

Getting Religion: Identity Formation in the Protestant Reformation

Marcel Caesmann*

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Updated frequently. Most recent version [here](#).

Abstract

This paper examines how new identity markers emerge, spread, and define enduring social boundaries. I study Reformation Germany (1480–1806) using 4.9 million baptismal names from 2,210 towns to trace how families expressed religious affiliation through naming choices. Naming remained nearly identical across Catholics and Protestants for decades after 1517 but diverged sharply from 1580 onward, stabilizing by 1618. Church enforcement strengthened local identities, while social learning and conformity spread them across space. Using a staggered difference-in-differences design around Jesuit and Protestant college foundings—complemented by counterfactual placements and visitation records—I show a strong link between institutional presence and local alignment. Applying a DeGroot model of learning with spatial-lag specifications, I show that towns updated their naming toward locally shared beliefs and prevailing norms, producing lasting cultural and economic divides.

Keywords: Identity, cultural change, religion, first names, Holy Roman Empire

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1 Introduction

Everywhere one confronts confessional prejudice; everywhere one encounters the fence, indeed the wall of confession.

Harnack (1907)

Culture is learned. People learn identities by observing others: which groups matter, what they mean, and how to express belonging (Boyd and Richerson 1988; Henrich 2016). These identities, often built around nation, class, or religion, shape how people interact and behave economically (Tajfel and Turner 1979; Horowitz 1985; Shayo 2009). While cultural identities are often persistent, they can change: People lose their faith, abandon class identity, or redefine national belonging.¹ How do new identity markers emerge, spread, and come to define deep social divides?

I study these dynamics during the Protestant Reformation, Western Europe's largest religious rupture. The Reformation split Christianity into competing confessions, creating new group boundaries that shaped politics, culture, and economic life for centuries (Becker, Pfaff, and Rubin 2016). Three features make this setting ideal. First, religion has long structured social life, shaping communities for millennia and continuing to guide behavior for billions today (Iannaccone 1998; McCleary and Barro 2006; Becker, Rubin, and Woessmann 2024), making these findings broadly relevant. Second, the Holy Roman Empire's fragmented sovereignty generated rich variation in institutional responses: within a compact geographic area, hundreds of sovereign states pursued different enforcement strategies. Third, first names provide a consistent, observable identity marker spanning three centuries, allowing me to trace identity formation continuously from before the shock through its long-run consolidation—avoiding the "compression of history" typical of long-run persistence studies.²

I assemble a novel dataset linking 4.9 million baptismal records from 2,210 towns (1480-1806) to detailed measures of church enforcement: 112 Jesuit colleges and Protestant academies, church visitation records in 460 towns, detailed clergy data, religious printing volumes, and conflict exposure during the Thirty Years' War. This granular panel allows me to trace how institutional investments shaped identity formation and diffusion.

Three descriptive facts motivate the analysis. First, names acquired religious meanings gradually and selectively. By 1650, "Matthias" became distinctively Catholic while "Christoph" became distinctively Protestant. Yet, "Jacob" remained denominationally neutral suggesting that religious meaning was not inherent to names but emerged through social processes that selected certain names as identity markers. Second, identity polarization took time: flat from 1520 to 1570, accelerating sharply between 1580 and 1620, then slowing after 1620. This suggests positive feedback mechanisms that amplify polarization before

¹ See Bisin and Verdier (2001); Voigtländer and Voth (2012); Alesina, Giuliano, and Nunn (2013) on persistence. On identity change, see Fouka (2020); Fouka and Serlin (2024); Bonomi, Gennaioli, and Tabellini (2021); Gennaioli and Tabellini (2023); Cantoni, Mohr, and Weigand (2025); Fernández (2025).

² An established literature uses first names as an expression of identity and links it to behavioral outcomes (Fryer and Levitt 2004; Abramitzky, Boustan, and Eriksson 2020; Fouka 2020; Fouka and Serlin 2024; Bentzen and Andersen 2022; Cantoni, Mohr, and Weigand 2025)

saturating. Third, doctrine preceded identity. Using language in printed books as a proxy for doctrinal partisanship (Gentzkow, Shapiro, and Taddy 2019), I show that doctrinal differentiation emerged first, with identity polarization in names lagging behind. Doctrinal differences alone were insufficient to create identity distinctions. Something beyond theology was needed to translate doctrine into lived practice. This suggests three questions: Which mechanisms transformed doctrine into identity markers? How did communities coordinate on shared name meanings? Why was polarization initially slow, accelerated mid-period, then saturated?

The empirical analysis establishes three corresponding mechanisms. First, I show that stronger church enforcement shifted local naming patterns. Using a staggered difference-in-differences approach around the founding of Jesuit colleges and Protestant academies, I find that exposure to a college increased denomination-specific naming by .48 standard deviations for Catholics and .39 standard deviations for Protestants, equivalent to moving from the median to the 30th or 66th percentile in the empirical name score distribution of towns in 1650. Event studies reveal no differential pre-trends, and effects are robust to controlling for expected college placement based on counterfactual scenarios taking church strategy and pre-Reformation town characteristics as given (Borusyak and Hull 2023). I corroborate this using church visitations, inspection tours by central church authorities to local parishes. I instrument visitation intensity with distance to administrative seats. Greater visitation frequency increased confessional naming by around .06 of a standard deviation in the Protestant name score per additional visitation by 1650 (mean number of visitations = 10.7). These effects operated through two channels: academies increased clergy quality and religious printing, while I provide suggestive evidence that visitations operated through monitoring and replacing ineffective pastors. The dissolution of the Jesuit order in 1773 provides further evidence for the importance of sustained institutional enforcement: when direct oversight was weakened, the distinctiveness of Catholic naming declined.

Second, I demonstrate that parents learned name meanings through decentralized social observation. For each name-town-decade, I construct the "gap" between local usage and neighbors' usage of names within a 50km radius. Names underused relative to neighbors subsequently increased in popularity, consistent with DeGroot (1974) learning where parents update beliefs about name meanings by observing neighbors'. Convergence is faster when signals were clearer: for names with high usage, in densely connected networks, and where local naming portfolios are more distinctive.

Third, I establish that towns coordinated aggregate identity through peer conformity. Towns' overall confessional intensity converged toward nearby co-religionist communities, controlling for town and time fixed effects. Critically, conformity operates through portfolio adjustment. Communities maintain diverse name menus while shifting their overall positions, rather than mechanically concentrating on fewer names. Together, learning at the name level and conformity at the aggregate level create social amplification: enforcement effects diffuse spatially and accelerate through reinforcing feedback.

I develop a dynamic model integrating these three mechanisms. Individuals choose identity positions balancing church enforcement, conformity to spatially proximate co-religionists, and attachment to idiosyncratic preferences. They then select names to signal these positions. The model operates at two levels simultaneously. At the aggregate level, communities conform toward nearby co-religionists' identity positions, diffusing enforcement effects spatially. At the name level, parents learn which names

signal which confession by observing neighbors' usage. Two dynamic processes create reinforcing feedback across generations: belief learning and spatial conformity. Enforcement seeds initial variation in identity positions. Conformity amplifies and spreads it spatially. Learning clarifies which names signal which confession. Their interaction generates persistence through accumulated beliefs and spatial patterns. These mechanisms amplified geographically-concentrated institutional investments, transforming localized church enforcement into empire-wide religious polarization.

Finally, I examine whether naming patterns correlate with consequential behaviors. Within town-decade contexts, parents' and children's name scores are strongly correlated. Similarly, spouses' scores are strongly correlated in local marriage markets, suggesting names signal transmitted identity and partner compatibility. Individuals with stronger confessional signals were more likely to pursue church careers. At the group level, towns with clearer confessional signals faced asymmetric conflict exposure during the Thirty Years' War: Catholic towns with strong Catholic signals were 21 percentage points more likely to be attacked by Protestant Union forces. Protestant towns with strong Protestant signals were 9.2 percentage points more likely to be attacked by Catholic League forces. While these correlations cannot be interpreted causally, their consistency across family, marriage, career, and conflict domains suggests that naming differentiation reflects meaningful identity formation.

This paper makes three primary contributions. First, I contribute to the literature on the origins and dynamics of social identity and cultural traits. A foundational literature emphasizes the persistence of cultural traits through intergenerational transmission (Bisin and Verdier 2001; Bénabou and Tirole 2011; Bisin et al. 2011; Voigtländer and Voth 2012). Michalopoulos (2012) highlight geographic factors shaping ethnolinguistic diversity, while institutional origins have received increasing attention (Grosfeld, Rodnyansky, and Zhuravskaya 2013; Alesina and Giuliano 2015; Becker and Pascali 2019; Cantoni, Mohr, and Weigand 2025). Recent work shows that identity salience can shift rapidly within a lifetime due to shocks or changing economic conditions (Shayo 2009; Bentzen 2019; Fouka 2020; Fouka and Serlin 2024; Voth and Yanagizawa-Drott 2023; Bonomi, Gennaioli, and Tabellini 2021; Gennaioli and Tabellini 2023; Fernández 2025). I extend this literature in two ways. Empirically, I provide a granular, individual-level measure of religious identity spanning more than 300 years, documenting the full trajectory of differentiation before, during, and after the emergence of a new creed. This avoids the "compression of history" common in long-run persistence studies. Conceptually, I show that identity boundary formation is neither purely top-down (institutional imposition) nor purely bottom-up (spontaneous coordination), but emerges from their interaction. I document three mechanisms—enforcement, learning, and conformity—and demonstrate how their interaction generates self-reinforcing dynamics.

Second, I contribute to the literature on the rise of state capacity in early modern Europe. A long-standing tradition views inter-state conflict as a central driver of effective states (Tilly 1975; Besley and Persson 2008; Besley and Persson 2009; Dincecco and Onorato 2016; Dincecco and Onorato 2017; Cantoni, Mohr, and Weigand 2024; Bosshart and Weigand 2025), with empirical work predominantly focusing on fiscal capacity (Besley and Persson 2010; Gennaioli and Voth 2015). This paper shows that religious competition also drove an expansion of state capacity, particularly in its ideological dimension—the ability of states and religious institutions to build shared belief systems and induce social discipline (Oestreich 1968). Churches built extensive clergy training systems, monitoring infrastructure, and doctrinal produc-

tion. This dimension of capacity, central to the rise of early modern state-building, complements existing work focusing on fiscal and legal institutions.

Third, I contribute to the literature on the Protestant Reformation (see Becker, Pfaff, and Rubin (2016) for a comprehensive review). Previous work has studied the causes of the Reformation (Cantoni 2012; Rubin 2014; Dittmar and Seabold 2019) and its long-run consequences for economic development (Weber 1905; Becker and Woessmann 2009; Boppart, Falkinger, and Grossmann 2014; Cantoni 2015), institutions (Rubin 2017), human capital (Dittmar and Meisenzahl 2020; Becker and Pascali 2019; De La Croix and Morault 2024), and violence (Leeson and Russ 2018). Recent work adds evidence on the consequences of the Catholic Counter-Reformation (Becker, Pino, and Vidal-Robert 2021; Cabello 2025). I contribute by documenting *when and how* Protestant and Catholic identities diverged, unpacking the black box linking the initial Reformation shock to persistent behavioral differences. By tracking identity formation continuously from 1480 to 1806, I show that confessional boundaries were not immediate consequences of theological disputes but were actively constructed through decades of institutional investment, social learning, and peer conformity. This unpacks the process through which the Reformation’s long-run effects were generated and transmitted.

The remainder of the paper proceeds as follows. Section 2 introduces the historical context. Section 3 describes data construction. Section 4 documents the three motivating facts about identity polarization. Section 5 presents the main empirical results on enforcement. Section 6 studies the social transmission of religious identity through learning and conformity. Section 7 provides a conceptual framework integrating the empirical results. Section 8 documents the link between names as identity markers and individual and group level behaviors. Section 9 concludes.

2 Historical Background

In the late medieval period, the Catholic Church was the dominant religious institution in the Holy Roman Empire, exercising wide spiritual, political, and economic authority. By the early sixteenth century, however, critics across the Empire decried perceived abuses and administrative weaknesses. The sale of indulgences, simony, and absenteeism undermined credibility and pastoral care (Ozment, Eire, and Rittgers 2020). Administrative distance limited consistent enforcement, particularly in prince-bishoprics where bishops balanced territorial and spiritual duties (Whaley 2012). Many clergy were poorly trained. Preaching and catechesis varied widely, and lay understanding of doctrine was limited (Zeeden 1965; Strauss 1975). While religion permeated civic and ritual life, these gaps in oversight and instruction left space for persistent elements of pagan and superstitious beliefs (Zeeden 1965; Becker and Voth 2025). Reform attempts such as the conciliar movement failed to deliver lasting change (Tanner 2001).

2.1 Protestant Reformation and Church Organization

Martin Luther’s Ninety-Five Theses (1517) marked the beginning of the Protestant Reformation. Print technology amplified the movement, rapidly circulating pamphlets and vernacular Bibles to urban and rural audiences (Eisenstein 1980; Rubin 2014; Dittmar and Seabold 2019). By the mid-sixteenth century, Protestant communities formalized doctrine. The *Confessio Augustana* (1530), drafted by Philipp

Melanchthon and presented at the Diet of Augsburg, articulated Lutheran teaching. The *Konkordienformel* (1577) later sought to unify divergent strands (Kolb and Arand 2005).

Protestant territories invested heavily in enforcement infrastructure that would shape congregants' religious identity. The Reformation embedded belief through a coordinated package: print, catechetical instruction, training of an effective pastoral cadre, and persistent institutional oversight (Reinhard 1983). Luther's *Small Catechism* (1529) distilled basic doctrine for households. The *Large Catechism* targeted clergy and schoolmasters (Pettegree 2005). Secular rulers and city councils issued church ordinances regulating liturgy, schooling, and poor relief (Sehling 1902; Dittmar and Meisenzahl 2020). Resources from dissolved monasteries financed the new ecclesiastical infrastructure. Buildings and endowments were redirected to support clergy and schools (Schmidt 1992).

New institutions for training and administration emerged. The former Augustinian house in Tübingen became the *Tübinger Stift*, a seminary preparing pastors on generous scholarships. The University of Marburg (1527) trained Protestant clergy and administrators. Saxon *Fürstenschulen* prepared boys for clerical and bureaucratic careers using monastic endowments. Urban centers such as Nuremberg adopted comprehensive ordinances establishing publicly funded schools and regulating civic life along confessional lines (Schmidt 1992). Regular visitations, promoted by Luther and Melanchthon, enforced conformity and revealed substantial gaps in instruction, reinforcing the need for catechesis (Zeeden 1982).

These institutions aimed not merely to train elites but to reshape religious identity among ordinary congregants. Catechetical instruction taught laypeople not just theological doctrine but how to be Protestant in everyday life. One domain where this identity formation became visible was naming practices. First names had no inherent confessional content. Their confessional meanings emerged entirely from social convention. As Protestant and Catholic group boundaries sharpened over time, parents' naming choices increasingly reflected these emerging confessional identities. Names transformed from neutral labels into markers of religious belonging (Zschunke 1984; François 1991).

2.2 Catholic Counter-Reformation

The Catholic response, the Counter-Reformation, was anchored in the Council of Trent (1545–1563). Trent reaffirmed doctrine on sacraments and authority while mandating higher standards for clerical education, residency, and discipline (Ekelund, Hebert, and Tollison 2004; O'Malley 2013). Implementation relied on new and revitalized institutions, above all the Society of Jesus (1540), which became central to Catholic renewal through missions, schools, and pastoral work (Zeeden 1965; Reinhard 1983; Wright 2005; Friedrich 2016).

Jesuit foundations spread widely across the Empire, typically through episcopal, princely, civic, and private patronage. Ingolstadt, though modest in size, received the first Jesuit college (1556) and became a bastion of Catholic scholarship once Jesuits secured professorships (Schmidt 1992). Larger towns integrated Jesuit teaching into universities and urban institutions. Cologne (1556), Munich (1559), Trier (1561), and Mainz (1561) established Jesuit colleges. Augsburg's college benefited from a substantial Fugger endowment (Schmidt 1992; Grendler 2019). The Jesuit Constitutions favored foundations in populous cities and universities to maximize reach. However, local actors frequently shaped the map in more idiosyncratic ways (Friedrich 2016). Dillingen, for example, was elevated to a Jesuit university in 1564

through the initiative of Prince-Bishop Otto Truchsess von Waldburg, who secured papal authorization and assigned monastic lands to support the endowment (Grendler 2019). Landsberg am Lech established a college in 1576 owing to the prestige and efforts of the administrator Schweikhard von Helfenstein, former president of the Reichskammergericht (Friedrich 2016). These cases illustrate how personal networks, officeholders, and patrons could direct foundations to smaller towns as well as major centers. The *Ratio studiorum* (1599) standardized pedagogy across colleges. Tuition-free day schools educated both elites and burghers. Post-Tridentine visitations translated conciliar norms into regular oversight and enforcement at the parish level (Zeeden 1982). Taken together, the Tridentine decrees, Jesuit schooling, and systematic visitations constituted sustained investments in personnel training, doctrinal dissemination, and parish monitoring across the Empire.

The Counter-Reformation's emphasis on catechesis and standardized instruction similarly aimed to embed Catholic identity in everyday practice. Jesuit schools did not merely educate nobility; they conducted public catechism classes for urban children and coordinated with parish priests to ensure doctrinal conformity among families. This systematic pedagogy extended to the most intimate family decisions, including the choice of children's names. Saints' names, promoted through Jesuit religious instruction and reinforced in baptismal rituals, became vehicles for expressing Catholic identity—a form of everyday confessional signaling that required no theological sophistication but marked one's place in the religious order.

2.3 Confessionalization

By the late sixteenth century, these parallel reforms crystallized into what German historians have termed Confessionalization: the consolidation of distinct confessional churches and cultures through coordinated efforts by territorial states and religious authorities. Foundational work by Zeeden (1958), Schilling (1981), and Reinhard (1983) documents how Protestant and Catholic territories alike invested heavily in doctrinal standardization, clerical training, and institutional oversight. These investments transformed abstract theological differences into hardened social boundaries.

A crucial institutional feature shaped this process: the Religious Peace of Augsburg (1555) enshrined “*cuius regio, eius religio*” (whose realm, his religion). The ruler's confession determined the official religion of all subjects within that territory. While subjects formally possessed the right to emigrate (*ius emigrandi*) rather than convert, substantial barriers limited cross-confessional mobility in practice. Legal restrictions required formal conversion or explicit permission to resettle. Economic costs included forfeiting land tenure and trade networks. Social costs involved severing kinship ties. Contemporary sources suggest large-scale confessional migration was rare except under direct persecution. Most subjects remained in their birth territories regardless of religious changes (Schilling 1981; Schilling 1988; Whaley 2012).

This institutional arrangement meant religious denomination became effectively a location-level characteristic, determined by rulers' decisions rather than individual choice. These decisions reflected dynastic, political, and theological considerations that evolved independently of local customs. A town's confession thus depended largely on which dynasty controlled it and when that dynasty converted—factors external to local populations' preferences or practices. In the case of free imperial cities, it was a function of which confessional group gained the upper hand in local city councils during the contested and turbulent early

stages of the Reformation.

Yet boundaries remained fluid in practice. Peaceful coexistence was often maintained under the arrangements of the Peace of Augsburg (Schilling 1988). Intermarriage across religious boundaries was still frequent, particularly in bi-confessional cities like Augsburg where Protestants and Catholics lived door to door (François 1991). When Michel de Montaigne visited Augsburg in 1580, he noted:

“Marriages between Catholics and Protestants take place daily. The part that has the most desire accepts the faith of the other. There are thousands of such marriages. Our host, for example, was a Catholic, his wife a Protestant.”³

At the same time, Protestant and Catholic authorities invested heavily to sharpen doctrine, enforce social norms, develop persuasive media, and build educational systems to foster internalization of the new order (Reinhard 1983).⁴ These changes took time to materialize. Training a new generation of clergy and promoting them through ecclesiastical hierarchies required decades. By the 1580s, harder-line figures on both sides increasingly occupied influential positions and started to propel religious polarization (Reinhard 1983). This joint effort of territorial states and churches formed part of a broader drive toward social control (Oestreich 1968). In 1589, Giovanni Botero captured the appeal of confessional governance for early modern rulers:

“Among all laws, there is none more favorable to princes than the Christian one, for it subjects to them not only the bodies and goods of their subjects [...] but also their souls and consciences, and it binds not only the hands but also the feelings and thoughts.”⁵

By targeting minds as well as conduct, confessionalization extended beyond the strictly religious sphere and brought profound social change (Schilling 1988). Confessional boundaries hardened. Protestants and Catholics came to be perceived as mutually exclusive groups (Zeeden 1965; Schmidt 1992). Their cultures and ways of life diverged and remained a central social cleavage well into the nineteenth and twentieth centuries (Zschunke 1984; François 1991).⁶

3 Data

To examine how distinct religious identities took shape in early modern Germany, I compile a dataset combining novel information on markers of religious identity, measures of church enforcement capacity, and data on social and economic consequences. The base structure comprises 2,390 towns and their

³ Quoted according to François (1991).

⁴ The centrality of higher education in both confessions' efforts to strengthen identity contributed to a near breakdown of scholarly exchange across confessional lines, producing increasingly separate intellectual worlds. Figure A.12 plots the share of scholar transfers that crossed between Catholic and (eventually) Protestant universities. See also De La Croix and Morault (2024); Curtis et al. (2025).

⁵ Quoted according to Reinhard (1983).

⁶ François (1991) notes that as late as the 1960s, 31% of Protestant and 36% of Catholic parents expressed serious distaste for their children marrying someone of the opposing confession. This is comparable to the 38% of Republicans and Democrats reporting in 2020 that they would be somewhat or very upset if their child married someone with opposing party preferences (YouGov 2020).

catchment areas within the Holy Roman Empire, as depicted in the *Deutsches Städtebuch* (Keyser et al. 1939).⁷

3.1 Religious Identity

To measure religious identity, I compile information on 4.9 million first names of individuals born within the Holy Roman Empire. The data draw on two broad categories of sources.

Church records. I use birth and baptism records from Catholic and Protestant churches. In these records, local priests documented the date of birth or baptism (which, for religious reasons, closely coincided), the child's full name, and the names of parents and godparents. Part of these data come from newly collected and digitized baptism records. The Church of Jesus Christ of Latter-Day Saints provides additional records, collected and digitized for genealogical purposes and made available on FamilySearch.com.⁸ Additionally, I draw on indexed birth and baptism records from [Computergenealogie](#) (2025).

Elite sources. I use university matriculation lists to increase coverage, especially for 1450-1600. These lists record students' names, places of origin, and sometimes subjects of study at enrollment. I collect and digitize edited matriculation lists for most German universities in the early modern period.⁹ I supplement this with student information from the *Repertorium Academicum Germanicum* (Hesse and Schwinges 2025).

I also use information on 730,359 notable individuals from *Deutsche Biographie* (Hockerts and Lanzinger 2022) and 404,954 individuals from the *Oberdeutsche Personendatenbank* (Rupp 2025). These sources provide birth and death dates, professions, and places of residence. For all individuals from elite sources, I remove duplicates across sources, geolocate birthplaces, and assign them to the nearest town. The occupational information in *Deutsche Biographie* enables analysis of how confessional identity predicts career choices, such as church careers versus commercial occupations.

Name processing. I clean and standardize names to ensure comparability across time and space. I harmonize first-name spelling (e.g., Johann to Johannes, Josef to Joseph) and exclude names occurring 50 or fewer times over the sample period. I assign confession based on parish of birth. Where I do not observe the parish, I use the confession of the town of birth as a fallback for assigning confessional status. For a subset of the data where I observe parents, I construct parent-child and spousal pairs.

Appendix Section C.1 describes the digitization process, provides a detailed description of the data processing and coverage, and presents validation exercises testing the internal consistency of the data sources and representativeness of the sample.

Text data on doctrine. To measure doctrinal differentiation, I collect data on all known prints produced in the Holy Roman Empire between 1400 and 1700 from the *Universal Short Title Catalogue* (USTC)

⁷ This source covers all settlements within the 1937 German borders that ever obtained town status. I use town borders from [Bogucka, Cantoni, and Weigand](#) (2019) to match parishes to towns.

⁸ I access the data through an agreement with the Church of Jesus Christ of Latter-Day Saints.

⁹ Appendix Section C.1 lists the consulted sources.

(2025). I match authors to *Deutsche Biographie* (Hockerts and Lanzinner 2022) to infer confession and use USTC subject classifications. I match print locations to towns and their religious status.

For the 53,846 prints matched to authors and locations, I use GPT to translate short titles from Latin and early modern German to modern German, remove procedural information (e.g., dissertation metadata), and generate embeddings via OpenAI API.¹⁰ For an alternative interpretable approach, I follow Gentzkow, Shapiro, and Taddy (2019) in processing titles with stopword removal, stemming, and bigram tokenization.

Supplementary institutional data. I complement identity data with information on institutional and religious history. I map towns to religion in a given period using a three-step process. First, I code year of adoption of reform and counter-reformation from *Deutsches Städtebuch* (Keyser et al. 1939). Second, if this information is not available, I use religious status in 1546 and 1650 from Becker and Pascali (2019) building on the maps by Zeeden (1986). Third, I assign all towns that are Protestant by 1546 to be Protestant for all years from 1480 to 1546 to create a fixed reference group for the name score computation. Based on religious status, I code whether towns are at religious borders (neighboring towns with opposing confession). I use Becker and Pascali (2019) for population estimates by century. I add geographic characteristics: agricultural suitability (Fischer et al. 2021), terrain ruggedness, distances to coast and navigable rivers (Cantoni, Mohr, and Weigand 2024), number of markets (Cantoni, Mohr, and Weigand 2020a), construction activity (Cantoni, Mohr, and Weigand 2020b), ruler mappings 1500-1789 (Cantoni, Mohr, and Weigand 2019), fiscal centralization (Cantoni, Mohr, and Weigand 2024), and school establishments from *Deutsches Städtebuch* (Keyser et al. 1939).

3.2 Church Enforcement

I compile novel data on local church enforcement—the institutional infrastructure through which churches monitored congregations, disseminated doctrine, and shaped religious behavior.

Catholic enforcement infrastructure. For Catholic regions, I collect information on Jesuit activity and monastic presence. I obtain data on Jesuit college foundations and closures from Niedersächsische Akademie der Wissenschaften (2025). I match Jesuit presence to each town by year. From the same source, I obtain information on monasteries and their activity periods. I obtain borders and seats of bishoprics in 1500 from Niedersächsische Akademie der Wissenschaften (2020).

Protestant enforcement infrastructure. For Protestant regions, I use the *Repertorium Eruditiorum Totius Europae* (De La Croix 2021) to identify Protestant universities and academies, including foundation dates, activity periods, associated scholars, and confessional affiliation. I supplement this with information on *Fürstenschulen* and *Gymnasium Illustre* (academic schools in Protestant territories) from Walter (2017). I match the presence of active Protestant academies to each town by year. I add data on church ordinances from *Die evangelischen Kirchenordnungen des XVI. Jahrhunderts* (Sehling 1902), as coded by Dittmar

¹⁰ Appendix Section D.1 details data processing.

and Meisenzahl (2020). These record which cities adopted new ordinances regulating religious life and public good provision.

Church visitations. I create a novel dataset on church visitations—supervisory inspections by higher church authorities to ensure discipline, correct doctrine, and proper administration. I draw on *Repertorium der Kirchenvisitationsakten* (Zeeden 1982), covering visitations in modern-day Baden-Württemberg and Hesse during the sixteenth and seventeenth centuries.¹¹ I record when each town experienced its first visitation and total visitation frequency to capture monitoring intensity. From the same source, I record seats of Protestant *Superintendenturen* (bodies conducting parish visitations) and compute each Protestant town’s distance to the nearest *Superintendentur*.

Enforcement channels. I measure local enforcement capacity through two channels: clergy personnel and religious printing activity.

