *Journal of Economic Literature*, 54 (2016), 395–441.
- Jürgensmeier, Friedhelm, and Regina Elisabeth Schwerdtfeger, *Orden und Klöster im Zeitalter von Reformation und katholischer Reform, 1500–1700*, 3 vols. (Münster: Aschendorff, 2005–2008).
- Kaufmann, Thomas, "The Clergy and the Theological Culture of the Age: The Education of Lutheran Pastors in the Sixteenth and Seventeenth Centuries," in *The Protestant Clergy of Early Modern Europe* C. Scott Dixon and Luise Schorn-Schütte, eds. (New York: Palgrave Macmillan, 2003).
- Kim, Hyojoung, and Steven Pfaff, "Structure and Dynamics of Religious Insurgency: Students and the Spread of the Reformation," *American Sociological Review*, 77 (2012), 188–215.
- Kleineidam, Erich, *Universitas studii Erfordensis: Überblick über die Geschichte der Universität Erfurt, Band 3: 1521–1632, Die Zeit der Reformation und Gegenreformation* (Leipzig: St.-, 1983).
- Kuran, Timur, *The Long Divergence: How Islamic Law Held Back the Middle East* (Princeton, NJ: Princeton University Press, 2011).
- Leinweber, Josef, *Verzeichnis der Studierenden in Fulda von 1574 bis 1805* (Frankfurt: Knecht, 1991).

- 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*, 20 (2006), 49–72.
- McLaughlin, R. Emmet, "The Making of the Protestant Pastor: The Theological Foundations of a Clerical Estate," in *The Protestant Clergy of Early Modern Europe* C. Scott Dixon and Luise Schorn-Schütte, eds. (New York: Palgrave Macmillan, 2003).
- McLeod, Hugh, *Religion and the People of Western Europe 1789–1990* (Oxford: Oxford University Press, 1981).
- Mills, C. Wright, *The Sociological Imagination* (Oxford: Oxford University Press, 1959).
- Mokyr, Joel, "The Intellectual Origins of Modern Economic Growth," *Journal of Economic History*, 65 (2005), 285–351.
- , *The Enlightened Economy: An Economic History of Britain, 1700–1850* (New Haven, CT: Yale University Press, 2009).
- , *A Culture of Growth* (Princeton, NJ: Princeton University Press, 2017).
- Murphy, Kevin M., Andrei Shleifer, and Robert W. Vishny, "The Allocation of Talent: Implications for Growth," *Quarterly Journal of Economics*, 106 (1991), 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).
- North, Douglass C., John Joseph Wallis, and Barry R. Weingast, *Violence and Social Orders: A Conceptual Framework for Interpreting Recorded Human History* (Cambridge: Cambridge University Press, 2009).
- Nunn, Nathan, "The Importance of History for Economic Development," *Annual Review of Economics*, 1 (2009), 65–92.
- 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*, 41, (2010), 48–67.
- Ozment, Steven E., *The Reformation in the Cities: The Appeal of Protestantism to Sixteenth Century Germany and Switzerland* (New Haven, CT: Yale University Press, 1975).
- Pettegree, Andrew, *The Reformation: Critical Concepts in Historical Studies* (London: Routledge, 2004).
- Rubin, Jared, "Printing and Protestants: An Empirical Test of the Role of Printing in the Reformation," *Review of Economics and Statistics*, 96 (2014), 270–286.
- , *Rulers, Religion, and Riches: Why the West Got Rich and the Middle East Did Not* (Cambridge: Cambridge University Press, 2017).
- 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).
- Schliephake, F.W.T., *Geschichte von Nassau von den ältesten Zeiten bis auf die Gegenwart* (Wiesbaden: Kreidels 1884).
- Schwinges, Rainer Christoph, and Christian Hesse, "Repertorium Academicum Germanicum," <http://www.rag-online.org>, 2015.

- Sehling, Emil, *Die Evangelischen Kirchenverordnungen des XVI. Jahrhunderts* (Leipzig: O.R. Reisland, 1902–2013).
- Seifert, Arno, “Das höhere Schulwesen: Universitäten und Gymnasien,” in *Handbuch der Deutschen Bildungsgeschichte*, Nothker Hammerstein, ed., vol. 1 (Munich: C.H. Beck, 1996).
- Spitz, Lewis, “The Impact of the Reformation on the Universities,” in *Universities in the Reformation: Lectures from the University of Copenhagen Symposium* Leif Grane, ed. (Leiden: Brill, 1981).
- Squicciarini, Mara P., and Nico Voigtländer, “Human Capital and Industrialization: Evidence from the Age of Enlightenment,” *Quarterly Journal of Economics*, 130 (2015), 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*, 28 (1988), 191–206.
- Tawney, Richard H., *Religion and the Rise of Capitalism* (London: J. Murray, 1926).
- 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).
- , *Economy and Society: An Outline of Interpretive Sociology*, vol. 1 (Berkeley: University of California Press, 1978).
- Whaley, Joachim, *Germany and the Holy Roman Empire: Volume I: Maximilian I to the Peace of Westphalia, 1493–1648* (Oxford: Oxford University Press, 2011).
- Wolgast, Eike, *Die Einführung der Reformation und das Schicksal der Klöster im Reich und in Europa* (Gütersloh: Gütersloher Verlagshaus, 2014).