First, I gather information on priests. I obtain data on notable clergy from *Deutsche Biographie* (Hockerts and Lanzinner 2022), using place of death to link them to the nearest town. Place of death better proxies where clergy were active than birthplace. This constructs a panel of clergy personnel by town and decade, measuring local enforcement capacity through human capital. For the Duchy of Württemberg, I supplement this with detailed priest biographies from the *Pfarrerbuch des Herzogtums Württemberg* (2025) to construct full educational and career trajectories.

Second, I use the universe of religious prints from the USTC (2025), matching print locations to nearest towns. Religious printing activity captures doctrinal dissemination intensity, the primary channel through which theological positions reached congregations. I construct town-decade panels of religious print production.

Adverse shocks. To explore alternative explanations, I gather data on shocks that might affect naming patterns. I obtain conflict incidents from Cantoni and Weigand (2021). I code pandemic and fire outbreaks from *Deutsches Städtebuch* (Keyser et al. 1939). Winter temperature data come from Luterbacher et al. (2004). I code winters with average temperatures below one standard deviation from the long-run average as shocks. Following Barber, Jetter, and Krieger (2023), I construct local exposure to solar eclipses (obscuration rates above 80%) using data from Jubier (2025).

3.3 Outcomes

To investigate outcomes of confessional identity formation, I collect additional data at both individual and group levels.

Individual-level outcomes. Two sources provide data on individual-level outcomes. First, the church baptism records described in Section 3.1 enable measurement of family transmission patterns. I construct parent-child pairs to measure intergenerational transmission of confessional identity (correlation between

¹¹ Unfortunately the project to compile a comprehensive overview of church visitation records was never finished with only the two volumes covering modern-day Baden-Württemberg and Hesse published.

parents' and children's name scores) for all records where I observe information on parents. When I observe information on both parents, I construct married couples to measure assortative matching (correlation between husbands' and wives' name scores), removing duplicates from couples with multiple children in my data.

Second, *Deutsche Biographie* (Hockerts and Lanzinner 2022) provides occupational information for 730,359 notable individuals. I use the categorization of occupations into church, administrative, military, and business careers. Combined with individuals' name scores from birthplace, this enables analysis of how confessional identity predicts career paths. I use place of birth to link individuals to towns, as birth location captures childhood exposure to enforcement rather than later career location.

Group-level outcomes: conflict. To examine whether confessional polarization affected collective violence, I use conflict data from Cantoni and Weigand (2021) on the Thirty Years' War (1618-1648). This dataset records which alliance troops belonged to in each incident—the Imperial-Catholic faction or the Protestant Union. This allows testing whether towns with stronger confessional signals faced differential targeting by opposing alliances. I construct town-level indicators for any troop exposure and separate indicators for exposure to Catholic League versus Protestant Union troops.

4 Descriptive Patterns: The Emergence of Confessional Identity

This section documents the emergence of confessional identity through naming patterns. I first define how names signal religious identity and establish the empirical measure used throughout the paper. I then present a puzzle: three illustrative names follow divergent paths after the Reformation, becoming Protestant, Catholic, or remaining neutral. Aggregating across all names reveals systematic polarization beginning in the 1580s, more than six decades after the Reformation's start. Doctrinal differentiation in printed texts follows a similar but earlier pattern, suggesting theological divergence gradually translated into lay identity formation.

4.1 Measuring Confessional Identity Through Names

First names provide a revealed-preference measure of confessional identity. Naming choices reflect parents' desired identity expression at a critical moment: the child's baptism. While formal religious affiliation was determined by territorial rulers under *cuius regio, eius religio*, names reveal the intensity and salience of confessional identity—how much parents wished to signal their religious belonging. Names have no inherent confessional content. Their confessional meanings emerge entirely from social convention. Observing how names acquire Protestant or Catholic meanings reveals the process through which religious identity crystallizes.

To measure how strongly a name signals Protestant versus Catholic identity, I construct the Protestant name score for each name in each decade. Following an extensive literature using names to measure identity (Fryer and Levitt 2004; Bazzi, Fiszbein, and Gebresilasse 2020; Abramitzky, Boustan, and Eriksson 2020; Fouka 2020; Bentzen and Andersen 2022), the score captures the posterior probability that an individual is Protestant given their name, assuming a neutral prior:

$$(1) \quad \text{ProtScore}_{name,t} = \frac{\Pr(name | \text{Protestant})_t}{\Pr(name | \text{Protestant})_t + \Pr(name | \text{Catholic})_t}$$

The Protestant name score measures how Protestant a name is. If Catholics and Protestants use a name with equal relative frequency, the score equals 0.5 (neutral). If only Protestants use a name, the score equals 1.0 (perfectly Protestant). If only Catholics use a name, the score equals 0 (perfectly Catholic). The score has a Bayesian interpretation: it represents how much observing a name updates beliefs about confession. Names with scores far from 0.5 are distinctive or clear signals, while scores near 0.5 indicate neutral or ambiguous names.

I compute these scores separately for each decade using observed birth records, allowing me to track how individual names' meanings evolve over time.¹². I validate the Protestant name score measure in Appendix Section C.6. First, I show that names with extreme scores align with historians' assessments of highly partisan names (François's classification for Augsburg). Second, I demonstrate that confessional differentiation is distinct from purely geographic patterns: the Protestant name score shows low correlation with regional or linguistic cluster scores, confirming it captures confessional rather than geographic variation. Third, I document that the the observed polarization is not merely reflecting divergence in the relative use of religious or germanic names by confessional group.¹³

4.2 The Puzzle: Three Names, Three Paths

Before examining aggregate patterns, I illustrate the puzzle with three specific names that follow divergent trajectories after the Reformation. Figure 1 plots the Protestant name score over time for Christoph, Jacob, and Matthias—three of the top 10 names in 1500.

Christoph begins the period as a neutral name (score ≈ 0.46 in the 1510s), used roughly equally by Catholics and Protestants until the 1580s. After 1580, the score rises steadily, reaching 0.57 by 1600 and 0.67 by 1620. Within four decades, Christoph becomes a distinctively Protestant name, disproportionately used among Protestants for the next 200 years. *Matthias* follows the opposite trajectory. The score begins at 0.51 in the 1510s and declines steadily after 1560, reaching 0.41 in the 1570s and 0.30 by 1650. Matthias transforms from a neutral name into a distinctively Catholic name. *Jacob* exhibits a third pattern: persistent neutrality. The score fluctuates around 0.5 throughout the entire period, never deviating more than 0.05 from neutrality. Despite the religious upheaval, Jacob remains a name used equally by both confessions.

This divergence illustrates a central puzzle: how do identity markers emerge? All three names were

¹²For the main empirical analysis, I compute scores using the full set of birth records in my sample in a given decade. For the name-level learning and group-level conformity analysis (Section 6), I compute a local Protestant name score using choice probabilities within a certain radius around towns, constructing scores based on usage patterns in their local social environment.

¹³Appendix Figure C.21 shows the use of religious and germanic names by confession over time. Both groups exhibit similar dynamics in the main period of interest (1480 to 1700) where distinct markers emerge and group boundaries form. The Protestant name score captures something distinct from group differences in religiosity or attachment to germanic identity that might be correlated with confessional group belonging. In the later period (1700 to 1800), I observe a clear increase in the use of germanic names among Protestants, likely driving the continued differentiation between confessional groups over the course of the 18th century.

common before the Reformation. All three remained common afterward. Yet they followed completely different trajectories in the confessional space.

Three core patterns require explanation. First, names' confessional associations develop slowly. Divergence does not start immediately with Luther's 1517 break but takes several decades to materialize. This suggests naming patterns respond not to the theological event itself but to some slower process of identity formation. Second, once names acquire confessional meaning, they diverge rapidly and persistently. Third, not all names become confessionally loaded. Popular names like Jacob remain neutral throughout, never becoming informative of confession.

4.3 Aggregate Differentiation in Naming

To measure aggregate differentiation, I compute the average probability that a neutral observer would correctly infer an individual's confession from their name. Following [Gentzkow, Shapiro, and Taddy \(2019\)](#), the average partisanship measure captures how informative names are about group membership:

$$(2) \quad \text{Average Partisanship}_t^{\text{name}} = \frac{1}{N_t} \sum_{i \in t} \left[y_i \cdot \text{ProtScore}_{name_i, t} + (1 - y_i) \cdot (1 - \text{ProtScore}_{name_i, t}) \right]$$

where $y_i \in \{0, 1\}$ indicates whether individual i is Protestant, and the sum runs over all births in decade t . This equals the expected posterior probability of correct classification. If I observe someone's name, how confident can I be about their confession? A value of 0.5 indicates names provide no information (random guessing), while values approaching 1.0 indicate perfect segregation.

[Figure 2](#) plots average partisanship in naming over time. The red line shows estimates using true confessional labels, with 95% confidence intervals from the empirical distribution. The gray dashed line shows a placebo test using randomly shuffled labels. The placebo benchmark hovers around 0.5, indicating that finite-sample bias does not drive the observed patterns ([Gentzkow, Shapiro, and Taddy 2019](#)).

Three patterns emerge. First, there is minimal differentiation before 1517. Average Partisanship equals 0.52 in 1510, only slightly above random chance. Regions that later become Protestant and those that remain Catholic had similar naming practices before the Reformation. Second, differentiation does not gain traction immediately after 1517. Naming patterns remain largely unchanged through the 1570s. Third, rapid differentiation occurs from 1580 to 1610. Average Partisanship rises from 0.52 to above 0.54, doubling the predictive power of names from 2 to 4 percentage points above random guessing. Differentiation stabilizes during the Thirty Years' War (1618-1648) and the remainder of the seventeenth century. It then resumes at a slower rate during the eighteenth century, reaching 0.57 by 1790. This long-run increase indicates that confessional identity became a permanent and salient social cleavage.

[Appendix Figure A.1](#) shows that confessional signals compound when observing multiple family members. An observer learning the names of a family of four would infer their confession with 58% confidence in 1550. By 1650, this rises to 63%. Identity markers became more informative not only individually but also in how they aggregated across families, making confessional boundaries increasingly visible in everyday social interactions.

These patterns are robust to examining men and women separately, elite versus non-elite samples,

and within the bi-confessional city of Augsburg (Appendix Section C.7). Even when living in the same place, confessional groups adopted different naming conventions, ruling out broad geographic trends as the primary driver. Alternative measures yield similar conclusions. Appendix Figure C.15 presents the Theil Index with bootstrap correction (Cantoni, Mohr, and Weigand 2025), which measures distributional divergence. The Theil Index shows the same timing: minimal divergence before 1570, rapid increase from 1580-1610, slowed progression thereafter.

4.4 Differentiation in Doctrine: Evidence from Printed Texts

The delayed emergence of naming differentiation raises a question: did doctrinal differences also emerge gradually, or did theological divergence precede lay identity formation? To address this, I examine confessional differentiation in printed texts as a proxy for elite theological discourse.

I represent each title as a text embedding and estimate a penalized logistic regression predicting whether the place of publication was Protestant, following Gentzkow, Shapiro, and Taddy (2019). I then compute Average Partisanship for texts analogously to Equation 2, measuring how accurately language predicts a text’s confessional origin.¹⁴

Appendix Figure D.1, Panel A, plots Average Partisanship for printed texts over time. Three patterns emerge. First, doctrinal differentiation jumps immediately in the 1520s. This sharp spike reflects Luther’s theological writings and the pamphlet wars between reformers and Catholic defenders. The early Reformation was primarily a theological conflict, visible immediately in print. Second, differentiation temporarily declines through 1555. Third, sustained differentiation resumes around 1560 and rises steadily through 1620. Panels B and C of Appendix Figure D.1 show that this later rise extends beyond purely theological texts to legal, historical, and literary works—confessional identity was becoming a broader organizing principle.¹⁵

Summary and implications. Three facts emerge from this descriptive analysis. First, individual names follow divergent paths after the Reformation: some become Protestant markers (Christoph), others Catholic markers (Matthias), and others remain neutral (Jacob). Second, aggregate naming differentiation begins around 1580, more than six decades after Luther’s break, and accelerates through the early seventeenth century. Third, doctrinal differentiation in printed texts responds immediately to the Reformation, preceding naming polarization by half a century.

This temporal pattern reveals a critical puzzle: theological divergence alone was insufficient to generate identity differentiation. Doctrine and identity are distinct. Protestant and Catholic theologies diverged sharply in the 1520s, yet ordinary families continued using similar names for decades. Something beyond theology was needed to translate doctrinal differences into lived identity markers.

What mechanisms transformed doctrine into identity? I investigate three forces. First, *enforcement*: churches invested in institutions, such as colleges, visitations, and clergy training, that actively shaped local identity formation. Second, *learning*: parents observed neighbors’ naming patterns to learn

¹⁴ Formally: Average Partisanship_t^{text} = $\frac{1}{N_t} \sum_{i \in t} [y_i \cdot \hat{p}(x_i) + (1 - y_i) \cdot (1 - \hat{p}(x_i))]$, where $\hat{p}(x_i)$ is the predicted probability that title i was published in a Protestant location. Appendix D provides full methodological details.

¹⁵ Appendix Section D.3 employs alternative measurement approaches (bigram-based classification, out-of-sample AUC) and provides illustrative examples of content that becomes predictive of confession.

which names signaled which confession. Third, *conformity*: communities coordinated their aggregate confessional intensity with nearby co-religionists. Together, these mechanisms explain why differentiation accelerated in the 1580s rather than immediately after 1517, and how local enforcement effects diffused spatially to create empire-wide polarization.

5 Church Enforcement and Confessional Identity

Empirical setting. I study how local church enforcement shaped religious identity. I measure identity using the average Protestant name score in town c and decade t . Institutions of higher learning proxy for enforcement: Jesuit colleges for Catholics, universities and academic gymnasiums for Protestants. These institutions trained clergy for each confession and functioned as centers of local church enforcement.¹⁶

Figure A.2 plots the raw data. Panel A compares Catholic towns that ever hosted a Jesuit college (red) with those that never did (gray). Both groups had similar name scores until the first Jesuit college opened in Ingolstadt in 1556. Thereafter, names became more distinctly Catholic in towns that would eventually host a college. The gap shrinks after the Jesuit suppression in 1773. Panel B shows a similar pattern for Protestant towns: those that would eventually host an academy adopted more distinctly Protestant names than those without. These descriptive patterns suggest that academy exposure is associated with stronger confessional differentiation. The empirical analysis investigates this link more rigorously.

A central concern is that unobserved variables could affect both academy exposure and naming patterns, confounding causal interpretation. I address this by exploiting geographic and temporal variation in exposure to colleges and academies and by simulating counterfactual college placements to adjust for expected exposure (Athey and Imbens 2022; Borusyak and Hull 2023).

The location of Jesuit colleges and Protestant academies was shaped by both strategic and logistical considerations. Strategically, rulers chose whether, when, and where to invite the Jesuits or establish Protestant academies. Logistical constraints affected site selection: colleges required resources to attract scholars, facilities to house students, and sustained financial support. However, idiosyncratic preferences and constraints of territorial lords often proved decisive in the final placement decision.

These factors raise two identification concerns. First, strategic placement may correlate with pre-existing trends in religious loyalty. Rulers might have targeted towns experiencing decline in confessional commitment, threatening the parallel-trends assumption. Second, logistical factors such as town size could confound results. Larger towns were more likely to host colleges but might also differ systematically in religious attitudes due to their economic structure. Figures A.4, Panel A, and A.5, Panel A examine balance on baseline town characteristics. Exposure was indeed more likely in larger towns and those with pre-existing educational infrastructure such as universities, schools, or monasteries. This highlights the need to adjust for these confounders in the empirical analysis.

Baseline empirical strategy. I study the relationship between local academy exposure and confessional identity using variation in the timing and location of Jesuit colleges and Protestant academies across towns. The outcome is the average Protestant name score in town c and decade t . Figure 3 shows the

¹⁶Figure A.18 shows images illustrating the academies used to proxy for local church presence.

geographic and temporal variation in exposure.

A naive two-way fixed effects (TWFE) specification would estimate

$$(3) \quad \text{ProtScore}_{c,t} = \beta \text{Enforcement}_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t},$$

where $\text{Enforcement}_{c,t}$ is an indicator for Jesuit or academy presence, and α_c and α_t are town and decade fixed effects. However, when effects differ across cohorts or evolve over time, β is a non-transparent weighted average that may even place negative weight on some effects (Goodman-Bacon 2021; De Chaise-martin and D'Haultfoeuille 2020; Sun and Abraham 2021).

To address this, I follow Callaway and Sant'Anna (2021) and estimate cohort-by-time average treatment effects:

$$(4) \quad \text{ATT}(g, t) = \mathbb{E}[\text{ProtScore}_{c,t}(1) - \text{ProtScore}_{c,t}(0) \mid G_c = g], \quad t \geq g,$$

where G_c is the first decade town c is exposed to an academy. In each period t , towns treated in decade g are compared to not-yet-treated or never-treated towns, yielding $\text{ATT}(g, t)$ for each cohort-time pair. These effects are then aggregated across t to form an overall average effect or by event time $e = t - g$ to produce an event-study profile. This approach avoids problematic weighting and makes the timing of effects transparent.

First, I examine whether towns exposed to academies experienced differential pre-treatment trends. Figure 4 shows event study estimates from Equation 4. Panel A indicates no differential pre-trends between Catholic towns that later host Jesuits and those that do not. The difference becomes visible four decades after Jesuit arrival and continues to widen for over a century. Panel B shows similar results for Protestant towns: pre-treatment differences are small and statistically insignificant. Effects materialize after three decades and continue to grow for over ten decades. Appendix Figures A.6 and A.7 show results aggregated by calendar time and cohort.

Table 1 reports the aggregated estimates from Equation 4. Column 1 shows that Jesuit exposure is associated with a .018 lower Protestant name score in Catholic towns (32% of a standard deviation), indicating stronger adoption of Catholic names. Column 3 shows that Protestant academies are associated with a .022 higher score in Protestant towns (39% of a standard deviation).

Addressing selection into treatment. A key concern is that college and academy placement was not random. Larger towns with universities or monasteries were more attractive sites for early investments. Rulers may have deliberately targeted towns where confessional loyalty was weakening. Failing to account for these factors could bias estimates and threaten causal interpretation.

To address this, I construct a measure of *expected exposure* based on baseline town characteristics. The intuition is straightforward: some towns were almost certain to receive colleges given their size and infrastructure, while others received them only due to idiosyncratic factors. Consider two examples. Trier was a major city with 10,000–15,000 inhabitants around 1500, an active university founded in 1473, multiple schools, and a series of monasteries. A town like Trier would almost inevitably attract a Jesuit college given its size, infrastructure, and strategic importance. In contrast, Landsberg am Lech was a smaller

market town with fewer than 5,000 inhabitants and only a parish school. A former Benedictine abbey had been abandoned for centuries. Its eventual Jesuit college (1576) was largely due to the personal initiative of Schweikhard von Helfenstein, president of the Reichskammergericht, who leveraged his influence to secure a foundation for the town. My approach discounts predictable cases like Trier and exploits variation from cases like Landsberg, where exposure arose from idiosyncratic, ruler-specific decisions.

Formally, I simulate 100 counterfactual college placements based on baseline town characteristics: city size, monastery presence, school presence, and university presence. I hold the overall number of colleges active in each decade constant but randomly assign them across towns with probabilities proportional to these baseline characteristics. This generates a distribution of potential exposure for each town. I then compute *expected exposure*—the average simulated probability that a town receives a college by each decade. This captures the predictable component of treatment based on observable characteristics.

I then adjust the estimation in Equation 4 by controlling for expected exposure. Following [Borusyak and Hull \(2023\)](#), this approach isolates variation in actual exposure that deviates from predicted exposure. The identifying assumption is that, conditional on expected exposure, residual variation in academy exposure reflects idiosyncratic institutional decisions rather than systematic differences in towns' confessional trajectories. In other words, after accounting for the predictable component based on town characteristics, remaining variation is as good as random with respect to potential outcomes.

Figures A.4 and A.5 show that controlling for expected exposure substantially improves balance on observables. Figures 5 and A.3 plot maps of expected exposure and the resulting residual variation. Returning to illustrative examples: in counterfactual simulations, Trier's probability of receiving a Jesuit college is roughly 75% by 1750, while Landsberg's is just 9%. The estimation procedure gives more weight to variation from towns like Landsberg and less to towns like Trier.

Table 1, Columns 2 (Jesuit exposure) and 4 (Protestant academy exposure) report results after adjusting for expected exposure. The point estimates suggest that academy exposure increased denomination-specific naming by .48 standard deviations for Catholics and .39 standard deviations for Protestants, equivalent to moving from the median to the 30th and 66th percentile respectively in the empirical name score distribution of towns in 1650. The qualitative pattern is confirmed, indicating that selection on observables is not driving the findings. This strengthens the case for a causal interpretation. The quantitative changes of coefficients for Jesuit exposure in comparison to column 1 is informative. Now, my estimates zero in on the most incidentally exposed towns like Landsberg am Lech. The increased coefficients suggest larger treatment effects for this set of towns relative to the ones that were almost surely exposed based on their pre-treatment characteristics like Trier.

Appendix Section B demonstrates robustness using alternative approaches. First, I use doubly robust inverse probability weighting (DR-IPW) with baseline city characteristics ([Sant'Anna and Zhao 2020](#); [Callaway and Sant'Anna 2021](#)), reported in Table B.3. Second, I use probit nearest-neighbor matching on baseline covariates, reported in Table B.2. These approaches yield consistent results, corroborating that the observed effects reflect the causal impact of academy exposure on confessional identity.¹⁷ Appendix Section B summarizes additional robustness checks and details the implementation algorithm for expected

¹⁷ Church ordinances provide an alternative proxy for local church enforcement. Ordinances reorganized public good provision ([Dittmar and Meisenzahl 2020](#)) and regulated religious life. Figure A.13 shows that ordinances are also associated with stronger confessional differentiation, consistent with the main results using academy presence.

exposure.

5.1 How Does Enforcement Work? The Role of Clergy and Printing

The previous analysis established that colleges increased confessional differentiation. This section examines the mechanism: how did colleges affect religious identity expression?

I argue colleges operated through two complementary channels. First, they trained clergy who embedded confessional meanings through catechesis, preaching, and pastoral oversight. Second, they produced religious texts that standardized doctrine and disseminated confessional narratives. Together, these channels built the capacity to shape identity systematically.

Clergy training and quality. Illustrative evidence comes from microdata on priests in the Duchy of Württemberg. The *Pfarrerbuch des Herzogtums Württemberg* (*Württemberger Pfarrerbuch* 2025) records full educational histories and careers of all priests active in the region from 1500 to 1806. Figure A.14 shows rapid growth in clergy education after the Reformation. The share of parish priests with a Magister degree (higher university education) increased from around 15% in 1540 to above 90% by 1610, indicating intentional efforts to raise priestly quality and expand enforcement capacity at the parish level. To test whether colleges systematically increased clergy presence, I estimate Equation 4 with the number of notable clergy as outcome. Table 2, Columns 1-4 show that Jesuit colleges and Protestant academies increase the number of notable clergy active in a town.

Religious printing. Colleges also served as centers of doctrinal production. Using the universe of religious prints from the Universal Short Title Catalogue, I test whether colleges increased local religious printing activity. Columns 5-8 of Table 2 show that both Jesuit and Protestant academy towns produce significantly more religious prints. Religious printing provided the standardized catechisms, sermons, and devotional materials through which clergy transmitted confessional meanings. The combination of trained clergy and doctrinal materials created the infrastructure for systematic enforcement.

5.2 Persistence and Removal of Enforcement

The previous sections documented the link between academies and confessional differentiation. This section examines persistence: did effects require sustained oversight, or did they reflect one-time permanent shifts?

Two pieces of evidence address this question. First, I examine whether repeated church visitations by ecclesiastical authorities strengthened differentiation. Second, I study whether removing enforcement capacity through the 1773 Jesuit suppression reversed differentiation. Together, these tests distinguish between deeply internalized identity and identity partially maintained through continued oversight.

5.2.1 Repeated Church Visitations

Church visitations were supervisory inspections by higher church authorities to ensure doctrinal conformity and discipline at the parish level. If sustained monitoring mattered, visitation intensity should

predict stronger differentiation. I use the *Repertorium der Kirchenvisitationsakten* (Zeeden 1982), which records parishes visited in modern-day Baden-Württemberg and Hesse during the sixteenth and seventeenth centuries. This provides systematic information on 460 towns, allowing me to measure timing of first visitations and total visitation frequency. Figure A.8 maps these towns and their first visitation dates.

First visitation effects. Applying the staggered difference-in-differences framework from Equation 4, I exploit variation in when towns experienced their first visitation. Table A.1 reports results. Catholic towns experienced a .014 lower Protestant name score following their first visitation relative to not-yet-visited towns (.37 standard deviations). Protestant towns experienced a .011 higher score (.29 standard deviations). Despite the small sample, effects are statistically significant and consistent with the college results: direct church oversight strengthened confessional differentiation.

Visitation intensity. I next examine whether visitation frequency mattered. A key concern is endogeneity: supervision might have targeted areas with weak confessional adherence. To address this, I instrument visitation intensity with distance to the nearest Superintendentur (regional ecclesiastical administration) for Protestant towns.

The identifying assumption is that proximity affected visitation frequency for logistical reasons—shorter distances lowered supervision costs—but is otherwise unrelated to identity trajectories. Figure A.10 shows distance is balanced with respect to baseline covariates. Figure 6, Panel B shows distance is unrelated to baseline naming patterns in the 1530s, supporting the exclusion restriction.

Table A.2 presents instrumental variables results. In cross-sections for 1650 (Columns 1-2) and 1700 (Columns 3-4), instrumented visitation frequency positively predicts Protestant name scores. Towns visited more frequently adopted more distinctly Protestant names. Including region fixed effects (Columns 2 and 4) exploits only within-region variation, purging broad territorial differences.

Complementary evidence links visitations to personnel discipline. Using detailed priest career data from the *Pfarrerbuch des Herzogtums Württemberg*, I find priest turnover is significantly higher in decades with at least one visitation (Table A.3). This suggests visitations disciplined clergy by credibly threatening replacement. Together, these results indicate repeated oversight by church authorities strengthened differentiation.

5.2.2 Removal of Enforcement: The 1773 Jesuit Suppression

As a complementary test, I study consequences of removing enforcement capacity. In 1773, Pope Clement XIV suppressed the Jesuit order following mounting opposition from European monarchs. Implementation in the Holy Roman Empire was swift (Friedrich 2016).¹⁸

¹⁸ Prussia under Frederick II. was the notable exception. Protestant Prussia refused to acknowledge Papal authority and allowed the Jesuits to operate in the Catholic minority areas of recently annexed Silesian and Polish territories. I exclude these towns from the sample for this analysis.

To estimate the effect of the suppression, I estimate:

$$(5) \quad ProtScore_{c,t} = \sum_{\tau=-5}^5 \beta_\tau (EverJesuit_c \times RelativeDecade_{\tau(t)}) + \alpha_c + \alpha_t + \epsilon_{c,t},$$

where $RelativeDecade_{\tau(t)}$ measures decades relative to 1773. Figure A.11 shows that Protestant name scores in previously Jesuit towns rise immediately after the suppression and continue to increase thereafter, indicating a shift toward less distinctively Catholic naming. There is no evidence of differential pre-trends, supporting the parallel-trends assumption. This pattern is consistent with Figure A.2, Panel A, where the Jesuit/non-Jesuit gap narrows after 1773.

Alternative explanations. An alternative explanation is that adverse events—violent conflict, pandemics, environmental shocks—deepened confessional divides through crisis responses rather than institutional enforcement.¹⁹ Appendix Section B.2 tests this hypothesis by examining whether exposure to five types of adverse shocks (military conflict, plague outbreaks, severe winters, solar eclipses, and urban fires) predicts stronger confessional differentiation. I find no evidence that any of these shocks systematically increased naming polarization. This contrasts sharply with the robust positive effects of academy exposure, indicating that the documented rise in confessional identity reflects deliberate institutional investments rather than spontaneous responses to existential threats.

Taken together, these results demonstrate that church enforcement through educational institutions and sustained monitoring via visitation systems seeded initial variation in confessional identity and maintained persistent polarization in naming practices.

6 Social Transmission of Religious Identity

The previous section established that church enforcement increases confessional differentiation in treated locations. However, enforcement operates only in specific places at specific times, yet confessional divergence occurs across the entire territory and unfolds gradually over decades. How do naming patterns spread beyond directly-treated areas?

Two patterns point to social transmission mechanisms. First, locations with low enforcement also exhibit increasing differentiation over time, suggesting diffusion from treated to untreated areas. Second, even in treated locations, naming changes occur gradually rather than instantaneously, consistent with learning or imitation rather than pure enforcement compliance.

I examine whether identity patterns spread through decentralized social transmission: parents observe nearby co-religionists' choices and adjust their own decisions accordingly. This process operates through two conceptually distinct mechanisms operating at different levels of aggregation.

Learning (name-level): Parents face an information problem: which names signal which confession? They learn by observing usage patterns. If most Protestants nearby use "Christoph," this reveals

¹⁹ A substantial literature documents that adverse shocks can heighten ingroup-outgroup salience and strengthen religious beliefs: natural disasters (Bentzen 2019), pandemics (Berkes et al. 2023), solar eclipses (Barber, Jetter, and Krieger 2023), and violent conflict (Sampanis and Shayo 2013).

Christoph's Protestant association. This generates convergence in individual names' usage as parents update beliefs about name meanings.

Conformity (group-level): Communities face a coordination problem: how distinctively Protestant or Catholic should we be? They conform by observing nearby same-denomination communities. When surrounded by Protestants with strong confessional signals, Protestant communities increase their own confessional intensity. This generates convergence in aggregate confessional identity within group, and divergence across groups.

While conceptually distinct (learning updates beliefs, conformity reflects social preferences), both mechanisms generate convergence dynamics. I cannot perfectly separate them using reduced-form specifications alone. However, examining convergence at both levels provides complementary evidence. The name-level analysis reveals whether parents learn which names mean what by observing local patterns. The group-level analysis reveals whether communities coordinate on how distinctive to be by observing nearby co-religionists. Heterogeneity tests showing faster adjustment when signals are clearer provide additional evidence consistent with information processing.

Together, these mechanisms create social amplification. Enforcement seeds initial variation in a few locations. Learning spreads knowledge about name meanings across space. Conformity accelerates diffusion as communities coordinate their aggregate intensity.

Section 6.1 examines name-level learning: individual names' usage adjusts toward spatial network averages, with faster convergence when signals are clearer. Section 6.2 examines group-level conformity: aggregate confessional identity adjusts toward same-denomination neighbors' intensity, operating through portfolio reweighting rather than mechanical concentration on fewer names. Together, these patterns demonstrate that social transmission amplified enforcement effects and drove spatial diffusion beyond directly-treated locations.

6.1 Name-Level Learning

I begin by examining social transmission at the disaggregated level: how individual names' usage evolves over time and space. Consider a parent in 1580 choosing a name for her Protestant son. She wants to express Protestant identity but faces uncertainty about which names signal Protestant versus Catholic affiliation. First names carry no intrinsic religious content. Their confessional meanings emerge entirely from social convention.

To resolve this uncertainty, she observes naming patterns among nearby Protestants and Catholics. If "Christoph" is more popular among Protestant neighbors than among Catholic neighbors, this reveals Christoph's Protestant association. She incorporates this information when making her own choice, potentially adopting Christoph herself. If this process operates systematically, names exhibiting stronger relative popularity among nearby co-religionists should show increasing local usage. This constitutes a testable prediction of information-based learning.

6.1.1 DeGroot Learning Framework

I model this learning process using the DeGroot (1974) framework, which provides a tractable model of belief updating on networks. Agents form beliefs as weighted averages of neighbors' beliefs rather than through full Bayesian inference. This bounded rationality approach suits the historical context: parents lacked centralized information about name meanings and instead relied on decentralized observation of local usage patterns. The framework generates testable gap-closing dynamics (Golub and Jackson 2010).

Parents update their usage as a weighted average of past usage and neighbors' signal:

$$(6) \quad \text{ProtScore}_{n,g,c,t} = (1 - \phi) \cdot \text{ProtScore}_{n,g,c,t-1} + \phi \cdot \text{ProtScore}_{n,g,c,t-1}^{\text{Network}}$$

where parameter $\phi \in [0, 1]$ measures adjustment speed. Differencing yields the gap-closing form:

$$(7) \quad \Delta \text{ProtScore}_{n,g,c,t} = \phi \cdot \underbrace{\left[\text{ProtScore}_{n,g,c,t-1}^{\text{Network}} - \text{ProtScore}_{n,g,c,t-1} \right]}_{\equiv \text{Gap}_{n,g,c,t-1}}$$

Towns with below-network usage (own score < neighbors' average) increase usage; towns with above-network usage (own score > neighbors' average) decrease usage. All towns converge toward neighbors' network average at rate ϕ per period. This framework generates spatial amplification: if a town c_0 increases usage of name n , this raises the network average for neighbors, inducing co-religionists to increase usage, which then affects their neighbors' network averages. Effects decay geometrically at rate ϕ^k for k -degree neighbors, creating spillovers beyond directly treated locations.

6.1.2 Empirical Implementation

For each name n , town c with confession g , and decade t , I construct two Protestant score measures using non-overlapping samples to avoid mechanical correlation. I illustrate the construction for a Protestant town; it follows the same logic for Catholic ones.

Own $\text{ProtScore}_{n,g,c,t}$ measures how distinctively town c uses name n relative to nearby opposite-confession communities:

$$(8) \quad \text{ProtScore}_{n,\text{Prot},c,t} = \frac{p_{n,c,t}^{\text{Prot}}}{p_{n,c,t}^{\text{Prot}} + p_{n,\text{ref},t}^{\text{Cath}}}$$

where $p_{n,c,t}^{\text{Prot}}$ is the share of Protestant births in town c receiving name n , and $p_{n,\text{ref},t}^{\text{Cath}}$ is the share among nearby Catholic communities (within 50km).

$\text{ProtScore}_{n,g,c,t}^{\text{Network}}$ measures how distinctively nearby co-religionists use name n :

$$(9) \quad \text{ProtScore}_{n,\text{Prot},c,t}^{\text{Network}} = \frac{p_{n,\text{network},t}^{\text{Prot},-c}}{p_{n,\text{network},t}^{\text{Prot},-c} + p_{n,\text{ref},t}^{\text{Cath}}}$$

where $p_{n,\text{network},t}^{\text{Prot},-c}$ is the share in other Protestant communities within 50km (excluding c) and uses the same Catholic reference communities.

$\text{Gap}_{n,g,c,t}$ captures whether nearby co-religionists use name n more or less distinctively than town c currently does. A positive gap means other Protestant communities use name n more distinctively (relative to Catholics) than town c , suggesting parents could learn to increase usage. A negative gap suggests town c signals more distinctively than neighbors. This construction avoids mechanical correlation: Own ProtScore reflects town c 's choices, while ProtScore^{Network} reflects other Protestant towns' choices, both measured relative to the same Catholic reference.

The baseline specification tests this gap-closing prediction:

$$(10) \quad \Delta\text{ProtScore}_{n,g,c,t} = \phi \cdot \text{Gap}_{n,g,c,t-1} + \gamma_n + \alpha_{g,c} + \delta_t + \varepsilon_{n,g,c,t}$$

where γ_n are name fixed effects, $\alpha_{g,c}$ are town fixed effects, and δ_t are decade fixed effects. Standard errors are clustered at the town level. Coefficient $\hat{\phi}$ measures the fraction of the gap that closes per decade.

6.1.3 Signal Quality and Information Environment

If learning operates through information extraction rather than mechanical imitation, adjustment speed should vary with signal quality. I test this by interacting the gap with three proxies for signal quality:

$$(11) \quad \begin{aligned} \Delta\text{ProtScore}_{n,g,c,t} = & \phi_0 \cdot \text{Gap}_{n,g,c,t-1} + \phi_1 \cdot \text{Gap}_{n,g,c,t-1} \times \text{Signal Quality}_{n,g,c,t-1} \\ & + \gamma_n + \alpha_{g,c} + \delta_t + \varepsilon_{n,g,c,t} \end{aligned}$$

The three signal quality measures capture different dimensions of information reliability:

Signal credibility. Names with higher local frequency provide more observations, making the gap more statistically reliable. *High usage name* _{n,g,c,t} indicates names above median of local usage frequency. Parents should trust signals backed by larger samples more than those based on rare observations.

Information reliability. Observing many co-religionist neighbors provides more reliable averages about appropriate naming patterns. *High network density* _{g,c} counts towns with confession g within 50km. Learning should be more effective when parents can observe larger reference groups rather than drawing inferences from sparse networks.

Interpretive clarity. In locations where the overall naming portfolio consists primarily of distinctive names, parents more easily infer the general name-confession mapping. I construct:

$$(12) \quad \text{Signal Clarity}_{g,c,t} = \sum_n \pi_{n,g,c,t} \cdot |\text{ProtScore}_n - 0.5|$$

measuring the average distinctiveness of names used locally. When the local environment exhibits clear confessional patterns, interpreting network signals becomes easier.

Positive ϕ_1 in each case would indicate faster adjustment when information quality is higher. Table 3 presents results. Column (1) shows baseline gap-closing ($\hat{\phi} \approx .31$): towns adjust usage toward neighbors' patterns. Columns (2)-(4) show adjustment accelerates with signal quality. Convergence is faster when names are frequently observed, networks are dense, and local portfolios are distinctive. This pattern is consistent with learning rather than mechanical imitation.

6.2 Group-Level Conformity

The previous subsection examined how individual names diffuse, testing learning about which names signal which confession. This subsection shifts to aggregate confessional identity, testing conformity in overall Protestant or Catholic intensity. The distinction matters: a location could learn name meanings perfectly yet still choose varying confessional intensity. Consider two Protestant communities both understanding that Christoph signals Protestant, Matthias signals Catholic, and Jacob is neutral. One could use 80% Christoph/20% Jacob (strong intensity), the other 40% Christoph/60% Jacob (moderate intensity). Name-level learning explains coordination on meanings. Group-level conformity explains coordination on intensity.

6.2.1 Empirical Specification

I measure aggregate confessional identity as the average Protestant score across all individuals in a confession-town-decade:

$$(13) \quad \bar{a}_{g,c,t} = \frac{1}{N_{g,c,t}} \sum_{i \in g,c,t} \text{ProtScore}_{n(i),g,c,t}$$

where $\text{ProtScore}_{n(i),g,c,t}$ is the Protestant score of the name chosen for individual i , computed as in Section 6.1. This captures overall confessional intensity: communities using many strongly Protestant names have high \bar{a} , while communities using neutral or mixed names have \bar{a} near zero.

The network measure reflects nearby co-religionists' average intensity:

$$(14) \quad \bar{a}_{g,c,t}^{\text{Network}} = \sum_{c' \neq c} w_{cc'} \cdot \bar{a}_{g,c',t}$$

where the sum runs over other Protestant towns within 50km (excluding c itself) and $w_{cc'}$ are uniform spatial weights.

$\text{Gap}_{g,c,t}$ captures whether town c is more or less confessionally distinctive than nearby co-religionists. A positive gap means nearby Protestant communities exhibit stronger confessional identity than town c , suggesting town c might increase its own intensity to conform. This construction differs from name-level analysis: while name-level learning requires comparing Protestant and Catholic usage to infer name meanings, group-level conformity compares only to co-religionists to determine appropriate intensity. The question shifts from "which names signal which confession?" to "how distinctively Protestant should we be?" This purely within-confession comparison reflects conformity: parents already understand name meanings from learning, but coordinate on aggregate intensity by observing what level of distinctiveness their co-religionist neighbors choose.

The specification tests whether aggregate identity exhibits gap-closing toward co-religionist neighbors:

$$(15) \quad \Delta \bar{a}_{g,c,t} = \phi \cdot \text{Gap}_{g,c,t-1} + \alpha_{g,c} + \delta_t + \varepsilon_{g,c,t}$$

where $\alpha_{g,c}$ are confession-town fixed effects and δ_t are decade fixed effects. Standard errors are clustered at the town level.

6.2.2 Heterogeneity and Portfolio Adjustment

As with name-level learning, I test whether adjustment varies with information quality:

$$(16) \quad \Delta \bar{a}_{g,c,t} = \phi_0 \cdot \text{Gap}_{g,c,t-1} + \phi_1 \cdot \text{Gap}_{g,c,t-1} \times \text{Signal Quality}_{g,c} \\ + \alpha_{g,c} + \delta_t + \varepsilon_{g,c,t}$$

Signal quality measures include network density (more same-confession neighbors) and local clarity (more distinctive name portfolio).

A key question is how communities adjust aggregate intensity. Communities could mechanically concentrate on fewer names, herding toward the most popular. Alternatively, they could adjust through portfolio reweighting, maintaining diverse name menus while shifting their overall confessional position. To distinguish these mechanisms, I test whether gaps predict changes in name concentration:

$$(17) \quad \Delta \text{Concentration}_{g,c,t} = \rho \cdot \text{Gap}_{g,c,t-1} + \alpha_{g,c} + \delta_t + \varepsilon_{g,c,t}$$

where $\text{Concentration}_{g,c,t}$ is the normalized Herfindahl index of name usage. If conformity operates through herding, $\rho > 0$; if through portfolio reweighting, $\rho < 0$ as communities maintain diversity while adjusting weights.

Table 4 presents results. Column (1) shows baseline gap-closing ($\hat{\phi} \approx .59$): communities adjust aggregate intensity toward neighbors' average. Columns (2)-(3) show adjustment accelerates with network density and signal clarity, consistent with information-based updating. Column (4) shows larger gaps induce lower concentration ($\rho < 0$): communities adjust by reweighting diverse portfolios rather than herding on fewer names. Appendix B.17 shows adjustment strength declines with distance, confirming transmission operates through local networks.

Together, these results provide reduced-form evidence for social transmission at two levels. At the name level, individual names converge toward neighbors' usage patterns, with faster adjustment when signals are credible—consistent with learning about which names signal which confession. At the group level, aggregate confessional intensity converges toward neighbors' average intensity through portfolio reweighting—consistent with conformity about how Protestant or Catholic communities should be. Three features emerge consistently: gap-closing dynamics with convergence rates of approximately 30% (name-level) and 59% (group-level) per decade, information-dependence showing adjustment accelerating where signals are clearer, and portfolio sophistication revealing communities maintain diverse naming menus while shifting aggregate positions.

7 Conceptual Framework

The empirical analysis documented three forces driving identity formation: enforcement institutions shaped local patterns (Section 5), parents learned name meanings by observing neighbors (Section 6.1), and communities conformed to nearby co-religionists' aggregate identity (Section 6.2). This section integrates them in a unified framework: How do enforcement, learning, and conformity work together to generate S-shaped diffusion?

I present the framework in four steps: individual choice structure, dynamic mechanisms, their interaction, and implications for temporal patterns. This framework is deliberately stylized to highlight core mechanisms and organize the empirical findings. It suggests plausible dynamics consistent with the data but does not formally derive all temporal patterns—these remain conjectures for future theoretical work to establish rigorously.

7.1 Individual Choice

Environment. A continuum of individuals indexed by $i \in [0, 1]$ inhabit locations $\ell \in \{1, \dots, L\}$ connected by spatial networks with proximity weights $w_{\ell\ell'}$ (uniform within a 50km radius, zero beyond). Following the principle of *cuius regio, eius religio*, each location mandates a confession $g(\ell) \in \{C, P\}$. Churches enforce doctrinal ideals $\theta^C = 0$ (Catholic) and $\theta^P = 1$ (Protestant) at local intensity $\kappa_{\ell,t} \geq 0$, reflecting investments in colleges, clergy, and printing (Section 5).

Each individual i has a fixed ideal point $\theta_i \in [0, 1]$ drawn fresh each period from distribution F with mean μ , representing idiosyncratic confessional orientation.²⁰ Differences between Catholics and Protestants emerge entirely through enforcement and social interaction, not pre-existing preferences.

Names $n \in \mathcal{N}$ serve as identity signals. Each name possesses a perceived Protestantness $s_{n,\ell,t} \in [0, 1]$, a variable reflecting the community's belief about the name's confessional affiliation based on prior usage. Values near 0.5 indicate ambiguous names; values near 0 or 1 indicate distinctively Catholic or Protestant names.

Stage 1: Identity positioning. Individual i in town c of confession g chooses confessional identity expression $a_{i,\ell,t} \in [0, 1]$ to maximize utility. The utility function balances three forces:

$$(18) \quad u_{i,\ell,t}(a) = \underbrace{-\kappa_{\ell,t}(a - \theta_g)^2}_{\text{Enforcement}} - \underbrace{\lambda(a - \bar{a}_{g,\ell,t-1}^{\text{local}})^2}_{\text{Conformity}} - \underbrace{\gamma(a - \theta_i)^2}_{\text{Own preference}}$$

The first term captures church enforcement toward doctrine θ_g . The second captures conformity toward spatially proximate same-confession communities observed in the previous period, where $\bar{a}_{g,\ell,t-1}^{\text{local}} = \sum_{\ell'} w_{\ell\ell'} \bar{a}_{g,\ell',t-1}$.²¹ The third captures attachment to own ideal point θ_i .

Interior maximization yields the optimal identity as a weighted average:

$$(19) \quad a_{i,\ell,t}^* = \frac{\kappa_{\ell,t}\theta_g + \lambda\bar{a}_{g,\ell,t-1}^{\text{local}} + \gamma\theta_i}{\kappa_{\ell,t} + \lambda + \gamma}$$

Aggregating over individuals in confession g , town c gives the group mean:

²⁰ I abstract from intergenerational transmission of preferences (Bisin and Verdier 2001) to focus on the social mechanisms.

²¹ Similar to Bonomi, Gennaioli, and Tabellini (2021), I assume individuals minimize distance to their group stereotype. However, this simple framework abstracts from their full derivation of cross-group influences and the fixed-point determination of beliefs about ingroup versus outgroup stereotypes.

$$(20) \quad \bar{a}_{g,\ell,t} = \frac{\kappa_{\ell,t}\theta_g + \lambda\bar{a}_{g,\ell,t-1}^{\text{local}} + \gamma\mu}{\kappa_{\ell,t} + \lambda + \gamma}$$

Group positions differ through enforcement (θ_g) and conformity (\bar{a}^{local}), while individual heterogeneity creates within-group dispersion around $\bar{a}_{g,\ell,t}$.

Stage 2: Name choice. At the beginning of period t , beliefs about name meanings are updated based on observed usage from period $t - 1$ (described below). Individual i then selects a name to signal their chosen identity $a_{i,\ell,t}^*$. The utility from choosing name n depends on the distance between the individual's identity and the name's perceived Protestantness $s_{n,\ell,t}$, subject to idiosyncratic taste shocks $\varepsilon_{i,n}$:

$$(21) \quad V_{i,n,\ell,t} = -\beta(a_{i,\ell,t}^* - s_{n,\ell,t})^2 + \varepsilon_{i,n}$$

This implies the choice probability:

$$(22) \quad \pi_{i,n|\ell,t} = \frac{\exp[-\beta(a_{i,\ell,t}^* - s_{n,\ell,t})^2]}{\sum_{n'} \exp[-\beta(a_{i,\ell,t}^* - s_{n',\ell,t})^2]}$$

Names matching individual identity are selected more frequently. The strength of this sorting depends on the clarity of the signal $s_{n,\ell,t}$.

7.2 Dynamic Mechanisms

Two social processes generate change across generations.

Mechanism 1: Learning. Parents update the perceived Protestantness of names based on usage observed in their network during the *previous* period. The score evolves according to:

$$(23) \quad s_{n,\ell,t} = (1 - \alpha)s_{n,\ell,t-1} + \alpha \sum_{\ell'} w_{\ell\ell'} \tilde{s}_{n,\ell',t-1}$$

where $\tilde{s}_{n,\ell',t-1}$ is the realized Protestant share among users of name n at time $t - 1$, and $\alpha \in [0, 1]$ measures learning speed. Perceived Protestantness converges toward observed historical usage at rate α . This backward-looking structure ensures that choices at t are based on beliefs formed from observations at $t - 1$.

This creates feedback: naming choices depend on beliefs (Stage 2), and beliefs update from observed choices. If Protestants disproportionately choose name n in period $t - 1$, this raises $\tilde{s}_{n,\ell,t-1}$, increasing $s_{n,\ell,t}$, making future Protestants more likely to choose n in period t . Initially neutral names tip toward either confession through accumulated deviations.

Mechanism 2: Conformity. The $-\lambda(a - \bar{a}_{g,\ell,t-1}^{\text{local}})^2$ term generates spatial diffusion. When enforcement increases identity expression in location ℓ_0 , individuals in neighboring locations observe this shift and

adjust toward the new regional norm in the subsequent period. This creates a spatial multiplier effect, propagating local shocks across the network.

7.3 Interaction and Amplification

The mechanisms reinforce each other through feedback loops connecting individual choices to aggregate patterns.

Complementarity. The mechanisms are likely complementary. When name meanings are ambiguous ($s_n \approx 0.5$), learning extracts little information, and conformity is weak because neighbors' signals are uninterpretable. As names acquire clearer associations, two channels potentially activate. First, parents can more reliably infer neighbors' intensity, making conformity actionable. Second, clearer signals enable stronger sorting (Stage 2), which further differentiates realized usage \tilde{s} , accelerating learning. While the framework does not formally prove these complementarities, the structure suggests how small initial shifts might enable modest conformity adjustments, which strengthen sorting, clarifying signals further, enabling stronger conformity—positive feedback.

Spatial diffusion. Enforcement effects spread spatially through conformity. A college in location ℓ_0 increases $\kappa_{\ell_0,t}$, raising $\bar{a}_{g,\ell_0,t}$. Neighbors observe this elevated mean and adjust via the \bar{a}^{local} term. Simultaneously, name choices in ℓ_0 shift toward distinctive patterns, and neighbors observing these update their perceived name scores, accelerating the spread of cultural markers.

Persistence through accumulated patterns. Individual preferences θ_i are drawn fresh each period—I abstract from explicit intergenerational transmission (Bisin and Verdier 2001) to focus on the core social mechanisms. Yet the system generates persistence through: (i) accumulated beliefs about name meanings ($s_{n,\ell,t}$) that evolve slowly ($\alpha < 1$) and are reinforced by continued sorting; (ii) spatial conformity sustaining elevated identity positions in locations with high enforcement and their neighbors. Even when enforcement κ weakens, the existing structure of beliefs and spatial patterns provides substantial inertia. This offers one interpretation of Figure A.2: after Jesuit suppression (1773), Catholic naming distinctiveness declines (weakened $\kappa_{\ell,t}$) but doesn't collapse fully.

This mechanism also ensures partial overlap between groups. The idiosyncratic preference parameter γ ensures that individual ideal points θ_i remain dispersed, preventing complete separation even in high-enforcement locations. Even when enforcement is strong, some Protestants will draw θ_i low enough to prefer neutral or even Catholic-leaning names, and vice versa. Consequently, while the system drives toward differentiation, the presence of idiosyncratic preferences prevents the name distribution from degenerating into two disjoint sets—consistent with the partial overlap observed in the data.

7.4 Temporal Patterns

The interaction effects suggest a coherent interpretation of polarization's three phases (Figure 2), though I emphasize these dynamics are conjectured rather than formally derived from the framework.

Phase 1: Slow start (1520–1570). Enforcement $\kappa_{\ell,t}$ is low. Perceived Protestantness is historically determined and largely neutral ($s \approx 0.5$). With weak signals, sorting is inefficient, and belief updating is slow.

Phase 2: Acceleration (1580–1620). Systematic enforcement shocks increase κ , potentially generating three reinforcing effects. First, colleges increase $\kappa_{\ell,t}$ in treated locations, directly affecting individual choices and creating spatial heterogeneity in positions. This activates conformity—individuals face clearer gradients in neighbors’ positions. Second, identity differentiation induces sorting in name choices. As individuals’ identities become dispersed and group means extreme, differential usage creates variance. Names acquire clearer associations ($s_{n,\ell,t}$ diverging from 0.5), accelerating learning. Third, complementarity may create feedback: clearer signals make neighbors’ positions interpretable, strengthening conformity; stronger conformity generates distinctive patterns, clarifying signals. Together, these mechanisms can generate the sharp acceleration observed in the data (1580–1620).

Phase 3: Stabilization (post-1620). Polarization continues but the rate of change slows. As name meanings stabilize, the marginal information gain from further sorting declines. Spatial patterns diffuse widely, reducing gradients. The system approaches a steady state where cultural boundaries are clearly defined, though not perfectly separated, as idiosyncratic preferences prevent total convergence to doctrinal extremes. However, polarization doesn’t stop entirely. Continued enforcement, ongoing learning, and incomplete diffusion sustain gradual divergence through the eighteenth century (Figure 2).

Empirical connection. The framework organizes reduced-form results conceptually. Enforcement effects (Table 1) operate through changes in $\kappa_{\ell,t}$, shifting individual choices via Equation (19), aggregating to group patterns. Name-level learning (Table 3) reflects belief-updating (Mechanism 1) on aggregated choices, with faster convergence for clear signals confirming information-based adjustment. Aggregate conformity (Table 4) reflects individual responses through the λ term aggregating to group convergence, with gap-closing rates capturing λ relative to total friction $\kappa_{\ell,t} + \lambda + \gamma$.

The framework provides a unified interpretation: enforcement seeded variation in individual choices, learning clarified which names signaled which confession from aggregated patterns, conformity spread patterns spatially through individual responses, and their interaction created potentially self-reinforcing dynamics. Together, these mechanisms operating through individual choices could transform localized institutional investments into empire-wide cultural divergence persisting through accumulated beliefs and spatial patterns.

Appendix E.1 provides formal derivations and extensions. Appendix E.2 sketches how doctrinal positions and enforcement capacity could arise endogenously from church competition.

8 Names as Identity Signals: Behavioral Validation

The previous sections established that church enforcement generates naming differentiation and that patterns diffuse through social transmission. This section examines whether naming patterns correlate with high-stakes decisions where confessional identity plausibly matters. I organize the analysis by level of aggregation: individual behaviors (intergenerational transmission, marriage, careers) and group-level outcomes (conflict exposure). None of these relationships can be interpreted causally, as unobserved factors may drive both naming and outcomes. However, their consistent pattern suggests naming choices reflect and signal meaningful confessional identity.

8.1 Individual-Level Behavior

Using parent-child pairs from baptism records, I find substantial intergenerational transmission: within city \times decade contexts, parents' and children's name scores are strongly correlated, even across gender (fathers to daughters, mothers to sons) (Appendix Table A.6). Marriage records reveal positive assortative matching on confessional intensity—spouses' name scores are correlated within local marriage markets for both Catholics and Protestants (Appendix Table A.5). Finally, linking name scores to occupational data from *Deutsche Biographie*, individuals with stronger confessional signals were more likely to pursue church careers (clergy, theologians) and less likely to become notable in commerce (merchants, bankers) (Appendix Table A.7). While unobserved family characteristics (religiosity, social networks, wealth) contribute to all these patterns, their consistency suggests names signaled orientations relevant for life decisions, echoing findings by Bentzen and Andersen (2022).

8.2 Group-Level Behavior: Conflict Targeting

If naming patterns signal group identity to external observers, towns with clearer confessional signals might face differential treatment during religious warfare. Using conflict data from Cantoni and Weigand (2021) on the Thirty Years' War (1618-1648), I construct measures of Catholic and Protestant naming intensity and examine exposure to troops from Catholic League versus Protestant Union forces.

The patterns reveal striking asymmetries (Table 5). Catholic towns with stronger Catholic naming signals faced 21 percentage points higher probability of attack from Protestant Union forces, while facing marginally lower probability from Catholic League forces. Protestant towns exhibit the mirror pattern: stronger Protestant signals associate with 9.2 percentage points higher probability of Catholic League attacks and 10.2 percentage points lower probability of Protestant Union attacks. Crucially, stronger signals predict attacks from *opposing* rather than same-confession alliances—towns with clearer identity markers do not face uniformly more conflict, but systematically different patterns depending on attackers' confession. While unobserved factors (political allegiances, military resources) may contribute, this asymmetry is consistent with military actors interpreting naming patterns as information about local religious composition when making targeting decisions.

Confessional name scores exhibit systematic correlations with consequential behaviors across multiple domains: intergenerational transmission, marriage sorting, career paths, and conflict exposure. While each correlation admits alternative explanations, their consistent pattern validates that naming differentiation represents meaningful identity formation rather than arbitrary fashion. Names functioned as legible markers of confessional affiliation in the social, economic, and political landscape of Reformation Germany.

9 Conclusion

Identity categories that define social boundaries are neither fixed nor natural. Throughout history, societies have witnessed rapid realignments in which identities matter and what they mean: ethnic categories that were once salient fade while new ones emerge; class consciousness waxes and wanes; religious affiliations splinter and recombine; partisan divisions deepen or dissolve. Understanding how new identity markers

emerge and spread—and when they come to structure deep social cleavages—remains central to explaining conflict, cooperation, and cultural change across contexts.

This paper examines identity formation during the Protestant Reformation using 4.9 million baptismal records to trace how religious boundaries crystallized through naming patterns. Three insights emerge. First, identity boundaries require both institutional investment and decentralized coordination—enforcement alone cannot generate lasting divisions without social transmission mechanisms that spread and internalize new meanings. Second, these mechanisms operate at multiple levels simultaneously: parents learn which markers signal which group (name-level) while communities coordinate on overall group distinctiveness (aggregate-level), and these processes reinforce each other through spatial networks. Third, these workers work together: initial differences amplify through feedback loops between institutional pressure, social learning, and conformity, eventually locking in divisions that persist for centuries. Future work quantifying the relative contribution of enforcement versus social transmission through structural estimation would enable counterfactual analysis of alternative institutional configurations and network structures.

These findings advance understanding of identity formation, state capacity, and religious change. They demonstrate that cultural boundaries emerge from interactions between top-down institutional investments and bottom-up social coordination, neither alone being sufficient. They reveal a dimension of early modern state-building—ideological capacity to shape beliefs and induce social discipline—that complements existing emphasis on fiscal and legal institutions. They unpack the mechanisms linking theological rupture to enduring behavioral differences, showing confessional identities were actively constructed rather than automatic consequences of doctrinal disputes.

More broadly, the analysis underscores historical contingency (Cantoni and Yuchtman 2025). The Reformation did not automatically produce two coherent confessional blocs. Transforming theological disagreements into a defining cleavage that structured German society for three centuries required deliberate institutional choices and sustained social coordination. Churches invested in enforcement infrastructure; parents learned and transmitted confessional meanings; communities coordinated on shared identities. Each decision reinforced the next, locking in divisions that could have evolved differently under alternative circumstances. Identity categories that appear natural often result from such path-dependent processes, shaped by strategic actors and amplified through social dynamics. Understanding these mechanisms illuminates not only historical transformations but also contemporary questions about polarization, cultural change, and the conditions under which social boundaries harden or dissolve.

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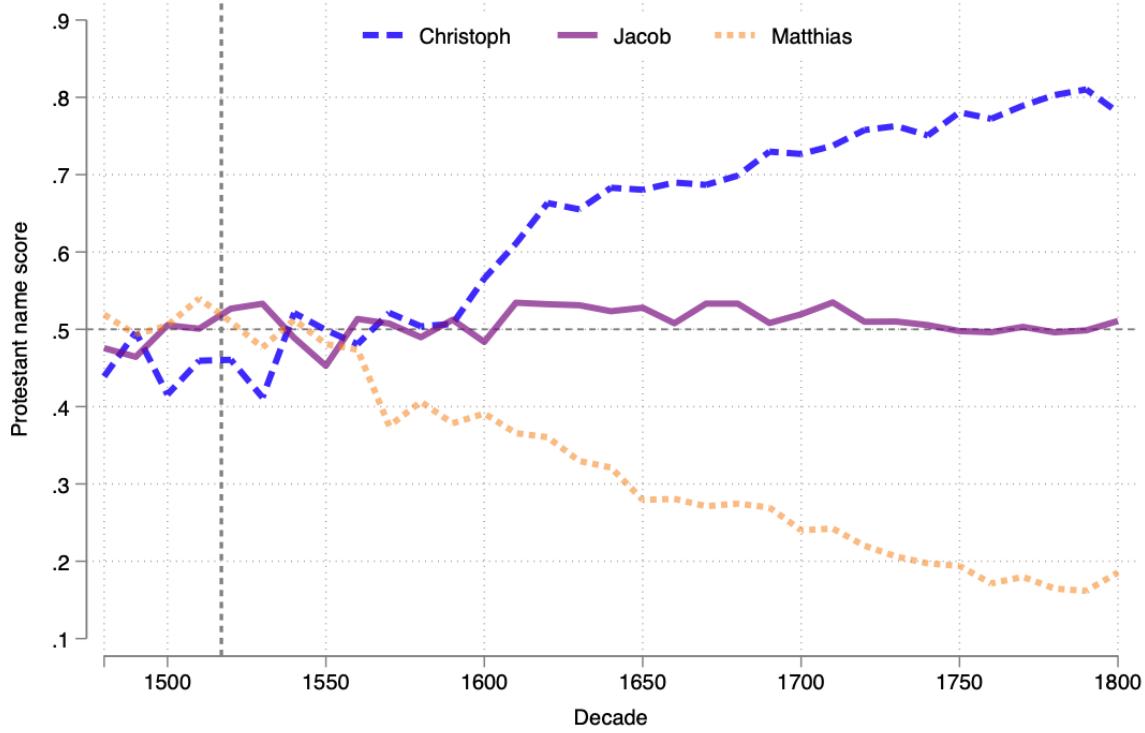
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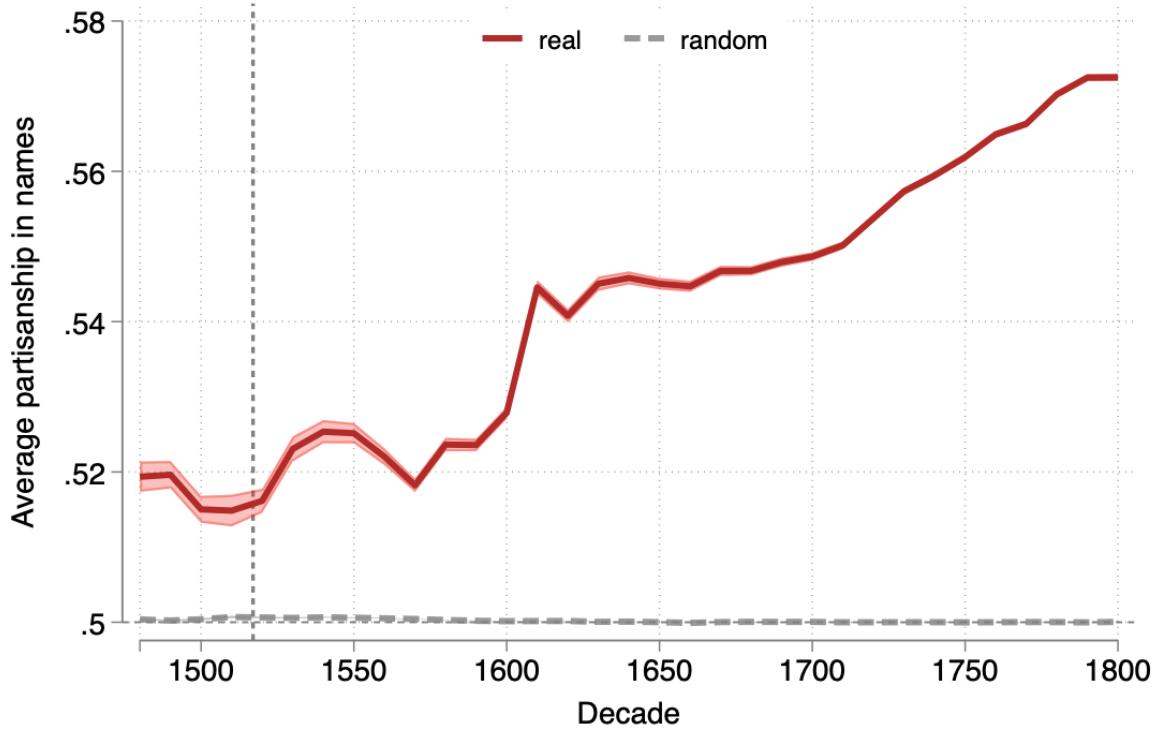
Figures

Figure 1: Trajectories of selected names.



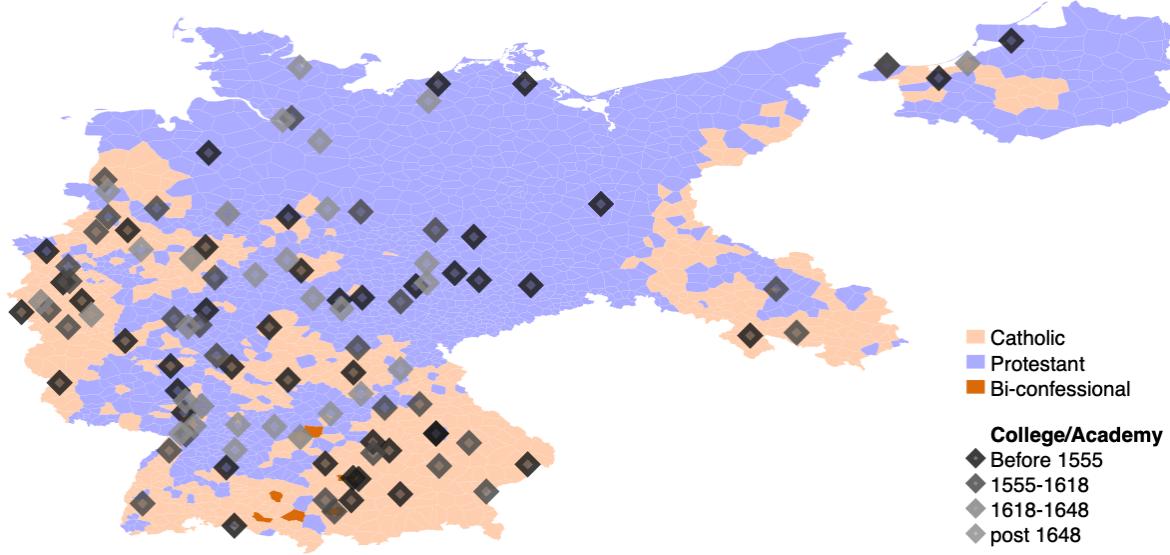
Note: This figure plots the Protestant name score computed as in Equation 1 on the y-axis. A value of 1 indicates a name exclusively used by Protestants, a value of 0 indicates a name exclusively used by Catholics, and a value of .5 indicates a name used in equal probability among both group. I plot the trajectory of the Protestant name score by decade for three selected names for the period between 1480 and 1800: Christoph (dashed blue line), Jacob (solid purple line), and Matthias (dotted orange line) which are among the top 10 names in 1500.

Figure 2: Partisanship in naming over time.



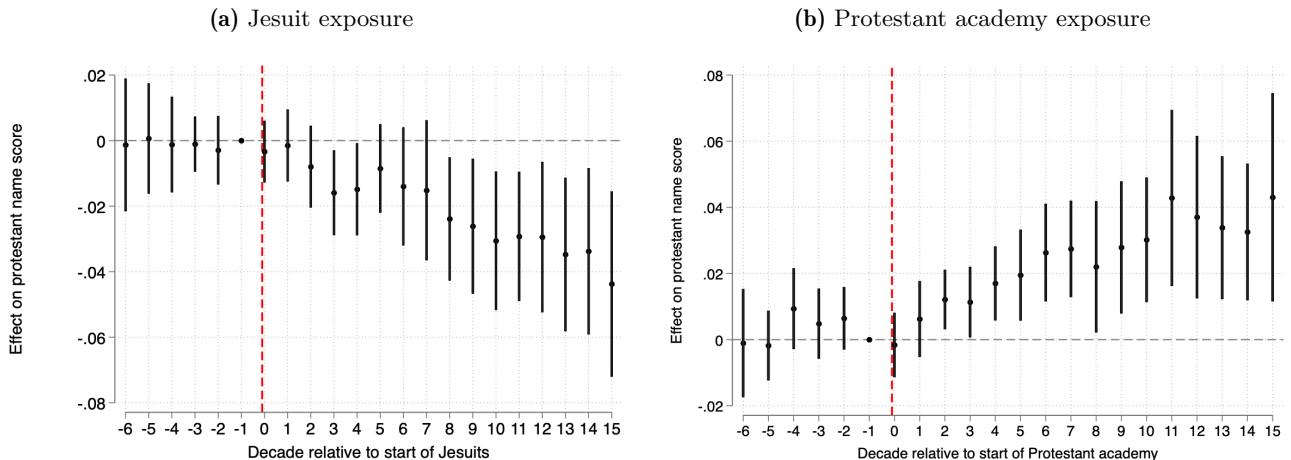
Note: This figure plots average name-based partisanship, $\text{Average Partisanship}_t^{\text{name}}$, by decade from 1480 to 1800, as defined in Equation 2. The solid red line reports the posterior probability that a neutral observer correctly infers confession from a randomly drawn name, with 95% confidence intervals. The dashed gray line shows the average over 500 iterations with randomly reshuffled labels. Names are classified using the parish's (eventual) confessional status. See Appendix Section C for details on data construction and robustness.

Figure 3: Jesuit and Protestant academies.



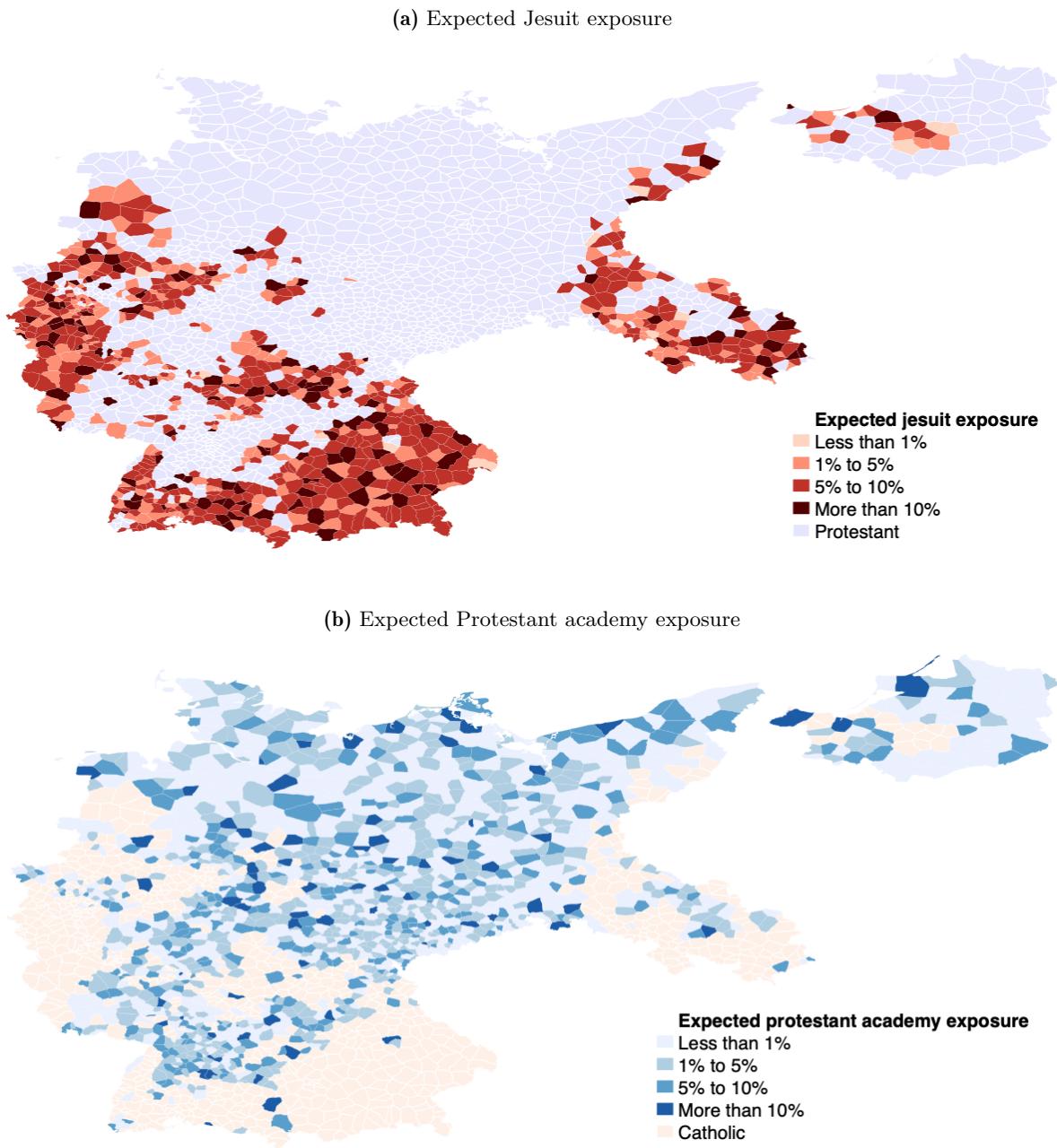
Note: This map shows the location of Jesuit and Protestant academies. The base map plots towns and their catchment areas using data from [Bogucka, Cantoni, and Weigand \(2019\)](#). Catholic towns are shown in orange, bi-confessional towns in dark orange, and Protestant towns in blue. Jesuit and Protestant academies are marked with gray diamonds, shaded by the period of establishment.

Figure 4: Confessional academies and religious identity (event studies).



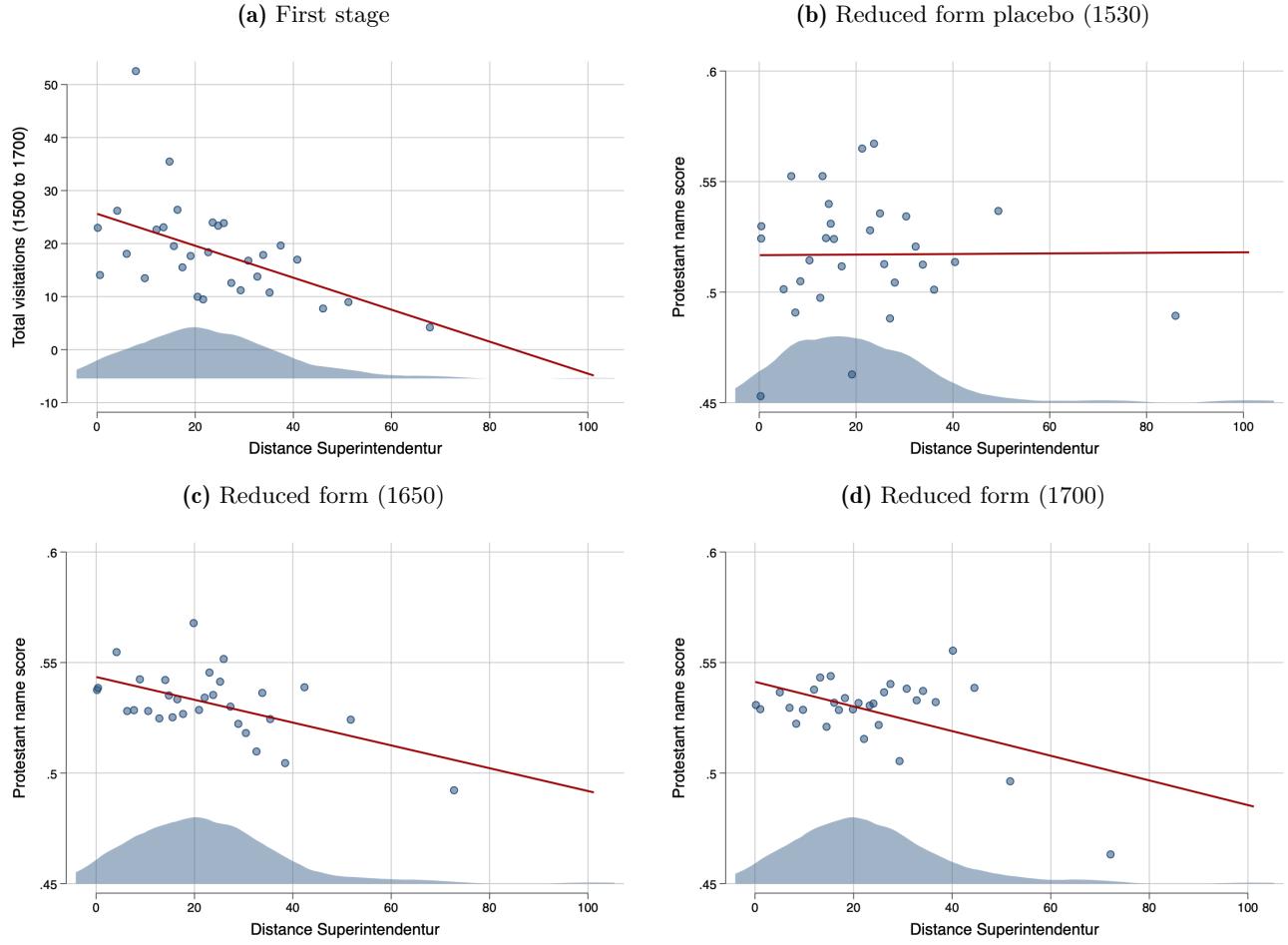
Note: This figure reports event-study estimates from Equation 4 with 95% confidence intervals. Observations are at the town-decade level; sample sizes are reported in Table 1. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Panel A uses Catholic towns and defines treatment by the decade of Jesuit arrival; Panel B uses Protestant towns and defines treatment by the decade of Protestant academy establishment. Control units are never-treated or not-yet-treated towns. Standard errors are clustered at the town level.

Figure 5: Map of expected academy exposure.



Note: This map shows expected exposure to confessional academies. Details on the computation of expected exposure are provided in Appendix Section B.3. Panel A shows expected exposure to Jesuit colleges for Catholic towns in red, with darker shading indicating higher probabilities of exposure. Panel B shows expected exposure to Protestant academies for Protestant towns in blue, with darker shading indicating higher probabilities of expected exposure.

Figure 6: Visitations and religious identity (instrumental variable).



Note: This figure shows binscatter plots illustrating the instrumental variables strategy for the sample of Protestant towns in the modern-day states of Baden-Württemberg and Hesse, where systematic visitation records exist for 1500–1700. The unit of observation is a town. Panel A plots the first stage, with the total number of visitations (1500–1700) on the y -axis and distance to the nearest *Superintendentur* on the x -axis. Panel B provides a placebo test, plotting the average Protestant name score in 1530 against distance to the nearest *Superintendentur*. Panels C and D show the reduced form, plotting the average Protestant name score in 1650 and 1700, respectively, against distance to the nearest *Superintendentur*.

Tables

Table 1: Confessional academies and religious identity.

| | Protestant name score | | | |
|-----------------------------|-----------------------|----------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | Protestant towns | | |
| Jesuit exposure | -0.018** (0.007) | -0.027*** (0.009) | | |
| Protestant academy exposure | | | 0.022*** (0.006) | 0.022*** (0.006) |
| Observations | 8,283 | 8,283 | 20,928 | 20,928 |
| Number of Towns | 574 | 574 | 1,148 | 1,148 |
| Outcome mean | 0.481 | 0.481 | 0.548 | 0.548 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns and define treatment by the decade of Jesuit arrival; Columns 3–4 use Protestant towns and define treatment by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2 and 4 include expected exposure as an additional control variable; details on the construction of expected exposure are provided in Section B.3. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 2: Confessional academies and religious activity.

| | Notable clergy (ihs) | | | | Religious prints (ihs) | | | |
|-----------------------------|----------------------|--------------------|--------------------|-------------------|------------------------|--------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Catholic towns | Protestant towns | | | | | | |
| Jesuit exposure | 0.149** (0.062) | 0.151** (0.064) | | | 0.565** (0.260) | 0.585** (0.263) | | |
| Protestant academy exposure | | | 0.171** (0.075) | 0.136* (0.073) | | | 1.713*** (0.358) | 1.545*** (0.340) |
| Observations | 27,060 | 27,060 | 51,810 | 51,810 | 17,578 | 17,578 | 33,924 | 33,924 |
| Number of Towns | 820 | 820 | 1,570 | 1,570 | 799 | 799 | 1,542 | 1,542 |
| Outcome mean | 0.012 | 0.012 | 0.031 | 0.031 | 0.066 | 0.066 | 0.100 | 0.100 |
| Town FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4. Observations are at the town–decade level. Columns 1–4 use the inverse hyperbolic sine of the number of notable clergy dying in town c and decade t as the dependent variable (33 decades, 1480–1800). Columns 5–8 use the inverse hyperbolic sine of the number of religious prints produced in town c and decade t (23 decades, 1480–1700). Columns 1, 2, 5, and 6 use Catholic towns and define treatment by the decade of Jesuit arrival; Columns 3, 4, 7, and 8 use Protestant towns and define treatment by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2, 4, 6, and 8 additionally control for expected exposure; details on its construction are provided in Section B.3. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 3: Name-level learning.

| | Δ Name score | | | |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) |
| Gap (t-1) | 0.3082*** (0.0058) | 0.2918*** (0.0068) | 0.2928*** (0.0079) | 0.3000*** (0.0075) |
| Gap (t-1) × High name usage | | 0.0467*** (0.0082) | | |
| Gap (t-1) × High network density | | | 0.0342*** (0.0110) | |
| Gap (t-1) × High signal clarity | | | | 0.0180** (0.0091) |
| Observations | 122,079 | 122,079 | 122,079 | 122,079 |
| Number of towns | 767 | 767 | 767 | 767 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Name FEs | ✓ | ✓ | ✓ | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 10. The dependent variable is the change in Protestant score for name n in town c from decade $t - 1$ to t . Gap($t - 1$) measures the difference between the weighted average Protestant score for name n among nearby co-religionists (within 50km, uniform weights) and the town's own Protestant score for that name. Updating and gap are reverse coded for Catholics, so positive gaps indicate stronger learning pressure and updating indicates updating towards the own confessional extreme consistently. High name usage is an indicator for names above median of local usage frequency. High network density is an indicator for towns above median of same-confession neighbors within 50km. High signal clarity is an indicator for towns above median of local clarity, measured as the average distinctiveness of locally-used names ($\sum_n \pi_{n,g,c,t} \cdot |\text{ProtScore}_n - 0.5|$). All specifications include name, town, and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 4: Group-level conformity.

| | Δ Avg. name Score | | | Δ Name Concentration |
|----------------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| | (1) | (2) | (3) | (4) |
| Gap (t-1) | 0.5965*** (0.0182) | 0.5249*** (0.0252) | 0.4044*** (0.0313) | -0.2117*** (0.0331) |
| Gap (t-1) × High network density | | 0.1427*** (0.0359) | | |
| Gap (t-1) × High signal clarity | | | 0.2312*** (0.0406) | |
| Observations | 9,286 | 9,286 | 9,286 | 9,286 |
| Number of towns | 723 | 723 | 723 | 723 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reprotosts estimates from Equation 15. The dependent variable in columns (1)-(3) is the change in average Protestant score for confession g in town c from decade $t - 1$ to t . Gap($t - 1$) measures the difference between the weighted average aggregate identity among nearby same-confession communities (within 50km, uniform weights) and the town's own aggregate identity. Updating and gap are reverse coded for Catholics, so positive gaps indicate stronger learning pressure and updating indicates updating towards the own confessional extreme. High network density is an indicator for towns above median of same-confession neighbors within 50km. High signal clarity is an indicator for towns above median of local clarity, measured as the average distinctiveness of locally-used names. In column (4) the dependent variable is the change in the normalized Herfindahl index of name usage. All specifications include town and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 5: Religious identity and conflict.

| | Any (1) | w/ Prot Union (2) Catholic towns | w/ Cath League (3) | Any (4) | w/ Prot Union (5) Protestant towns | w/ Cath League (6) |
|-----------------------|------------------|--|-----------------------|-------------------|--|-----------------------|
| Catholic signal | 0.165 (0.125) | 0.210*** (0.049) | -0.048 (0.030) | | | |
| Protestant signal | | | | -0.054 (0.058) | -0.102*** (0.032) | 0.092** (0.039) |
| <i>R</i> ² | 0.171 | 0.218 | 0.227 | 0.228 | 0.298 | 0.294 |
| Observations | 277 | 277 | 277 | 614 | 614 | 614 |
| Outcome mean | 0.547 | 0.259 | 0.090 | 0.431 | 0.148 | 0.158 |
| Town controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Region FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Cluster | Region | Region | Region | Region | Region | Region |

Notes: This table reports estimates from regressing an indicator of conflict on an indicator of confessional signal. Observations are at the town level. Columns 1–3 use Catholic towns; Columns 4–6 use Protestant towns. *Catholic Signal* equals one if a town's average Protestant name score is below 0.5 during the Thirty Years' War (1618–1648); *Protestant Signal* equals one if the score is above 0.5. Columns 1 and 4 use as dependent variable an indicator equal to one if the town was exposed to any troop presence during the war. Columns 2 and 5 use an indicator for exposure to troops of the Protestant Union; Columns 3 and 6 use an indicator for exposure to troops of the Catholic League. All regressions include the full set of pre-war town-level covariates and region fixed effects. Standard errors are clustered at the region level. Results should be interpreted as conditional associations rather than causal effects on war incidence. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Getting Religion: Identity Formation in the Protestant Reformation

Marcel Caesmann*

Appendix for Online Publication

*University of Zurich, E-Mail: marcel.caesmann@econ.uzh.ch

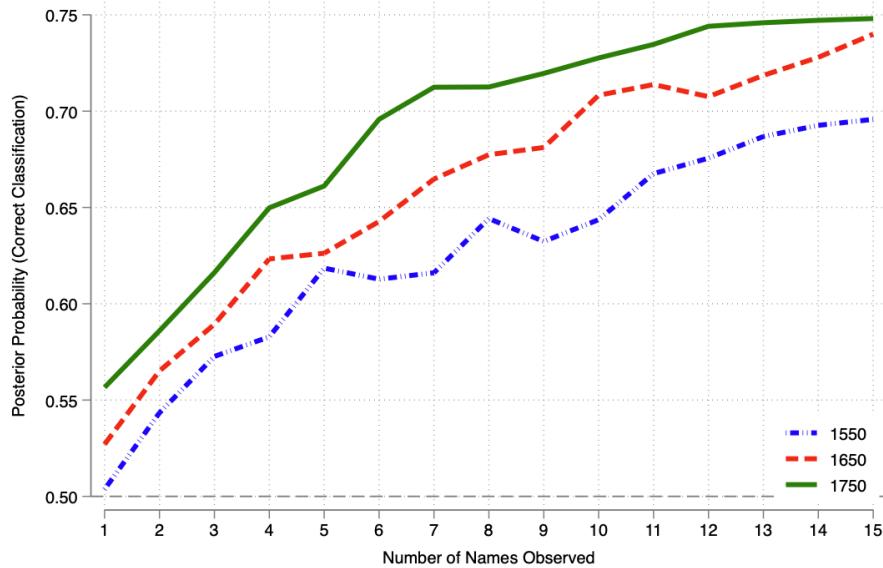
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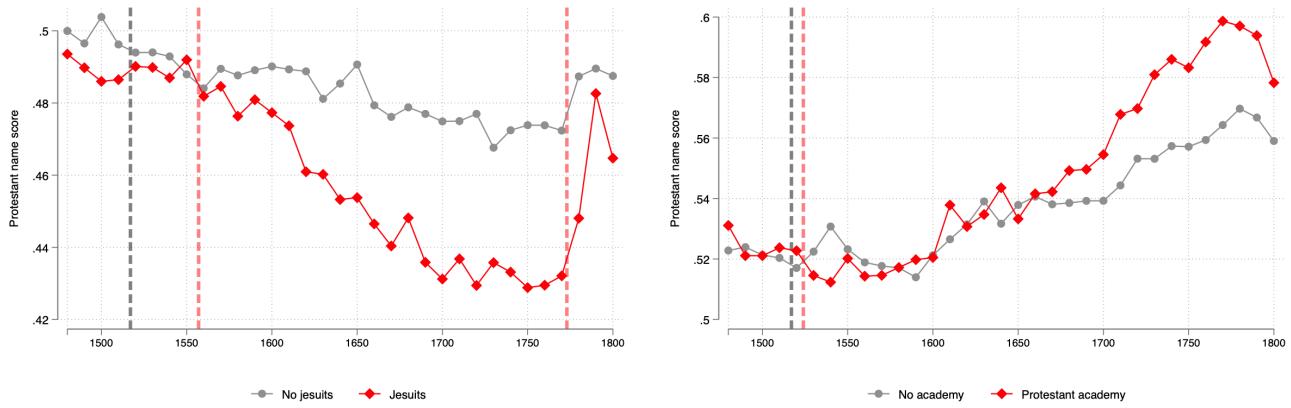
A Tables and Figures

Figure A.1: Classification accuracy by number of observed names over time.



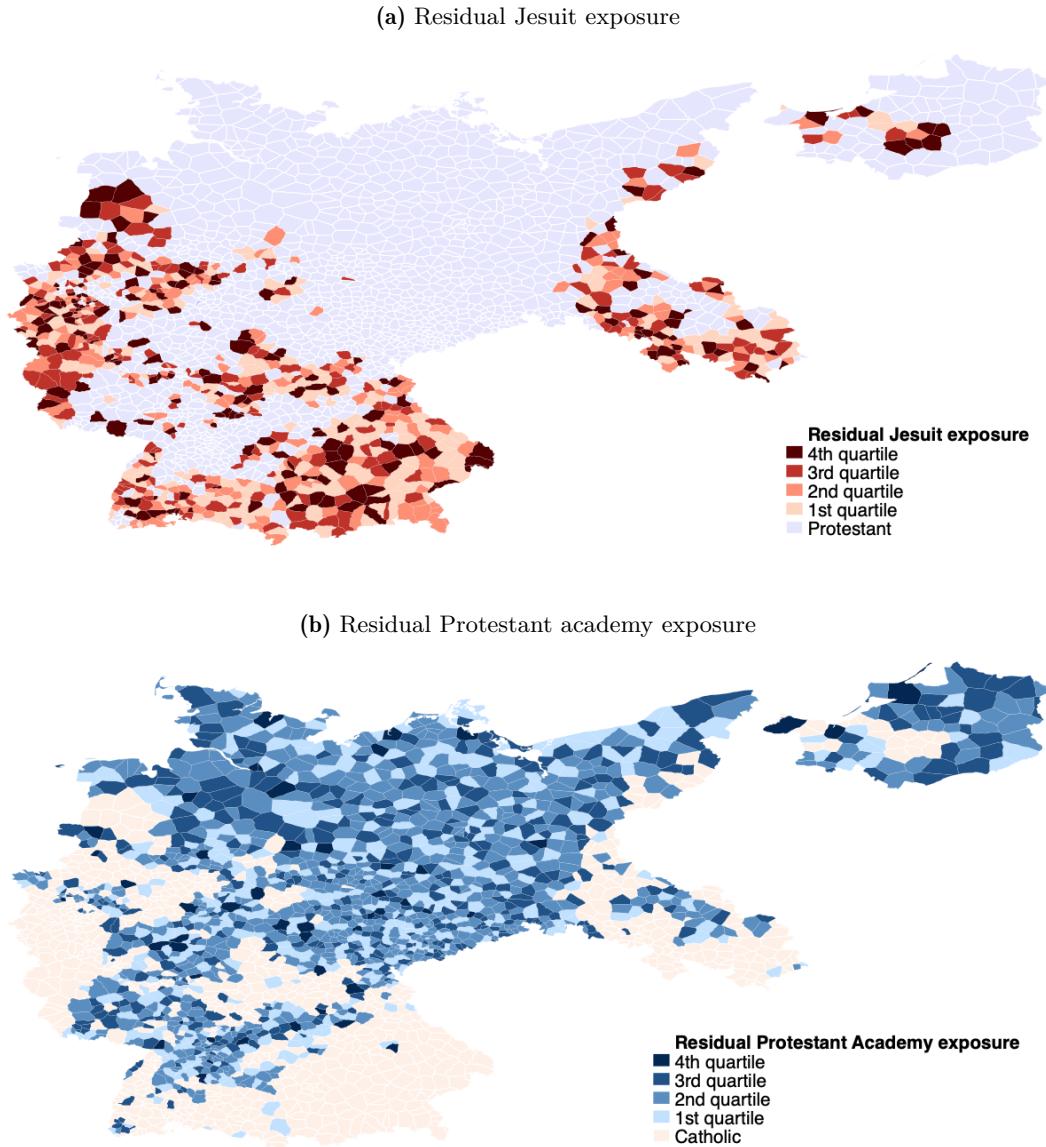
Note: This figure plots informativeness of names by number of observed names. For each town c and decade t , I calculate the expected posterior an observer with a neutral prior would place on a towns true confessional status after hearing a given number of names. I perform this calculation by Monte Carlo simulation and plot the average across towns for each decade and number of names observed. See Appendix Section C for details on data construction and robustness.

Figure A.2: Academy exposure and religious identity (raw data).



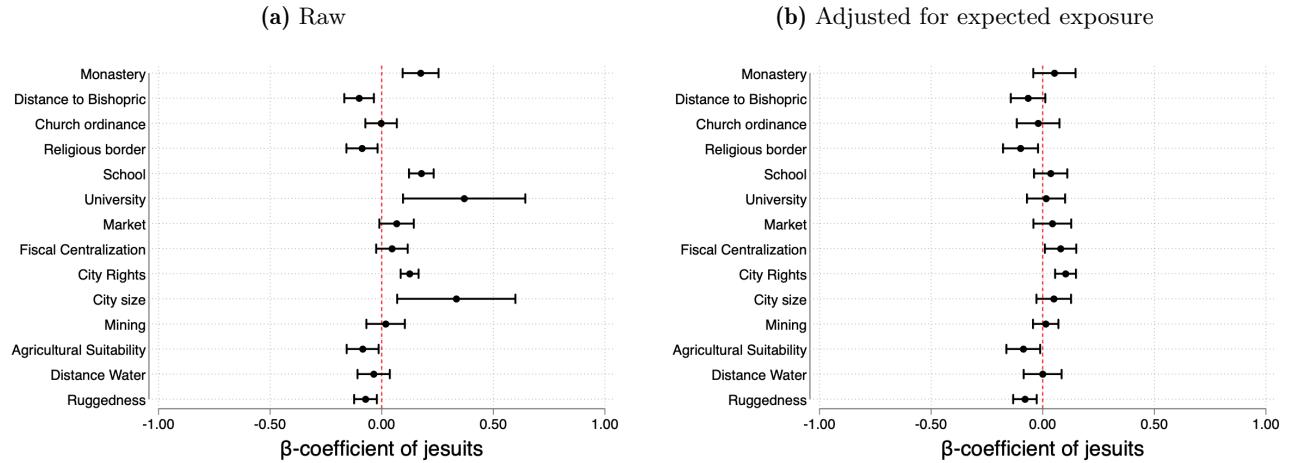
Note: This figure plots the average Protestant name score across towns by decade (1480–1800), as defined in Equation 1. Panel A uses Catholic towns and compares those that ever hosted a Jesuit college (red) to never-exposed Catholic towns (gray). Vertical markers: dashed gray = 1517 (start of the Reformation); solid red = 1556 (first Jesuit college in Ingolstadt); solid red = 1773 (suppression of the Jesuit order). Panel B uses Protestant towns and compares those that ever hosted a Protestant academy (red) to never-exposed Protestant towns (gray). Vertical markers: dashed gray = 1517; solid red = 1524 (first Protestant academy).

Figure A.3: Map of residual academy exposure.



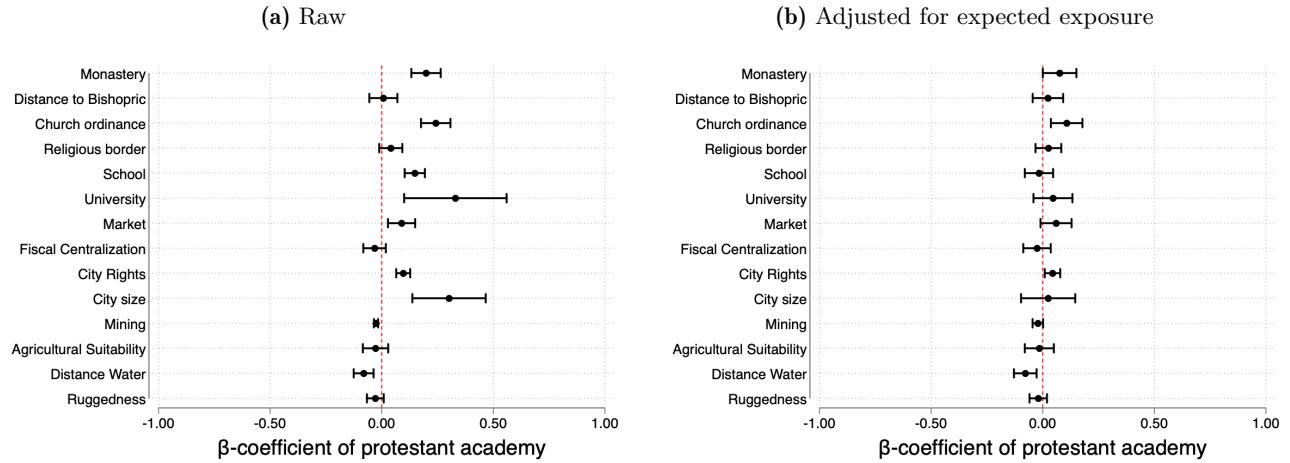
Note: This map shows residual exposure to confessional academies. Residual exposure is obtained by regressing actual confessional academy exposure on expected exposure and plotting the resulting residuals. Details on the computation of expected exposure are provided in Appendix Section B.3. Panel A depicts residual exposure to Jesuit colleges. Catholic and bi-confessional towns are shown in red, with darker shading indicating higher quartiles of residual exposure. Protestant towns are shown in light blue. Panel B depicts residual exposure to Protestant academies. Protestant towns are shown in blue, with darker shading indicating higher quartile of residual exposure. Catholic and bi-confessional are shown in light orange.

Figure A.4: Balance Jesuit exposure.



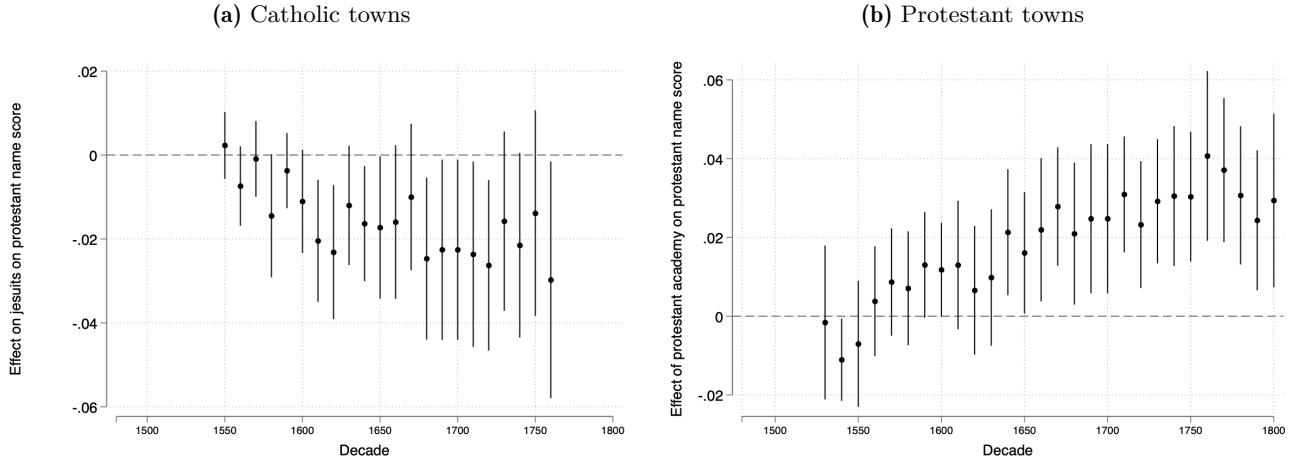
Note: This figure shows estimated coefficients and 95% confidence intervals from regressions of Jesuit exposure on observable town characteristics, using Catholic towns. Panel A reports results using unadjusted exposure; Panel B uses exposure residualized for expected exposure. Town characteristics include distance to bishopric, town size, and indicators for market, monastery, school, university, city rights, and mining activity (all measured in 1500). Balance is also shown with respect to time-invariant characteristics: distance to water (river or sea), agricultural suitability, and average ruggedness of the town territory. Additional covariates include indicators for issuing a church ordinance, belonging to a fiscally centralized territory, and location on a religious border (all measured in 1650) show the correlation between exposure and later institutional developments.

Figure A.5: Balance Protestant academy exposure.



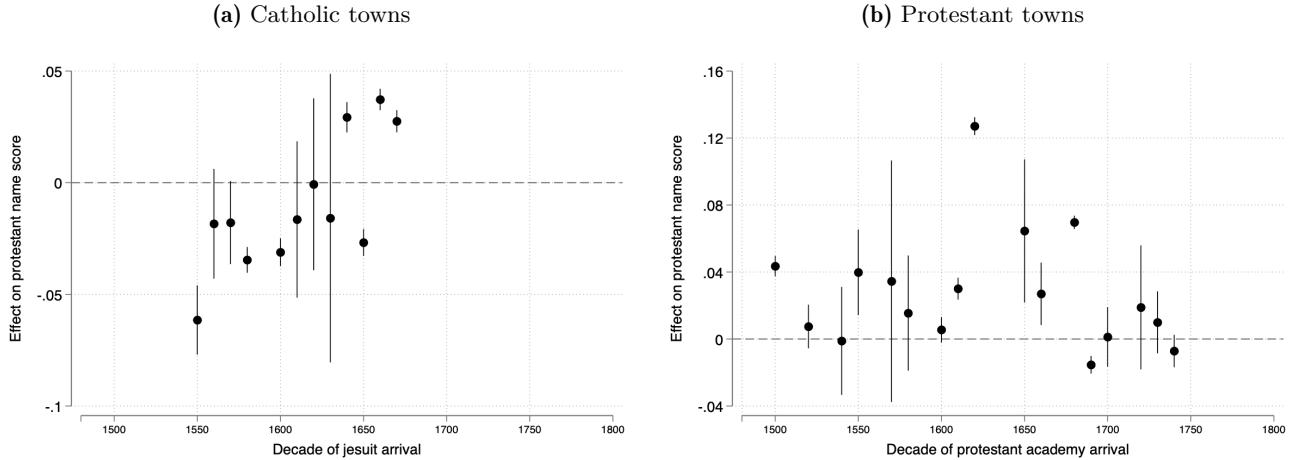
Note: This figure shows estimated coefficients and 95% confidence intervals from regressions of Protestant academy exposure on observable town characteristics, using Protestant towns. Panel A reports results using unadjusted exposure; Panel B uses exposure residualized for expected exposure. Town characteristics include distance to bishopric, town size, and indicators for market, monastery, school, university, city rights, and mining activity (all measured in 1500). Additional covariates include indicators for issuing a church ordinance, belonging to a fiscally centralized territory, and location on a religious border (all measured in 1650) show the correlation between exposure and later institutional developments.

Figure A.6: Effect of academies by calendar date.



Note: This figure shows treatment effects to confessional academies from Equation 4, aggregated by calendar date following Callaway and Sant'Anna (2021). Estimates include 95% confidence intervals. Observations are at the town–decade level; the number of towns is reported in Table 1. Panel A shows results for Jesuit colleges in the sample of Catholic towns. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2). The first Jesuit college was established in Ingolstadt in 1556. Panel B shows results for Protestant academies in the sample of Protestant towns. The sample spans 33 decades (1480–1800). The first post-Reformation Protestant academy was established in 1524 and the figure reports estimates effects aggregated from the 1530 decade onwards. Standard errors are clustered at the town level.

Figure A.7: Effect of academies by treatment cohort.



Note: This figure shows treatment effects to confessional academies from Equation 4, aggregated by treatment cohort following Callaway and Sant'Anna (2021). Estimates include 95% confidence intervals. Observations are at the town–decade level. The number of towns is reported in Table 1. Panel A shows results for Jesuit colleges in the sample of Catholic towns. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2). The first Jesuit college was established in Ingolstadt in 1556. Panel B shows results for Protestant academies in the sample of Protestant towns. The sample spans 33 decades (1480–1800). The first post-Reformation Protestant academy was established in 1524 - existing academies turned into Protestant academies founded before 1500 are dropped from this analysis. Standard errors are clustered at the town level.

Figure A.8: Map of start of visitations.



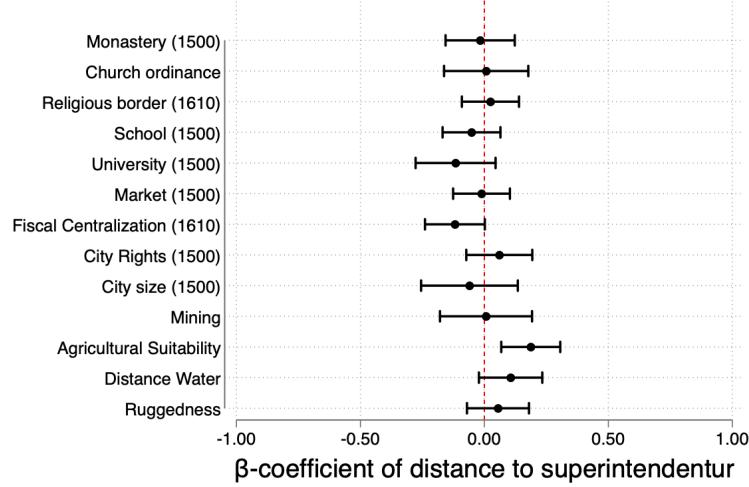
Note: This map shows the year of first visitation for towns covered in Zeeden (1982). Catholic towns are shown in orange, with darker shading indicating earlier visitations. Protestant towns are shown in blue, with darker shading indicating earlier visitations.

Figure A.9: Map of distance to Superintendentur.



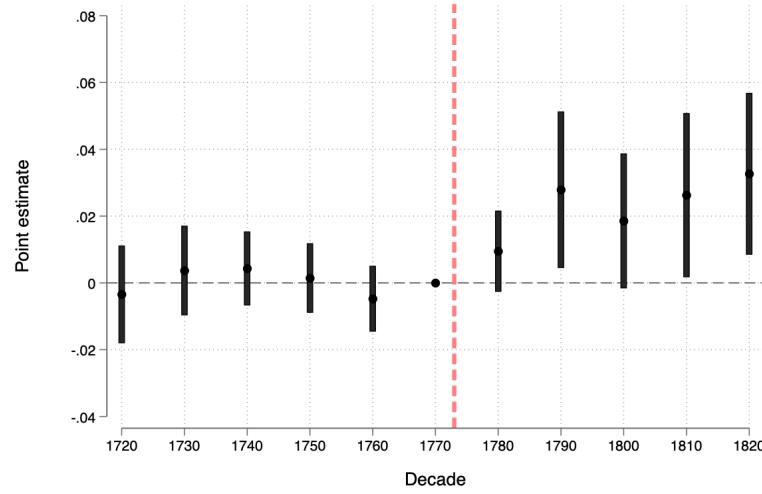
Note: This map shows the distance to the nearest *Superintendentur* for Protestant towns covered in Zeeden (1982). Seats of *Superintendenturen* are marked with black crosses. Darker shading indicates greater distance to the nearest *Superintendentur*.

Figure A.10: Balance of distance to Superintendentur.



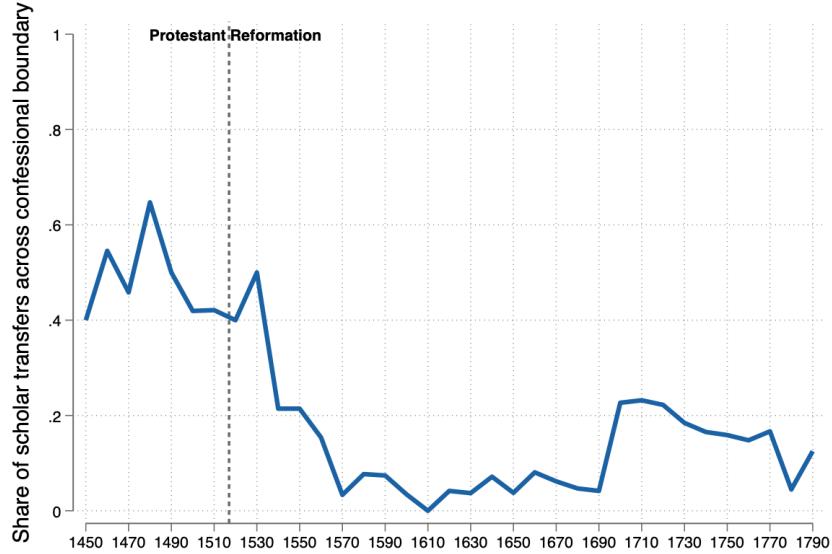
Note: This figure shows estimated coefficients and 95% confidence intervals from regressions of distance to the nearest *Superintendentur* on observable town characteristics, using Protestant towns covered in [Zeeden \(1982\)](#). Town characteristics include town size and indicators for market, monastery, school, university, city rights, and mining activity (measured in 1500). Balance is also reported for time-invariant characteristics: distance to water (river or sea), agricultural suitability, and average ruggedness of the town territory. Additional covariates include indicators for issuing a church ordinance, belonging to a fiscally centralized territory, and location on a religious border (measured in 1610) showing the correlation of the instrument with later institutional developments.

Figure A.11: Effect of ban of Jesuits (1773).



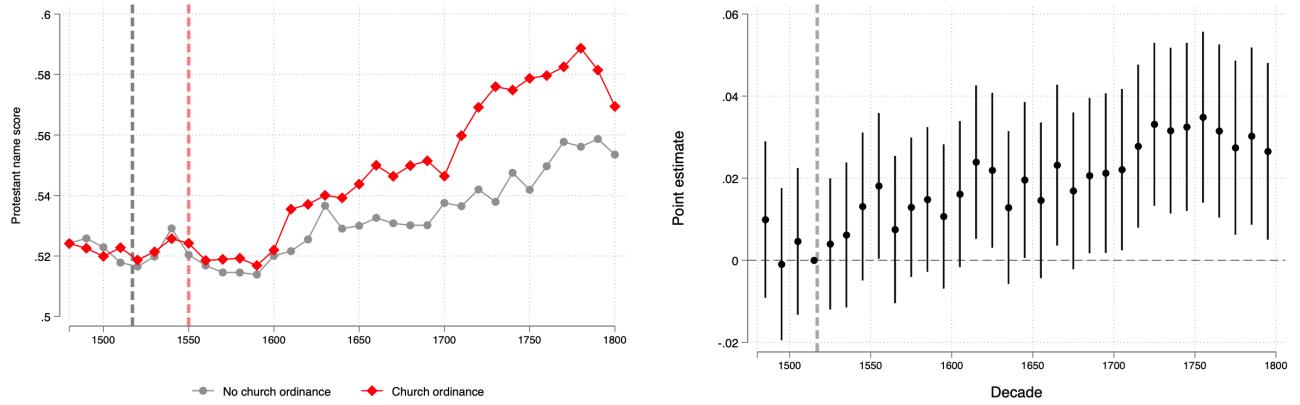
Note: This figure shows estimates from Equation 5 with 95% confidence intervals. Observations are at the town-decade level; the sample includes only Catholic towns. The dependent variable is the average Protestant name score in town c and decade t . Coefficients are plotted relative to the decade before the 1773 suppression of the Jesuit order. Standard errors are clustered at the town level.

Figure A.12: Scholar movement across confessional boundaries.



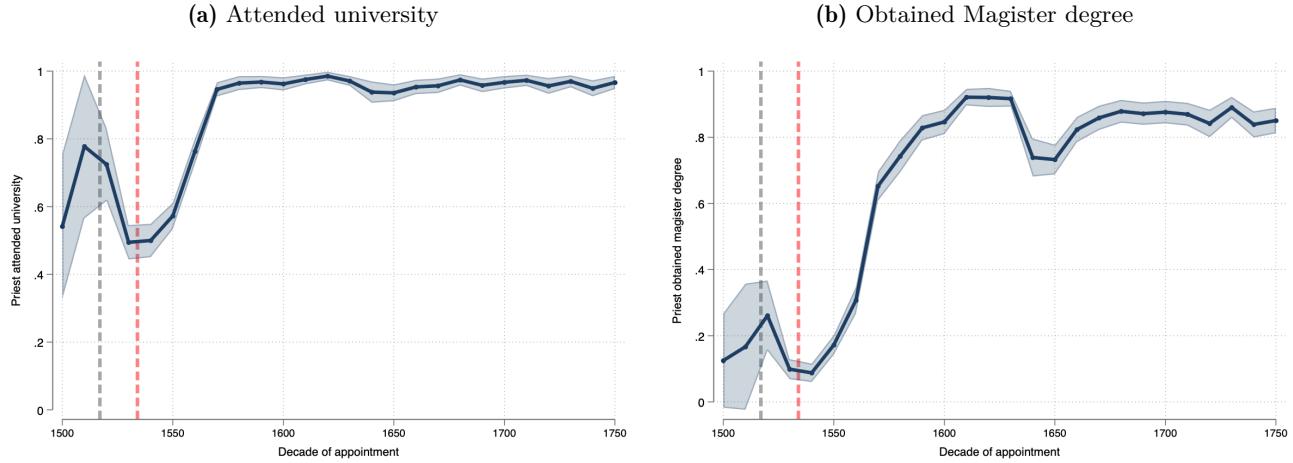
Note: This figure plots the share of scholar transfers across confessional boundaries—specifically from Catholic to (eventual) Protestant universities—by decade of transfer. Data are from De La Croix (2021). The vertical gray line marks 1517, the start of the Protestant Reformation.

Figure A.13: Church ordinances and Protestant name score.



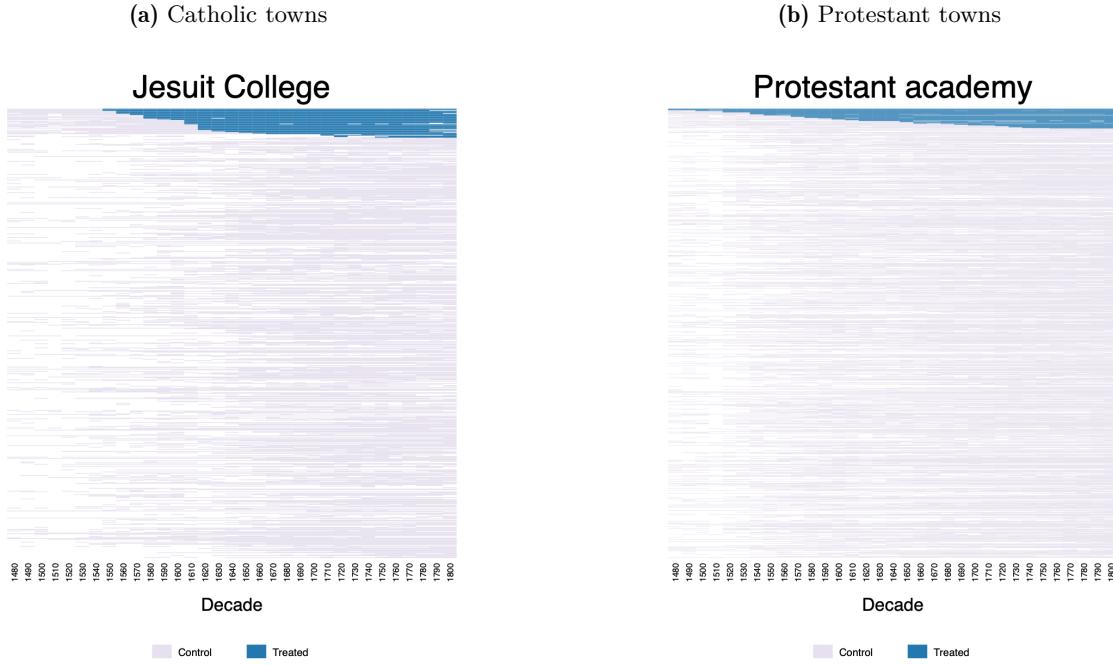
Note: Panel A plots the average Protestant name score across towns by decade (1480–1700) for the sample of Protestant towns. Towns that issued a church ordinance are shown in red; towns without an ordinance are shown in gray. The vertical dashed gray line marks 1517, the start of the Protestant Reformation. Panel B shows estimates from estimating $\text{ProtScore}_{c,t} = \sum_{k \neq 1510} \beta_k (\text{EverOrdinance}_c \times \mathbb{1}\{\text{Decade}(k)\}) + \alpha_c + \alpha_t + \epsilon_{c,t}$, with 95% confidence intervals. Treatment is defined as whether a town ever passed a church ordinance. Observations are at the town-decade level; the sample includes only Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Coefficients are plotted relative to the 1510 decade (Dittmar and Meisenzahl (2020) show that the majority of ordinances were issued between 1517 and 1540, making the use of calendar decades rather than relative timing a sensible choice). Standard errors are clustered at the town level.

Figure A.14: Priest education over time - Württembergisches Pfarrerbuch.



Note: This figure plots the share of priests in the Duchy of Württemberg who attended university (Panel A) or obtained a Magister degree (Panel B), by decade of appointment to a parish. Data are from the *Pfarrerbuch des Herzogtums Württemberg* (2025). The vertical gray line marks 1517, the start of the Reformation; the vertical red line marks 1534, when Protestantism was adopted in the Duchy of Württemberg.

Figure A.15: Treatment status and data coverage.



Note: This figure shows treatment status and data availability. Columns represent decades from 1480 to 1800; rows represent towns. Panel A displays Catholic towns, with those exposed to a Jesuit college (an absorbing state) highlighted in blue. Panel B displays Protestant towns, with those exposed to a Protestant academy (also an absorbing state) highlighted in blue. Gray rectangles denote the control group (never-treated or not-yet-treated town-decades). White rectangles indicate town-decade cells without baptism records in the data.

Table A.1: Visitations and religious identity.

| | Protestant name score | | | |
|-----------------|-----------------------|--------------------|------------------|--------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | Protestant towns | | |
| Post visitation | -0.011 (0.009) | -0.014* (0.009) | 0.010 (0.006) | 0.011** (0.005) |
| Observations | 1,239 | 1,239 | 2,724 | 2,724 |
| Number of Towns | 118 | 118 | 215 | 215 |
| Outcome mean | 0.497 | 0.497 | 0.526 | 0.526 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Town controls | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4. Observations are at the town–decade level. The sample covers 23 decades (1480–1700) and includes towns in the modern-day states of Baden-Württemberg and Hesse, for which systematic visitation records exist for 1500–1700. The dependent variable is the average Protestant name score in town c and decade t . Treatment is defined by the decade of the first visitation of town c . Columns 1–2 use Catholic towns; Columns 3–4 use Protestant towns. The control group consists of never-treated and not-yet-treated towns. Columns 2 and 4 include town-level controls measured at baseline (1500): town size, monastery, school, and university presence. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table A.2: Visitations and religious identity (instrumental variable).

| | Protestant name score | | | |
|-----------------------|-----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| Cumulated visitations | 0.0017*** (0.0006) | 0.0018** (0.0008) | 0.0015** (0.0007) | 0.0021** (0.0008) |
| Observations | 174 | 174 | 198 | 198 |
| Outcome mean | 0.532 | 0.532 | 0.528 | 0.528 |
| Region FEs | | ✓ | | ✓ |
| Sample | 1650 | 1650 | 1700 | 1700 |
| Cluster | Town | Town | Town | Town |
| First stage F-stat | 21.263 | 20.018 | 15.732 | 7.750 |

Notes: This table reports two-stage least squares estimates using distance to the nearest *Superintendentur* as an instrument for the cumulative number of church visitations received by each town up to a given decade. The sample consists of Protestant towns in the modern-day states of Baden-Württemberg and Hesse for which systematic visitation records exist. The dependent variable is the average Protestant name score in town c for the given decade. Columns 1–2 use the cross-section in 1650 instrumenting for the cumulated number of visitations by 1650; Columns 3–4 use the cross-section in 1700 instrumenting for the cumulated number of visitations by 1700. Columns 2 and 4 additionally include region fixed effects, exploiting only within-region variation in distance to a *Superintendentur*. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table A.3: Visitations and priest turnover.

| | Priest turnover per year | | | |
|-------------------------------|--------------------------|---------------------|---------------------|-------------------|
| | (1) | (2) | (3) | (4) |
| Visitation | 0.050*** (0.014) | 0.046*** (0.013) | 0.048*** (0.015) | 0.016* (0.008) |
| Observations | 2,646 | 2,100 | 2,058 | 2,646 |
| Number of Towns | 126 | 100 | 98 | 126 |
| Outcome mean | 0.191 | 0.211 | 0.214 | 0.191 |
| Town FEs | | | | ✓ |
| Decade FEs | ✓ | ✓ | | ✓ |
| Superintendentur FEs | | ✓ | | |
| Superintendentur × Decade FEs | | | ✓ | |
| Cluster | Town | Town | Town | Town |

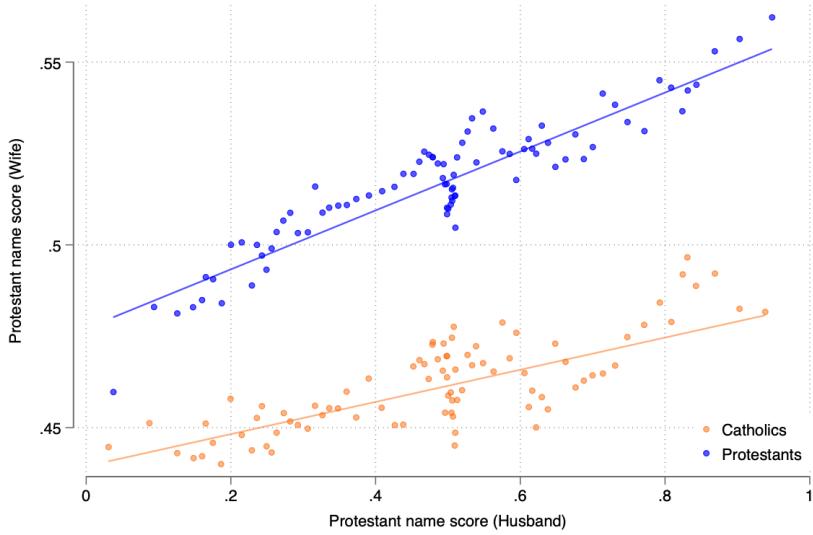
Notes: This table reports estimates from a specification adapted from Equation 3. Observations are at the town–decade level. The sample includes 126 Protestant towns covered in the *Pfarrerbuch des Herzogtums Württemberg* (2025) and Zeeden (1982), spanning 20 decades (1500–1690) for which visitation data are available. The dependent variable is the annual number of priest turnovers in town c and decade t . The treatment indicator equals one if town c was visited in decade t . Column 1 includes only decade fixed effects; Column 2 adds Superintendentur fixed effects; Column 3 includes Superintendentur-by-decade fixed effects; Column 4 includes town and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table A.4: Academy exposure and human capital spillovers.

| | Notable non-clergy (ihs) | | | | Non-religious prints (ihs) | | | |
|-----------------------------|--------------------------|-------------------|---------------------|---------------------|----------------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Catholic towns | | Protestant towns | | Catholic towns | | Protestant towns | |
| Jesuit exposure | 0.195* (0.109) | 0.191* (0.110) | | | 0.476*** (0.149) | 0.465*** (0.146) | | |
| Protestant academy exposure | | | 0.535*** (0.103) | 0.413*** (0.108) | | | 2.526*** (0.448) | 2.233*** (0.427) |
| Observations | 27,060 | 27,060 | 51,810 | 51,810 | 17,578 | 17,578 | 34,540 | 34,540 |
| Number of Towns | 820 | 820 | 1,570 | 1,570 | 799 | 799 | 1,570 | 1,570 |
| Outcome mean | 0.105 | 0.105 | 0.207 | 0.207 | 0.072 | 0.072 | 0.182 | 0.182 |
| Town FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4. Observations are at the town–decade level. Columns 1–4 use the inverse hyperbolic sine of the number of notable non-clergy individuals born in town c and decade t as the dependent variable (33 decades, 1480–1800). Columns 5–8 use the inverse hyperbolic sine of the number of non-religious prints produced in town c and decade t (23 decades, 1480–1700). Columns 1, 2, 5, and 6 use Catholic towns and define treatment by the decade of Jesuit arrival; Columns 3, 4, 7, and 8 use Protestant towns and define treatment by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2, 4, 6, and 8 additionally control for expected exposure; details on its construction are provided in Section B.3. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Figure A.16: Assortative matching.



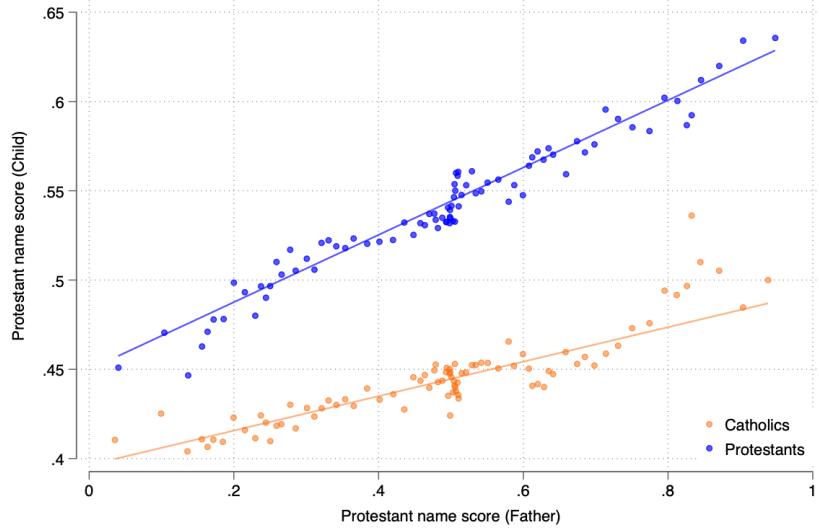
Note: The figure shows a binscatter plot split by Catholics (orange) and Protestants (blue). The Protestant name score of the wife is on the y-axis. The Protestant name score of the husband is on the x-axis.

Table A.5: Assortative matching.

| | Protestant name score (wife) | | | |
|---------------------------------|------------------------------|-----------------------|-------------------------|-------------------------|
| | (1) Catholic towns | (2) Catholic towns | (3) Protestant towns | (4) Protestant towns |
| Protestant name score (husband) | 0.013*** (0.002) | 0.007*** (0.001) | 0.021*** (0.002) | 0.015*** (0.002) |
| <i>R</i> ² | 0.054 | 0.073 | 0.069 | 0.094 |
| Observations | 886,418 | 884,494 | 883,133 | 879,156 |
| Number of Towns | 794 | 691 | 1,357 | 1,247 |
| Town FEs | ✓ | | ✓ | |
| Decade FEs | ✓ | | ✓ | |
| Town × Decade FEs | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from regressing the Protestant name score of the wife on the Protestant name score of the husband. Fixed effects used are indicated in each column. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Figure A.17: Inter-generational transmission.



Note: The figure shows a binscatter plot split by Catholics (orange) and Protestants (blue). The Protestant name score of the child is on the y-axis. The Protestant name score of the father is on the x-axis.

Table A.6: Inter-generational transmission.

| | Boys | | | | Girls | | | |
|--------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | | (2) | | (3) | | (4) | |
| | Catholic towns | | Protestant towns | | Boys | | Girls | |
| Protestant name score (mother) | 0.022*** (0.003) | 0.011*** (0.002) | 0.036*** (0.003) | 0.024*** (0.003) | 0.028*** (0.002) | 0.021*** (0.002) | 0.093*** (0.003) | 0.079*** (0.003) |
| Protestant name score (father) | 0.059*** (0.004) | 0.048*** (0.004) | 0.015*** (0.002) | 0.008*** (0.002) | 0.128*** (0.004) | 0.117*** (0.004) | 0.026*** (0.002) | 0.020*** (0.002) |
| <i>R</i> ² | 0.107 | 0.129 | 0.088 | 0.113 | 0.239 | 0.271 | 0.148 | 0.187 |
| Observations | 858,901 | 857,388 | 798,133 | 796,731 | 843,064 | 839,861 | 832,973 | 829,991 |
| Number of Towns | 741 | 667 | 731 | 657 | 1,302 | 1,217 | 1,273 | 1,196 |
| Town FEs | ✓ | | ✓ | | ✓ | | ✓ | |
| Decade FEs | ✓ | | ✓ | | ✓ | | ✓ | |
| Town × Decade FEs | | ✓ | | ✓ | | ✓ | | ✓ |
| Cluster | Town |

Notes: This table reports estimates from regressing the Protestant name score of children on the Protestant name score of their father and mother. Fixed effects used are indicated in each column. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table A.7: Career choice.

| | Church (1) | Government (2) | Military (3) | Business (4) | Church (5) | Government (6) | Military (7) | Business (8) |
|-------------------------|----------------------|----------------------|----------------------|---------------------|---------------------|----------------------|----------------------|---------------------|
| | Catholics | | | | Protestants | | | |
| Protestant name score | -0.087*** (0.017) | -0.010 (0.013) | 0.011* (0.006) | 0.033*** (0.010) | 0.020* (0.012) | 0.001 (0.007) | 0.004 (0.004) | -0.012** (0.006) |
| Religious name | 0.005 (0.007) | -0.014*** (0.005) | -0.009*** (0.002) | 0.008* (0.004) | 0.047*** (0.004) | -0.021*** (0.002) | -0.013*** (0.001) | 0.003 (0.002) |
| R^2 | 0.106 | 0.029 | 0.014 | 0.018 | 0.093 | 0.008 | 0.010 | 0.012 |
| Observations | 13,591 | 13,591 | 13,591 | 13,591 | 52,905 | 52,905 | 52,905 | 52,905 |
| Region FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Mean dependent variable | 0.171 | 0.074 | 0.017 | 0.047 | 0.181 | 0.060 | 0.017 | 0.033 |
| Cluster | Region | Region | Region | Region | Region | Region | Region | Region |

Notes: This table reports estimates from regressing an indicator of whether the individual chose a career in church (Columns 1 and 5), government (Columns 2 and 6), military (Columns 3 and 7), or business (Columns 4 and 8) on the Protestant name score of the individual covered in *Deutsche Biographie*. All specifications include region and decade fixed effects. Standard errors are clustered at the region level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Figure A.18: Example academies.

(a) Jesuit college in Ingolstadt



(b) Fürstenschule in Grimma



Note: The figure provides illustrations of academies used to proxy for local church enforcement. Panel A depicts the Jesuit college in Ingolstadt. Panel B depicts the *Fürstenschule* in Grimma, one of the Protestant academies in the sample.

B Robustness

B.1 Robustness of Main Empirical Results

In Section 5, I present evidence linking local academy exposure to the formation of religious identity. This section demonstrates that the results are robust to alternative specifications, sample restrictions, and inference procedures through five complementary exercises.

Controlling for confounds. First, I address concerns about omitted variable bias by flexibly controlling for town characteristics. Appendix Table B.1 includes interactions of baseline covariates (town size, monastery, school, and university presence in 1500) with decade fixed effects, allowing each town characteristic to have time-varying effects. The most demanding specification additionally includes territory fixed effects, absorbing all time-invariant differences across political jurisdictions. The results remain stable across all specifications, suggesting that unobserved time-varying heterogeneity at the territory level does not drive the findings.

Addressing selection into treatment. Second, I construct more comparable control groups to mitigate selection bias. Appendix Table B.2 uses probit nearest-neighbor matching (3 neighbors) on baseline observables to create matched samples. Appendix Figures B.1 and B.2 confirm that covariate balance improves substantially after matching, with standardized mean differences falling below conventional thresholds. Despite this restriction to observably similar towns, main effects remain virtually unchanged. As an additional check, Appendix Table B.3 implements the doubly robust inverse-probability weighting (DR-IPW) estimator of Sant'Anna and Zhao (2020), which combines outcome regression with inverse-probability weighting. Results remain consistent, confirming that selection on observables does not confound the estimates.

Alternative samples and measurement. Third, I test robustness to sample composition and alternative constructions of the religious identity measure. Appendix Table B.4 restricts analysis to a balanced panel of towns with at least ten baptisms in every decade, ensuring that compositional changes in the sample do not drive temporal patterns. Appendix Tables B.5 and B.6 employ alternative aggregations: computing name scores using a 20-year rolling window to smooth short-run fluctuations, and averaging scores across linguistic clusters (High, Middle, and Low German) to account for regional naming traditions. Appendix Table B.7 caps the number of baptisms per town-decade cell at 100 to prevent large urban centers from dominating the measure.²² Appendix Table B.8 restricts analysis to prime (first-listed) baptismal names only, eliminating potential noise from secondary names. Across all alternative samples and measurement approaches, estimated effects remain statistically and economically significant.

Accounting for spillovers. Fourth, I examine whether spatial spillovers into nearby untreated towns could bias estimates. If academy presence generates diffuse effects on neighboring towns, including proximate control towns would attenuate estimated treatment effects. Appendix Tables B.9 and B.10 re-estimate the baseline specification while excluding control towns within 20 km and 30 km of treated towns, respectively. Results remain robust, suggesting that spillover bias is minimal. Appendix Table B.11 further excludes all university towns—the most likely locations for both Jesuit colleges and Protes-

²²For each capped draw, I recompute the name score, repeat 100 times, and average the resulting estimates for each name across draws.

tant academies, and therefore the most selected sample. Dropping these towns does not materially change the findings, confirming that results extend beyond the most educationally developed locations.

Robustness of inference. Finally, I assess sensitivity to alternative inference procedures. Appendix Table B.12 reports results using four alternative clustering levels (town, region, territory, and Imperial Circle) as well as spatially corrected Conley standard errors at three distance cutoffs. Appendix Figure B.3 implements a leave-one-out analysis, sequentially dropping each region from the sample and re-estimating treatment effects. Estimates remain tightly centered on the baseline, demonstrating that no single region drives the results.

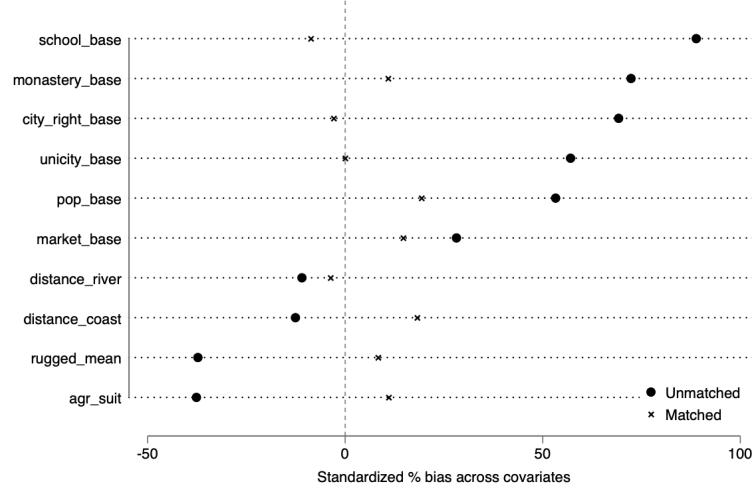
The combined evidence from these five exercises indicates that the estimated effects of academy exposure on religious identity formation are not sensitive to model specification, sample composition, measurement approach, or inference procedure.

Table B.1: Academy exposure and religious identity (TWFE, Controls, and Territory Fixed Effects).

| | Protestant name score | | | | | |
|-----------------------------|-----------------------|---------------------|---------------------|--------------------|--------------------|-------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Catholic towns | | | Protestant towns | | |
| Jesuit exposure | -0.016** (0.007) | -0.018** (0.007) | -0.016** (0.007) | | | |
| Protestant academy exposure | | | | 0.012** (0.005) | 0.012** (0.006) | 0.010* (0.005) |
| <i>R</i> ² | 0.585 | 0.598 | 0.602 | 0.547 | 0.540 | 0.566 |
| Observations | 8,283 | 8,214 | 8,260 | 20,928 | 18,906 | 18,987 |
| Number of Towns | 574 | 571 | 573 | 1,148 | 1,111 | 1,114 |
| Outcome mean | 0.481 | 0.481 | 0.481 | 0.548 | 0.548 | 0.548 |
| Town FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | | ✓ | | | ✓ | |
| Territory FEs | | | ✓ | | | ✓ |
| Cluster | Town | Town | Town | Town | Town | Town |

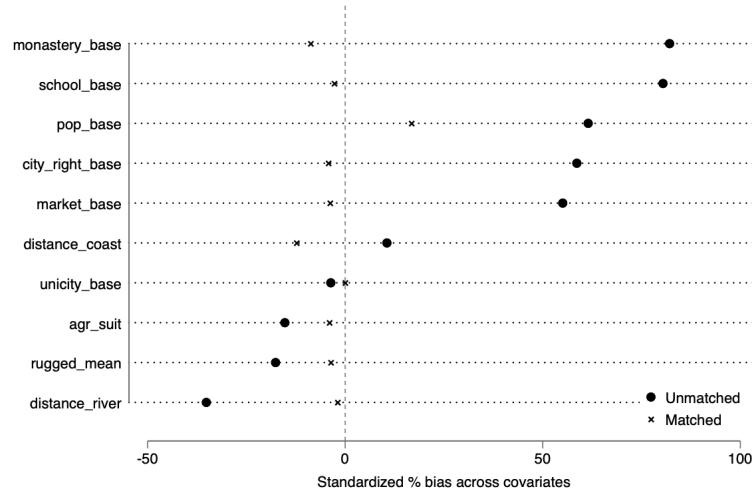
Notes: This table reports estimates from estimating Equation 3. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town *c* and decade *t*. Columns 1–3 use Catholic towns, with treatment defined as an indicator equal to one if Jesuits were active in town *c* in decade *t*. Columns 4–6 use Protestant towns, with treatment defined as an indicator equal to one if a Protestant academy was active in town *c* in decade *t*. All specifications include town and decade fixed effects. Columns 2 and 5 additionally include the full set of town characteristics interacted with decade fixed effects. Columns 3 and 6 additionally include territory fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Figure B.1: Probit nearest neighbor matching balance: Jesuits.



Note: This figure shows standardized mean differences (%) across covariates before matching (solid black dots) and after matching (black crosses) with respect to Jesuit exposure in the sample of Catholic towns. The matched sample is obtained using probit nearest-neighbor matching (3 nearest neighbors) on pre-1500 observables: indicators for the presence of a monastery, school, university, market, established city rights, and population category, as well as distance to river, distance to coast, average ruggedness, and agricultural suitability.

Figure B.2: Probit nearest neighbor matching balance: Protestant academies.



Note: This figure shows standardized mean differences (%) across covariates before matching (solid black dots) and after matching (black crosses) with respect to Protestant academy exposure in the sample of Protestant towns. The matched sample is obtained using probit nearest-neighbor matching (3 nearest neighbors) on pre-1500 observables: indicators for the presence of a monastery, school, university, market, established city rights, and population category, as well as distance to river, distance to coast, average ruggedness, and agricultural suitability.

Table B.2: Academy exposure and religious identity (nearest-neighbor matching).

| | Protestant name score | | | |
|-----------------------------|-----------------------|----------------------|--------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | | Protestant towns | |
| Jesuit exposure | -0.022** (0.009) | -0.025*** (0.009) | | |
| Protestant academy exposure | | | 0.014** (0.006) | 0.023*** (0.007) |
| <i>R</i> ² | 0.551 | | 0.517 | |
| Observations | 2,474 | 2,474 | 4,188 | 4,188 |
| Number of Towns | 147 | 147 | 187 | 187 |
| Outcome mean | 0.474 | 0.474 | 0.539 | 0.539 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Cluster | Town | Town | Town | Town |
| Estimator | TWFE | CSDID | TWFE | CSDID |

Notes: This table reports estimates at the town–decade level using towns matched via probit nearest-neighbor matching (3 neighbors) on baseline characteristics. Columns 1 and 3 report TWFE estimates (Equation 3); Columns 2 and 4 report estimates using Callaway and Sant’Anna (2021) (Equation 4). The sample spans 1480–1760 (29 decades) for Catholic towns (ending before the 1773 Jesuit suppression analyzed in Section 5.2.2) and 1480–1800 (33 decades) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns with treatment defined by Jesuit arrival decade; Columns 3–4 use Protestant towns with treatment defined by Protestant academy establishment decade. The control group consists of never-treated and not-yet-treated towns. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.3: Academy exposure and religious identity (Doubly-robust Inverse Probability Weighting).

| | Protestant name score | | | |
|-----------------------------|-----------------------|----------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | | Protestant towns | |
| Jesuit exposure | -0.016* (0.009) | -0.029*** (0.008) | | |
| Protestant academy exposure | | | 0.020*** (0.007) | 0.020*** (0.007) |
| Observations | 8,283 | 8,283 | 20,928 | 20,928 |
| Number of Towns | 574 | 574 | 1,148 | 1,148 |
| Outcome mean | 0.481 | 0.481 | 0.548 | 0.548 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Town controls | ✓ | | ✓ | |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |
| Doubly Robust IPW | ✓ | ✓ | ✓ | ✓ |

Notes: This table reports estimates at the town–decade level using doubly robust inverse probability weighting (DR-IPW) from Sant’Anna and Zhao (2020) (Equation 4). The sample spans 1480–1760 (29 decades) for Catholic towns (ending before the 1773 Jesuit suppression analyzed in Section 5.2.2) and 1480–1800 (33 decades) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns with treatment defined by Jesuit arrival decade; Columns 3–4 use Protestant towns with treatment defined by Protestant academy establishment decade. Columns 1 and 3 compute inverse probability weights using baseline town characteristics measured in 1500: town size, monastery, school, and university presence. Columns 2 and 4 compute weights based on expected exposure (Section B.3). The control group consists of never-treated and not-yet-treated towns. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.4: Academy exposure and religious identity (balanced panel).

| | Protestant name score | | | |
|-----------------------------|-----------------------|----------------------|---------------------|--------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | Protestant towns | | |
| Jesuit exposure | -0.022** (0.009) | -0.040*** (0.012) | | |
| Protestant academy exposure | | | 0.018*** (0.007) | 0.019** (0.007) |
| Observations | 1,539 | 1,539 | 5,062 | 5,062 |
| Number of Towns | 56 | 56 | 161 | 161 |
| Outcome mean | 0.474 | 0.474 | 0.539 | 0.539 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4 using a balanced sample of towns with at least 10 baptisms observed in every decade between 1480 and 1800. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns, with treatment defined by the decade of Jesuit arrival; Columns 3–4 use Protestant towns, with treatment defined by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2 and 4 additionally control for expected exposure, as described in Section B.3, to adjust for selection into treatment based on baseline town characteristics. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.5: Academy exposure and religious identity (20 year rolling name score).

| | Protestant name score (rolling) | | | |
|-----------------------------|---------------------------------|----------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | Protestant towns | | |
| Jesuit exposure | -0.019*** (0.007) | -0.027*** (0.008) | | |
| Protestant academy exposure | | | 0.017*** (0.005) | 0.018*** (0.006) |
| Observations | 8,283 | 8,283 | 20,928 | 20,928 |
| Number of Towns | 574 | 574 | 1,148 | 1,148 |
| Outcome mean | 0.481 | 0.481 | 0.547 | 0.547 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4 using the 20-year rolling version of the average Protestant name score as the dependent variable. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the rolling average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns, with treatment defined by the decade of Jesuit arrival; Columns 3–4 use Protestant towns, with treatment defined by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2 and 4 additionally control for expected exposure, as described in Section B.3, to adjust for selection into treatment based on baseline town characteristics. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.6: Academy exposure and religious identity (cluster average name score).

| | Protestant name score (cluster average) | | | |
|-----------------------------|---|----------------------|---------------------|-------------------------|
| | (1) Catholic towns | (2) | (3) | (4) Protestant towns |
| Jesuit exposure | -0.016** (0.008) | -0.026*** (0.009) | | |
| Protestant academy exposure | | | 0.018*** (0.005) | 0.019*** (0.006) |
| Observations | 8,283 | 8,283 | 20,928 | 20,928 |
| Number of Towns | 574 | 574 | 1,148 | 1,148 |
| Outcome mean | 0.491 | 0.491 | 0.547 | 0.547 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4 using the cluster-averaged version of the Protestant name score as the dependent variable. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. Columns 1–2 use Catholic towns, with treatment defined by the decade of Jesuit arrival; Columns 3–4 use Protestant towns, with treatment defined by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2 and 4 additionally control for expected exposure, as described in Section B.3, to adjust for selection into treatment based on baseline town characteristics. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.7: Academy exposure and religious identity (capped city influence).

| | Protestant name score (capped city influence) | | | |
|-----------------------------|---|----------------------|---------------------|-------------------------|
| | (1) Catholic towns | (2) | (3) | (4) Protestant towns |
| Jesuit exposure | -0.018*** (0.006) | -0.022*** (0.006) | | |
| Protestant academy exposure | | | 0.021*** (0.006) | 0.020*** (0.006) |
| Observations | 8,283 | 8,283 | 20,928 | 20,928 |
| Number of Towns | 574 | 574 | 1,148 | 1,148 |
| Outcome mean | 0.474 | 0.474 | 0.536 | 0.536 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4 using a capped sample, where the number of baptisms per town–decade cell is limited to a maximum of 100 to reduce the influence of large towns. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns, with treatment defined by the decade of Jesuit arrival; Columns 3–4 use Protestant towns, with treatment defined by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2 and 4 additionally control for expected exposure, as described in Section B.3, to adjust for selection into treatment based on baseline town characteristics. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.8: Academy exposure and religious identity (only prime name).

| | Protestant name score (prime first name) | | | |
|-----------------------------|--|----------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | | Protestant towns | |
| Jesuit exposure | -0.019** (0.008) | -0.027*** (0.009) | | |
| Protestant academy exposure | | | 0.021*** (0.006) | 0.021*** (0.007) |
| Observations | 8,283 | 8,283 | 20,928 | 20,928 |
| Number of Towns | 574 | 574 | 1,148 | 1,148 |
| Outcome mean | 0.485 | 0.485 | 0.548 | 0.548 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4 using only the prime (first) name to construct the average Protestant name score. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. Columns 1–2 use Catholic towns, with treatment defined by the decade of Jesuit arrival; Columns 3–4 use Protestant towns, with treatment defined by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2 and 4 additionally control for expected exposure, as described in Section B.3, to adjust for selection into treatment based on baseline town characteristics. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.9: Academy exposure and religious identity (spillovers: 20km).

| | Protestant name score | | | |
|-----------------------------|-----------------------|----------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | | Protestant towns | |
| Jesuit exposure | -0.020*** (0.007) | -0.026*** (0.010) | | |
| Protestant academy exposure | | | 0.018*** (0.006) | 0.018*** (0.006) |
| Observations | 6,423 | 6,423 | 17,850 | 17,850 |
| Number of Towns | 473 | 473 | 1,038 | 1,038 |
| Outcome mean | 0.485 | 0.485 | 0.549 | 0.549 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4 excluding all untreated towns located within 20 km of a treated town, in order to limit potential spillover effects. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns, with treatment defined by the decade of Jesuit arrival; Columns 3–4 use Protestant towns, with treatment defined by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns outside the 20 km spillover radius. Columns 2 and 4 additionally control for expected exposure, as described in Section B.3, to adjust for selection into treatment based on baseline town characteristics. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.10: Academy exposure and religious identity (spillovers: 30km).

| | Protestant name score | | | |
|-----------------------------|-----------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | | Protestant towns | |
| Jesuit exposure | -0.022*** (0.008) | -0.025** (0.012) | | |
| Protestant academy exposure | | | 0.019*** (0.007) | 0.019*** (0.007) |
| Observations | 4,902 | 4,902 | 14,480 | 14,480 |
| Number of Towns | 397 | 397 | 902 | 902 |
| Outcome mean | 0.484 | 0.484 | 0.548 | 0.548 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4 excluding all untreated towns located within 30 km of a treated town, in order to limit potential spillover effects. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns, with treatment defined by the decade of Jesuit arrival; Columns 3–4 use Protestant towns, with treatment defined by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns outside the 30 km spillover radius. Columns 2 and 4 additionally control for expected exposure, as described in Section B.3, to adjust for selection into treatment based on baseline town characteristics. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.11: Academy exposure and religious identity (no university towns).

| | Protestant name score | | | |
|-----------------------------|-----------------------|---------------------|--------------------|-------------------|
| | (1) | (2) | (3) | (4) |
| | Catholic towns | | Protestant towns | |
| Jesuit exposure | -0.014 (0.009) | -0.019** (0.009) | | |
| Protestant academy exposure | | | 0.012** (0.006) | 0.011* (0.006) |
| Observations | 7,911 | 7,911 | 20,240 | 20,240 |
| Number of Towns | 561 | 561 | 1,125 | 1,125 |
| Outcome mean | 0.482 | 0.482 | 0.548 | 0.548 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Expected Exposure | | ✓ | | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table reports estimates from Equation 4 excluding all towns that ever hosted a university from the sample. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns 1–2 use Catholic towns, with treatment defined by the decade of Jesuit arrival; Columns 3–4 use Protestant towns, with treatment defined by the decade of Protestant academy establishment. The control group consists of never-treated and not-yet-treated towns. Columns 2 and 4 additionally control for expected exposure, as described in Section B.3, to adjust for selection into treatment based on baseline town characteristics. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.12: Panel A. Jesuits and religious identity (standard errors).

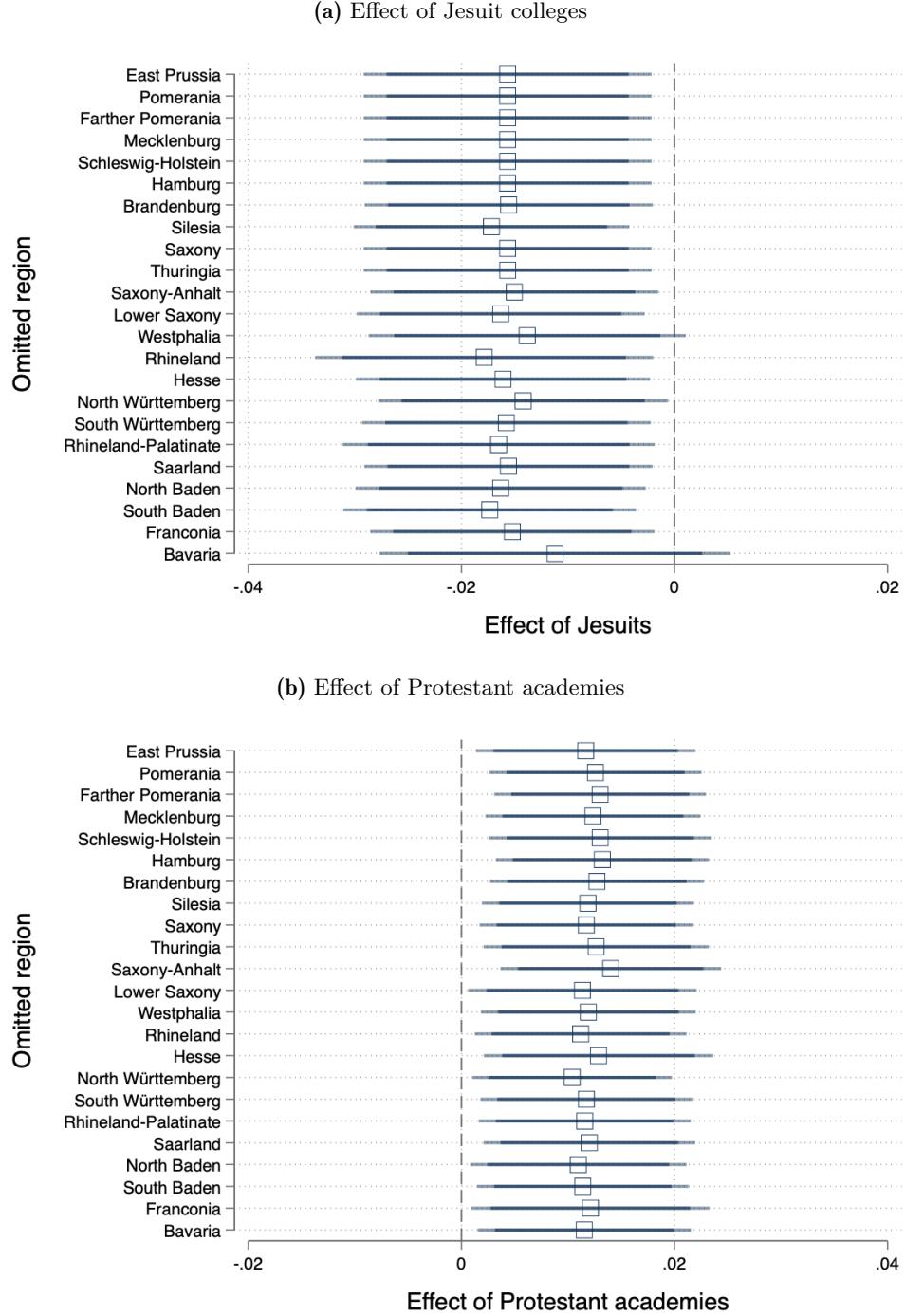
| | Protestant name score | | | | | | |
|-----------------|-----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) Catholic towns | (5) | (6) | (7) |
| Jesuit exposure | -0.016** (0.007) | -0.016*** (0.005) | -0.016*** (0.005) | -0.016** (0.005) | -0.016*** (0.003) | -0.016*** (0.003) | -0.016*** (0.003) |
| Observations | 8,283 | 8,283 | 8,283 | 8,283 | 8,283 | 8,283 | 8,283 |
| Number of Towns | 574 | 574 | 574 | 574 | 574 | 574 | 574 |
| Outcome mean | 0.481 | 0.481 | 0.481 | 0.481 | 0.481 | 0.481 | 0.481 |
| Town FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Cluster | Town | Region | Territory | Imperial Circle | 50km | 100km | 200km |

Table B.12: Panel B. Protestant academies and religious identity (standard errors).

| | Protestant name score | | | | | | |
|-----------------------------|-----------------------|--------------------|-------------------|-------------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) Protestant towns | (5) | (6) | (7) |
| Protestant academy exposure | 0.010** (0.005) | 0.010** (0.004) | 0.009* (0.005) | 0.009 (0.006) | 0.010*** (0.002) | 0.010*** (0.002) | 0.010*** (0.002) |
| Observations | 20,928 | 20,928 | 18,999 | 18,999 | 20,928 | 20,928 | 20,928 |
| Number of Towns | 1,148 | 1,148 | 1,114 | 1,114 | 1,148 | 1,148 | 1,148 |
| Outcome mean | 0.548 | 0.548 | 0.548 | 0.548 | 0.548 | 0.548 | 0.548 |
| Town FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Cluster | Town | Region | Territory | Imperial Circle | 50km | 100km | 200km |

Notes: This table reports results from estimating Equation 3. Observations are at the town–decade level. The sample spans 29 decades (1480–1760) for Catholic towns (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2) and 33 decades (1480–1800) for Protestant towns. The dependent variable is the average Protestant name score in town c and decade t . Columns differ by the level of clustering used to compute standard errors: town (Column 1), region (Column 2), territory (Column 3), and Imperial Circle (Column 4). Columns 5–7 report Conley (spatially corrected) standard errors using the distance cutoffs indicated in the table. Panel A uses the sample of Catholic towns with Jesuit exposure as treatment; Panel B uses the sample of Protestant towns with Protestant academy exposure as treatment. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Figure B.3: Leave-out plots.



Note: This figure shows results from estimating Equation 3 while sequentially leaving out one region (based on the *Deutsches Städtebuch* classification) at a time. Observations are at the town-decade level; the number of towns is reported in Table 1. The dependent variable is the average Protestant name score in town c and decade t . Panel A reports results for the sample of Catholic towns with Jesuit college exposure as treatment. The sample spans 29 decades (1480–1760) (ending in the decade before suppression of the Jesuit order in 1773 analyzed in Section 5.2.2). Panel B reports results for Protestant towns with Protestant academy exposure as treatment (33 decades, 1480–1800). All models include town and decade fixed effects. Standard errors are clustered at the town level, and 95 percent confidence intervals are shown.

B.2 Alternative Explanation: Adverse Shocks

The robustness exercises above confirm that academy exposure systematically increases religious identity differentiation. However, a conceptually distinct question remains: could bottom-up responses to adverse events, rather than top-down church enforcement, drive the observed polarization? If crises heightened existential anxieties or group boundaries, they might trigger stronger adoption of confessional markers independent of institutional efforts.

Hypothesis. Under this alternative mechanism, adverse shocks should coincide with sharper confessional differentiation in naming. Crises that threaten community survival, such as violent conflict, disease outbreaks, environmental disasters, may intensify saliency of religious identity and in-group/out-group distinction (Sambanis and Shayo 2013; Bentzen 2019; Barber, Jetter, and Krieger 2023; Berkes et al. 2023).

Empirical strategy. I test this hypothesis by replacing academy exposure with indicators for five shock types, using the baseline difference-in-differences specification from Equation 3. The shocks are: (i) violent conflict (battles, sieges, military occupations), (ii) pandemic outbreaks (plague, typhus, dysentery), (iii) severe winters (mean temperature more than one standard deviation below the long-run mean), (iv) solar eclipses (linked to heightened ingroup-outgroup salience by Barber, Jetter, and Krieger (2023)), and (v) major urban fires. Each shock indicator equals one in the decade of occurrence. If adverse events heighten confessional salience, I should observe significant coefficients on these indicators.

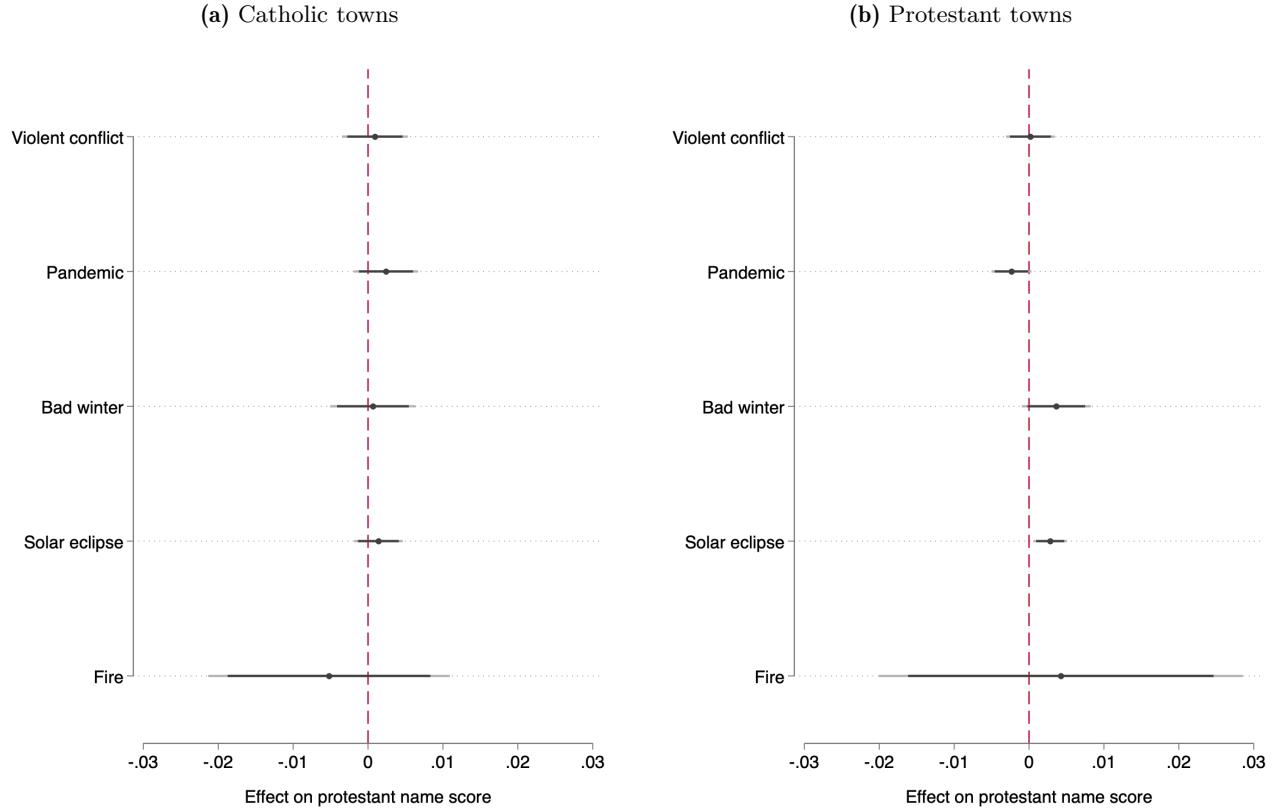
Results: Confessional differentiation. Appendix Figure B.4 presents estimates separately for Catholic towns (Panel A) and Protestant towns (Panel B), with the Protestant name score as the outcome. None of the five shock types associates with meaningful changes in confessional differentiation. Point estimates cluster near zero for all shocks in both panels. Violent conflict—the shock most likely to intensify group boundaries—shows no systematic effect. Solar eclipses, widely interpreted as divine warnings in this period, similarly fail to predict naming polarization.

Results: Religious intensity. As an alternative test, Appendix Figure B.5 examines whether shocks increase the overall prevalence of religious names (biblical names, saint names, names containing "Gott"), which might rise with heightened religiosity (see Bentzen (2019)). Some shocks modestly increase religious name usage among Catholics—consistent with pre-existing Catholic emphasis on saints—but these increases do not translate into greater Catholic-Protestant differentiation in naming patterns. Among Protestants, coefficients remain close to zero.

Interpretation. The absence of meaningful effects for adverse shocks contrast sharply with the robust effects of academy exposure documented in Section 5. This pattern is inconsistent with a crisis-driven, bottom-up theory of confessional identity formation. Instead, the results suggest that the documented rise in naming differentiation reflects deliberate, top-down enforcement investments by churches rather than spontaneous responses to existential threats. Churches actively constructed and maintained confessional boundaries through sustained institutional efforts—educational infrastructure, clergy training, visitation systems—not merely reactive intensification during crises.

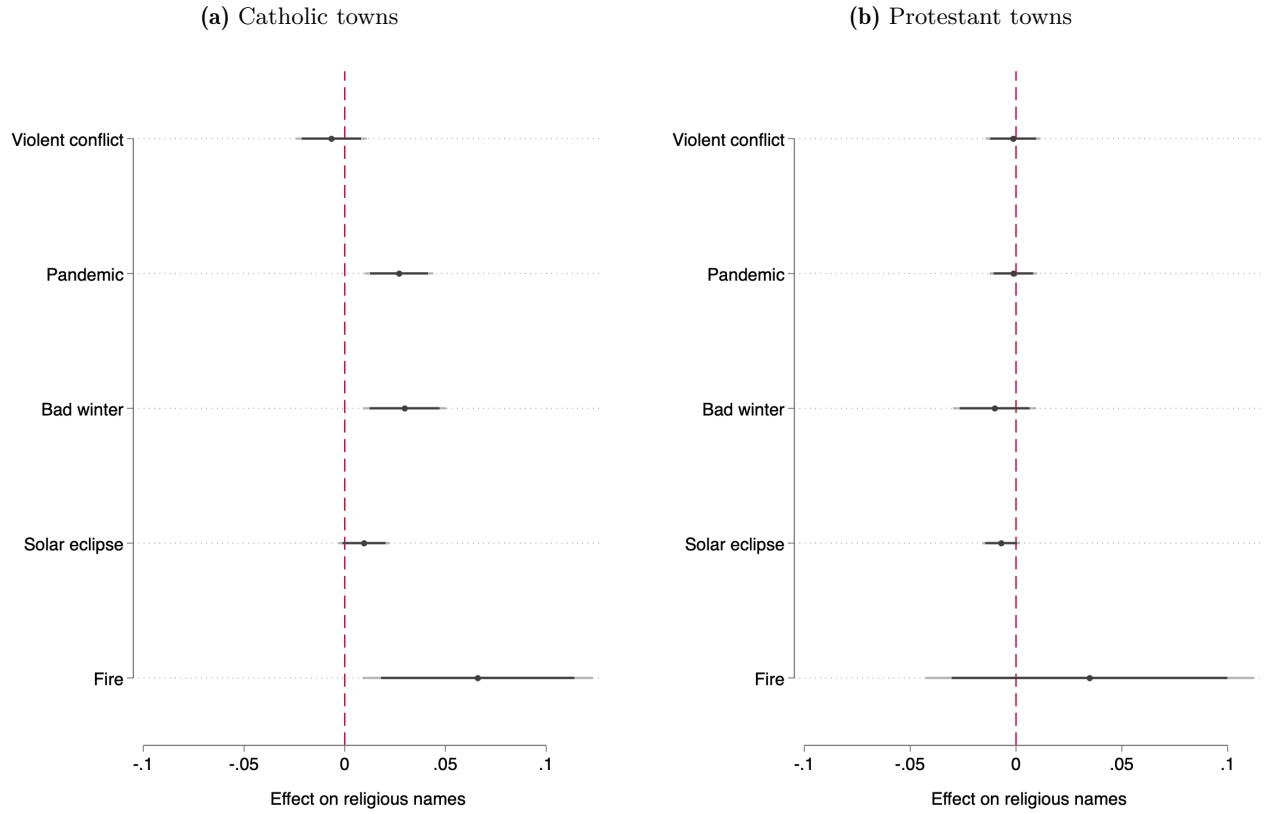
This exercise complements the main robustness checks by ruling out an alternative causal mechanism. Together, the evidence points to church capacity, not environmental shocks, as the primary driver of confessional identity formation during the Reformation era.

Figure B.4: Adverse shocks and confessional differentiation.



Note: This figure shows estimates from estimating Equation 3 with 95% confidence intervals using an indicator of exposure to adverse shocks as treatment. Observations are at the town–decade level; the number of towns is reported in Table 1. The sample spans 33 decades (1480–1800). The dependent variable is the average Protestant name score in town c and decade t . Coefficients are reported for exposure to violent conflict, pandemic, cold winter (temperature > 1 SD below the long-run mean), solar eclipse, and fire outbreak. Panel A uses Catholic towns; Panel B uses Protestant towns. Standard errors are clustered at the town level.

Figure B.5: Adverse shocks and religious names.



Note: This figure shows estimates from estimating Equation 3 with 95% confidence intervals, using the share of baptisms with religious names as the dependent variable and an indicator of exposure to adverse shocks as treatment. Observations are at the town–decade level; the number of towns is reported in Table 1. The sample spans 33 decades (1480–1800). Coefficients are reported for exposure to violent conflict, pandemic, cold winter (temperature > 1 SD below the long-run mean), solar eclipse, and fire outbreak. Panel A uses Catholic towns; Panel B uses Protestant towns. Standard errors are clustered at the town level.

B.3 Expected Exposure

Motivation and Identification Challenge

A key concern is that college and academy placement was not random. Larger towns with universities or monasteries were more attractive sites for investments. Failing to account for these factors could bias estimates and threaten causal interpretation.

Consider a simplified, time-invariant version of the main regression:

$$(24) \quad y_i = \beta x_i + \varepsilon_i,$$

where $i = 1, \dots, N$ indexes towns, $x_i = \text{Jesuit}_i$ (or Academy_i) is an indicator for exposure, and y_i is the outcome of interest (e.g., the Protestant name score). The parameter of interest β measures the effect of exposure on y_i . The concern is that x_i is endogenous: $\mathbb{E}[\varepsilon_i | x_i] \neq 0$ because towns selected for colleges systematically differ from untreated towns in ways correlated with y_i .

To address this, I construct an *expected exposure* measure following Borusyak and Hull (2023). The intuition is to separate college placement into two components: (i) a predictable component based on observable town characteristics that influenced historical site selection, and (ii) quasi-random residual variation arising from idiosyncratic factors (e.g., local political circumstances, availability of suitable buildings, benefactor preferences). By controlling for the predictable component, I isolate variation in exposure that is plausibly exogenous conditional on observables.

Formal Framework

Following borusyak·non-random·2023, I model the assignment process through a shock-exposure framework. Let $g = (\text{Realized}_k)_{k=1}^K$ denote one possible realization of which towns receive colleges, where Realized_k indicates whether potential site k was selected. The distribution $G(g | w)$ governs how baseline characteristics w (university presence, population size, educational infrastructure) determine the probability of different realizations through eligibility criteria, priority-based selection, and timing rules.

For each town i and realization g , exposure is determined by:

$$(25) \quad x_{it} = \tau(g; w_i, t),$$

where $\tau(\cdot)$ is a deterministic function that: (i) checks whether town i qualifies for treatment under realization g given its characteristics w_i , (ii) assigns the treatment start year if applicable, and (iii) constructs the time-varying exposure indicator for period t .

Expected exposure for town i at time t is then:

$$(26) \quad \hat{x}_{it} = \mathbb{E}[x_{it} | w_i] = \mathbb{E}_{g \sim G(\cdot | w)}[\tau(g; w_i, t)],$$

where the expectation is taken over $S = 100$ simulation draws from $G(g | w)$. The resulting \hat{x}_{it} measures the probability that town i would have been exposed by time t given w_i .

In the main specification, \widehat{x}_{it} enters directly as a control:

$$(27) \quad y_{it} = \beta x_{it} + \gamma \widehat{x}_{it} + \alpha_i + \alpha_t + \varepsilon_{it},$$

where γ absorbs the predictable component of treatment status. Identification of β comes from quasi-random deviations: towns that received colleges earlier or later than predicted by their baseline characteristics, or towns observably similar to treated towns that were never treated.

Identifying Assumptions. This approach requires three key assumptions (Borusyak and Hull 2023):

- **Shock Exogeneity:** Conditional on w_i , the residual randomness in the selection of foundation sites is as-good-as-random. Deviations from expected exposure arise from factors uncorrelated with potential outcomes.
- **Known Assignment Process:** The number of colleges (N_g) and the priority rule are correctly specified based on historical sources. Misspecification would leave predictable variation in the residual.
- **Relevance for Selection:** The simulated assignment process captures the main sources of predictable selection into treatment. Observables w_i span the characteristics that actually determined site selection.

Construction of Expected Exposure: Simulation Procedure

For each institution type $g \in \{\text{Jesuit, Academy}\}$, I generate expected exposure \widehat{x}_{it}^g through repeated simulation of the assignment process. Define x_{its}^g as an indicator that town c hosts an institution of type g in year t in simulation s . Expected exposure is then:

$$(28) \quad \widehat{x}_{it}^g = \frac{1}{S} \sum_{s=1}^S x_{its}^g,$$

where $S = 100$ is the number of simulations. Each simulation draw proceeds in four steps:

1. **Eligible Set:** Identify towns eligible to host an institution at baseline (1516). For Jesuit colleges, this includes Catholic or mixed-confession towns. For Protestant academies, this includes towns that eventually became Protestant.
2. **Priority-Based Selection:** Randomly select N_g towns using a priority rule that mimics historical site selection:
 - Draw randomly within priority tiers (universities first, then large towns, then towns with schools/monasteries)
 - Randomness within tiers ensures that observably similar towns have positive probability of (non-)selection
 - Aggregate across all tiers to reach the historical total N_g

3. **Timing Assignment:** Randomly order the N_g selected towns and assign historically observed foundation years to generate simulated start dates. This preserves the temporal distribution of foundations while randomizing which specific towns receive each date.
4. **Exposure Construction:** For each town-year pair, set $x_{its}^g = 1$ if $t \geq \text{start}_{is}$ (treating exposure as an absorbing state), and $x_{its}^g = 0$ otherwise.

Repeating this procedure $S = 100$ times and averaging yields the expected exposure measure \hat{x}_{it}^g for each town-year. Towns with characteristics that strongly predict selection (e.g., university presence) receive high expected exposure; towns with few predictive characteristics receive low expected exposure.

Implementation: Jesuit Colleges

The Jesuit simulation uses parameters calibrated to match the historical record:

- **Eligible Towns:** 820 Catholic or mixed-confession towns at baseline (1516)
- **Number of Sites:** $N_{\text{Jesuit}} = 58$, matching the historical number of Jesuit colleges established in the sample region
- **Priority Rule:**
 - Tier 1: Randomly select 3 towns with universities (reflecting Jesuit strategy of establishing colleges in university towns)
 - Tier 2: Randomly select 5 towns with $>5,000$ inhabitants (large urban centers)
 - Tier 3: Randomly select 15 towns with schools or monasteries (existing educational infrastructure)
 - Tier 4: Randomly select remaining 35 sites from the remaining eligible towns not yet selected.
- **Timing:** Assign historical foundation years (1556–1753) in randomized order to selected towns

Implementation: Protestant Academies

The Protestant academy simulation follows an analogous structure:

- **Eligible Towns:** 1,570 (eventually) Protestant towns
- **Number of Sites:** $N_{\text{Academy}} = 51$, matching the historical number
- **Priority Rule:**
 - Tier 1: Randomly select 5 towns with universities
 - Tier 2: Randomly select 10 large towns ($>5,000$ inhabitants)
 - Tier 3: Randomly select 25 towns with schools or monasteries
 - Tier 4: Randomly select remaining 11 sites from the remaining eligible towns not yet selected.

- **Timing:** Assign historical foundation years (1386–1760) in randomized order

The priority tier sizes reflect the historical importance of each characteristic in actual site selection, estimated from descriptive regressions of realized exposure on baseline observables.

Specification Tests and Validation

I conduct two additional tests to validate the expected exposure approach:

(1) Covariate balance. Appendix Figures A.4 and A.5 regress baseline covariates on (i) raw exposure and (ii) residual exposure. Panel A of each figure shows that raw exposure strongly predicts baseline characteristics—confirmation of non-random selection. Panel B shows that residual exposure is approximately orthogonal to observables: after conditioning on \hat{x}_{it} , treatment and control towns are balanced on all measured characteristics. Standardized differences fall below 0.1 in absolute value for nearly all covariates. This supports the assumption that remaining variation is plausibly exogenous.

(2) Geographic distribution. Figure A.3, Panel A, maps residual Jesuit exposure; Figure A.3, Panel B, maps residual Protestant academy exposure. Positive residuals (darker shading) indicate towns that received colleges earlier or more intensively than predicted; negative residuals indicate towns that were never treated despite favorable characteristics. The maps show that residual variation spans the full geographic area rather than clustering in specific regions, supporting the plausibility of quasi-random assignment conditional on observables.

Together, these tests support the validity of the expected exposure approach. By conditioning on \hat{x}_{it} , the main analysis isolates plausibly exogenous variation in academy exposure, strengthening causal interpretation of the estimated effects.

B.4 Robustness of name-level learning analysis

Section 6 presents evidence that individuals learn name-confession associations by observing usage patterns among geographically proximate co-religionists. This subsection assesses robustness of the name-level learning results to alternative specifications and network definitions.

Appendix Table B.13 replicates the analysis using the change in choice probability, i.e., the share of births receiving name n , as the dependent variable, rather than the Protestant score of name n . Results remain consistent, confirming that convergence in the name score is driven by change in usage of the name in town c itself.

Appendix Table B.14 tests sensitivity to the geographic scope of the learning network by varying the distance threshold for neighborhood definition from 25km to 75km. Convergence coefficients remain stable across specifications, suggesting that the exact cutoff is not driving the observed pattern.

Appendix Table B.15 decomposes the network effect by distance bands, constructing separate gap measures for concentric rings (0-50km, 50-100km, 100-150km, 150-200km). The coefficient on the 0-50km gap dominates, with effects attenuating sharply for more distant rings relative to the inner ring. This spatial decay pattern confirms that name-level learning primarily operates through local observation rather than broader regional or global trends.

Table B.13: Name-level updating: change in choice probabilities.

| | Δ Choice Probability | | | |
|---|-----------------------------|-----------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) |
| Gap (t-1) | 0.0519*** (0.0017) | 0.0351*** (0.0015) | 0.0524*** (0.0023) | 0.0371*** (0.0015) |
| Gap (t-1) \times High name usage | | 0.0373*** (0.0021) | | |
| Gap (t-1) \times High network density | | | -0.0012 (0.0030) | |
| Gap (t-1) \times High signal clarity | | | | 0.0324*** (0.0025) |
| Observations | 122,079 | 122,079 | 122,079 | 122,079 |
| Number of towns | 767 | 767 | 767 | 767 |
| Town FEs | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ |
| Name FEs | ✓ | ✓ | ✓ | ✓ |
| Cluster | Town | Town | Town | Town |

Notes: This table replicates the name-level learning analysis using an alternative dependent variable. The dependent variable is the change in the probability that name n is chosen by confession g in town c from decade $t-1$ to t , measured as the change in the share of births to confession g receiving name n . Gap($t-1$) measures the difference between the weighted average choice probability for name n among nearby co-religionists (within 50km, uniform weights) and the town's own choice probability for that name. High name usage, high network density, and high signal clarity are indicators for being above the median of local usage frequency, number of same-confession neighbors within 50km, and local clarity ($\sum_n \pi_{n,g,c,t} \cdot |\text{ProtScore}_n - 0.5|$), respectively. All specifications include name fixed effects, town fixed effects, and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.14: Name-level updating: variation of neighborhood radius.

| | Δ Choice Probability | | | Δ Name Score | | |
|-----------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Gap (t-1) | 0.0652*** (0.0030) | 0.0519*** (0.0017) | 0.0458*** (0.0014) | 0.3031*** (0.0094) | 0.3082*** (0.0058) |
| Observations | 41,526 | 122,079 | 169,356 | 41,526 | 122,079 | 169,356 |
| Number of towns | 468 | 767 | 870 | 468 | 767 | 870 |
| Town FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Name FEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Cluster | Town | Town | Town | Town | Town | Town |
| Radius | 25km | 50km | 75km | 25km | 50km | 75km |

Notes: This table examines name-level learning using different distance thresholds for defining spatial networks. The dependent variable is the change in choice probability (columns 1-3) or Protestant score (columns 4-6) for name n among confession g in town c from decade $t - 1$ to t . Gap($t - 1$) is constructed using uniform weights within three alternative radii: 25km (columns 1 and 4), 50km (columns 2 and 5), and 75km (columns 3 and 6). All specifications include name fixed effects, town fixed effects, and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.15: Name-level updating: ring specifications.

| | Δ Choice Probability | | Δ Name Score |
|------------------------|-----------------------|-----------------------|--------------|
| | (1) | (2) | |
| Gap to 0-50km (t-1) | 0.0447*** (0.0015) | 0.1335*** (0.0067) | |
| Gap to 50-100km (t-1) | 0.0025*** (0.0005) | 0.0714*** (0.0043) | |
| Gap to 100-150km (t-1) | 0.0030*** (0.0007) | 0.0732*** (0.0054) | |
| Gap to 150-200km (t-1) | 0.0045*** (0.0007) | 0.0782*** (0.0052) | |
| Observations | 111,510 | 111,510 | |
| Number of towns | 745 | 745 | |
| Town FEs | ✓ | ✓ | |
| Decade FEs | ✓ | ✓ | |
| Name FEs | ✓ | ✓ | |
| Cluster | Town | Town | |

Notes: This table examines whether name-level convergence operates through proximate versus distant locations by constructing separate gaps for concentric distance rings. The dependent variable is the change in choice probability (column 1) or Protestant score (column 2) for name n among confession g in town c from decade $t - 1$ to t . Gap to 0-50km measures the difference between the average among neighbors within 50km and own usage. Gap to 50-100km, Gap to 100-150km, and Gap to 150-200km measure the difference between the average among neighbors in each respective distance ring and own usage. All specifications include name fixed effects, town fixed effects, and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

B.5 Robustness of group-level conformity analysis

Section 6 demonstrates that aggregate religious identity converges toward the local mean through preference-based conformity. This subsection verifies that the group-level conformity results are robust to alternative network specifications.

Appendix Table B.16 varies the distance threshold used to define spatial networks from 25km to 75km. Conformity coefficients remain positive and statistically significant across all specifications, with magnitudes relatively stable. This insensitivity to distance cutoffs suggests that conformity pressures operate consistently within local geographic clusters.

Appendix Table B.17 tests whether conformity operates through proximate versus distant neighbors by including separate gaps for concentric distance rings. The 0-50km gap drives most of the effect, with coefficients on more distant rings are lower. This spatial decay mirrors the learning results, indicating that social influence in identity formation operates primarily through geographically proximate communities rather than long-distance diffusion.

Together, these robustness checks confirm that both learning and conformity mechanisms exhibit strong spatial localization, consistent with the theoretical framework's emphasis on network-mediated social influence.

Table B.16: Group-level updating: variation of neighborhood radius.

| | Δ Avg. name Score | | |
|-----------------|--------------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) |
| Gap (t-1) | 0.4903*** (0.0237) | 0.5965*** (0.0182) | 0.6124*** (0.0182) |
| Observations | 4,380 | 9,286 | 10,943 |
| Number of towns | 429 | 723 | 822 |
| Town FEs | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ |
| Cluster | Town | Town | Town |
| Radius | 25km | 50km | 75km |

Notes: This table examines group-level conformity using different distance thresholds for defining spatial networks. The dependent variable is the change in average Protestant score for confession g in town c from decade $t - 1$ to t . Gap($t - 1$) is constructed using three alternative radii: 25km (column 1), 50km (column 2), and 75km (column 3). All specifications include town and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table B.17: Group-level updating: ring specifications.

| | Δ | Name | Score |
|------------------------|-----------|------|-------|
| | | (1) | |
| Gap to 0-50km (t-1) | 0.2080*** | | |
| | (0.0297) | | |
| Gap to 50-100km (t-1) | 0.0843*** | | |
| | (0.0252) | | |
| Gap to 100-150km (t-1) | 0.1330*** | | |
| | (0.0417) | | |
| Gap to 150-200km (t-1) | 0.0772** | | |
| | (0.0346) | | |
| Observations | 9,023 | | |
| Number of towns | 699 | | |
| Town FEs | ✓ | | |
| Decade FEs | ✓ | | |
| Cluster | Town | | |

Notes: This table examines whether group-level convergence operates through proximate versus distant locations by constructing separate gaps for concentric distance rings. The dependent variable is the change in average Protestant score for confession g in town c from decade $t - 1$ to t . Gap to 0-50km measures the difference between the aggregate identity among neighbors within 50km and own aggregate identity. Gap to 50-100km, Gap to 100-150km, and Gap to 150-200km measure the difference between the average among neighbors in each respective distance ring and own aggregate identity. All specifications include town and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

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C Data and Measurement

This section documents the construction, processing, and validation of the name dataset used in the analysis. The dataset combines three sources: parish baptism registers, university matriculation lists, and biographical databases. I first describe data sources and digitization procedures (Section C.1), then detail data processing, cleaning, and sample restrictions (Section C.2). I next assess sample coverage and representativeness (Section C.3), followed by the construction of the Protestant name score and aggregate partisanship measures (Section C.4). Finally, I address concerns about finite-sample bias (Section C.5), validate the measure against historical evidence and alternative constructions (Section C.6), and present illustrative examples (Section C.7).

C.1 Data Sources and Digitization

Baptism Records

The baptismal data originate from sixteenth- and seventeenth-century parish registers, preserved as hand-written archival documents in municipal and church archives across Germany. In these registers, local priests recorded the date of birth or baptism (which typically coincided closely), along with the child's full name and the names of both parents and often godparents. Prior to the introduction of civil registration in the late 19th century, these parish registers were the most complete sources of nominal information for individuals born in a given location. Systematic baptism registration began gradually after the Reformation, with Protestant territories typically adopting record-keeping earlier than Catholic regions following Luther's emphasis on parish administration. Catholic territories expanded systematic registration after the Council of Trent (1563) formalized record-keeping requirements.

To transform these manuscripts into a structured dataset, I implement a three-step digitization pipeline:

Step 1: Layout detection. I use *Transkribus* (<https://www.transkribus.org>), a platform for automated handwritten text recognition, to detect page layout and segment tables. The algorithm identifies text lines, columns, and table structures, isolating individual baptismal entries for subsequent processing (Appendix Figure C.1, Panel B).

Step 2: Optical character recognition (OCR). I apply state-of-the-art handwriting recognition models in *Transkribus* to perform OCR on the segmented lines. These models, trained on historical German scripts, extract text from each entry. For registers with tabular structure, the algorithm parses entries into fields (date, child's name, parents' names, godparents). Appendix Figure C.1, Panel C shows sample output, with the child's first name appearing in the second column.

Step 3: Name extraction. I extract the child's first name from each baptism record. Each extracted raw record includes the parish name, the child's first name, and the event date.

Figure C.1: Digitization of baptism records.

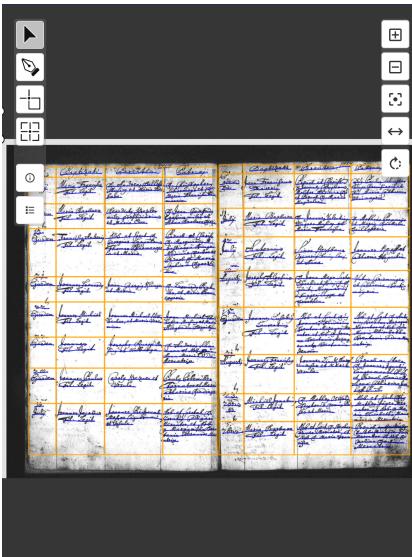
(a) Raw archival page

| | | | |
|------------|------------------|------------------|--|
| 1. August | Ciriacus | Gabrieling | |
| 2. August | Maria Francisca | of Georg Philipp | |
| 3. August | of Maria Barbara | of Maria Barbara | |
| 4. August | of Maria Barbara | of Maria Barbara | |
| 5. August | of Maria Barbara | of Maria Barbara | |
| 6. August | of Maria Barbara | of Maria Barbara | |
| 7. August | of Maria Barbara | of Maria Barbara | |
| 8. August | of Maria Barbara | of Maria Barbara | |
| 9. August | of Maria Barbara | of Maria Barbara | |
| 10. August | of Maria Barbara | of Maria Barbara | |
| 11. August | of Maria Barbara | of Maria Barbara | |
| 12. August | of Maria Barbara | of Maria Barbara | |
| 13. August | of Maria Barbara | of Maria Barbara | |
| 14. August | of Maria Barbara | of Maria Barbara | |
| 15. August | of Maria Barbara | of Maria Barbara | |
| 16. August | of Maria Barbara | of Maria Barbara | |
| 17. August | of Maria Barbara | of Maria Barbara | |
| 18. August | of Maria Barbara | of Maria Barbara | |
| 19. August | of Maria Barbara | of Maria Barbara | |
| 20. August | of Maria Barbara | of Maria Barbara | |
| 21. August | of Maria Barbara | of Maria Barbara | |
| 22. August | of Maria Barbara | of Maria Barbara | |
| 23. August | of Maria Barbara | of Maria Barbara | |
| 24. August | of Maria Barbara | of Maria Barbara | |
| 25. August | of Maria Barbara | of Maria Barbara | |
| 26. August | of Maria Barbara | of Maria Barbara | |
| 27. August | of Maria Barbara | of Maria Barbara | |
| 28. August | of Maria Barbara | of Maria Barbara | |
| 29. August | of Maria Barbara | of Maria Barbara | |
| 30. August | of Maria Barbara | of Maria Barbara | |
| 31. August | of Maria Barbara | of Maria Barbara | |

(b) Layout recognition

| 1. August | Ciriacus | Gabrieling | |
|------------|------------------|------------------|--|
| 2. August | Maria Francisca | of Georg Philipp | |
| 3. August | of Maria Barbara | of Maria Barbara | |
| 4. August | of Maria Barbara | of Maria Barbara | |
| 5. August | of Maria Barbara | of Maria Barbara | |
| 6. August | of Maria Barbara | of Maria Barbara | |
| 7. August | of Maria Barbara | of Maria Barbara | |
| 8. August | of Maria Barbara | of Maria Barbara | |
| 9. August | of Maria Barbara | of Maria Barbara | |
| 10. August | of Maria Barbara | of Maria Barbara | |
| 11. August | of Maria Barbara | of Maria Barbara | |
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| 23. August | of Maria Barbara | of Maria Barbara | |
| 24. August | of Maria Barbara | of Maria Barbara | |
| 25. August | of Maria Barbara | of Maria Barbara | |
| 26. August | of Maria Barbara | of Maria Barbara | |
| 27. August | of Maria Barbara | of Maria Barbara | |
| 28. August | of Maria Barbara | of Maria Barbara | |
| 29. August | of Maria Barbara | of Maria Barbara | |
| 30. August | of Maria Barbara | of Maria Barbara | |
| 31. August | of Maria Barbara | of Maria Barbara | |

(c) OCR output



| | Bantitate | | |
|------------------|--|---|---|
| oder de. | Joan. Franciscus Raverig. Fil. Legit. | Reprob. et Christ. P. Joanne parus Molitor Medicin et Cronob. c. Maria Magdalena | hattent zu Baron Feuchter Coupo revisare et zu Maria Catharina Weinwagen. |
| Juli | Maria Barbara Fil. Legit. | 8. Joannes Valentin Wagner Music et Maria Fratris. | 8. Mathias Gropmayr 24 Maria Barbara Bailhoferin |
| 12. sul so | Antonius Fil. Legit. | Simon Kerbau Operario kein loci et Anna | Joanner Koppfel Catharina Hapachin |
| . Augusti | Joseph Klapsius Fil. Legit. | 8. Jan. May Pastor Excellenissimi D. C. mit Marquard, Fugger Lage et Dorothea | Vitus Grieminger et Catharina Bock magen. |
| 5. Ejusdem | Joannes Eusebig Laurentius Fil. Legit. | Nob. et spect. g. Joannes Frideri Errenten Mezegra Meiz cator et Nob. 8. Jan. na Brentaria Mere re natu Brentaria genola. | Nob. et Pact. p. Anto. ein Krenten Mezegra Mercator et Nob. Qua Maria Elisabetha Brentani Senate catris. |
| 31. August | poannes Francise Fil. Legit. | Joannes Lincken, macher et Maril Anla- | Pronob. a. Stren~ Joannes Ignatio Langemant et Pronob. Domicella~ Anna Catharina In~ hoff P. A. |

Note: This figure illustrates the digitization process used to extract first names from original church registers. Panel A displays a sample page of the raw archival record from a Catholic parish register. Panel B shows the output of the layout recognition algorithm, which detects text lines and segments the page into a table structure with columns for date, name, parents, and witnesses. Panel C presents the OCR output, where the second column lists the baptized child's first name; these names are then cleaned and matched to a standardized list using fuzzy string matching.

University Matriculation Lists

The dataset also incorporates university matriculation lists from German universities, covering the period 1386–1806. Unlike baptism registers, which survive inconsistently, matriculation lists were systematically preserved, largely survived the upheavals of German history, and have been transcribed and published in edited volumes by historians and historical societies, mostly during the late 19th and early 20th centuries. These sources provide complementary coverage, particularly for the pre-1550 period when systematic baptism registration was rare. Table C.1 provides an overview of the consulted sources.

Each matriculation entry typically records the student's name, place of origin, and often the subject of study or degree sought. I digitize these printed volumes using OCR (for typeset text) and manual transcription (for complex tables), then parse entries into standardized fields. Appendix Figure C.2 illustrates the process. If year of birth is not directly observed, I assign year of matriculation - 17 as year of birth using the median age of matriculation observed in my data.

I manually create a link between raw place information and place name. University matriculation lists typically report the Latinized version (e.g., "Regiomontanus" for "Königsberg" or "Wertinganus" for "Wertingen"). Where available I rely on the "Ortsregister" (place register) in the edited sources to link between spelling variants and location. Additionally, I use the digitized versions of the matriculation lists for Helmstedt, Altdorf, Rostock, and Wittenberg that provide links between raw and clean place names. I further manually expand the bridge between raw place name and location for places names that occur more than 50 times in my data. The raw matriculation data contains 805,651 students out of which I can link 449,261 to an exact location.

Table C.1: Matriculation data sources.

| Founding | uniID | University | Confession | Sources |
|----------|---------------------|---------------------------------------|-----------------|---|
| 1379 | Uerfurt-1379 | University of Erfurt | Bi-confessional | Weissenborn (1881); Weissenborn (1884) |
| 1386 | Uheidelberg-1386 | Heidelberg University | Protestant | Hintzelmann and Toepke (1884) |
| 1388 | Ucologne-1388 | University of Cologne | Catholic | Keussen, Nyassi, and Grotten (1892) |
| 1402 | Uwurzburg-1402 | University of Wurzburg | Catholic | Merkle (1922) |
| 1409 | Uleipzig-1409 | Leipzig University | Protestant | Erler (1895); Erler (1909) |
| 1419 | Urostock-1419 | University of Rostock | Protestant | Hofmeister (1889) |
| 1425 | Ulouvain-1425 | University of Louvain | Catholic | Université De Louvain (1903) |
| 1454 | Utrier-1454 | University of Trier | Catholic | Keil (1917); Keil (1926) |
| 1456 | Ugreifswald-1456 | University of Greifswald | Protestant | Friedlaender (1893); Friedlaender (1894) |
| 1457 | Ufreiburg-1457 | University of Freiburg | Catholic | Mayer (1907); Mayer (1910) |
| 1459 | Uingolstadt-1459 | University of Ingolstadt | Catholic | Freninger (1872) |
| 1460 | Ubasel-1460 | University of Basel | Protestant | Rindlisbacher et al. (1951) |
| 1476 | Umainz-1476 | University of Mainz | Catholic | Benzing and Gerlich (1982) |
| 1476 | Utubingen-1476 | University of Tubingen | Protestant | Hermelink et al. (1906) |
| 1502 | Uwittenberg-1502 | University of Wittenberg | Protestant | Förstemann (1976); Weissenborn (1934); Weissenborn (1952); Weissenborn (1966) |
| 1506 | Ufrankfurt-1506 | University of Frankfurt (Oder) | Protestant | Friedlaender (1887); Friedlaender (1888) |
| 1523 | Ustrasbourg-1621 | University of Strasbourg | Protestant | Knod (1897) |
| 1527 | Umarburg-1527 | University of Marburg | Protestant | Marburg (1872) |
| 1544 | Ukonigsberg-1544 | University of Konigsberg | Protestant | Erler (1910) |
| 1553 | Udillingen-1553 | University of Dillingen | Catholic | Schröder (1909) |
| 1558 | Ujena-1558 | University of Jena | Protestant | Mentz (1944); Jauernig and Steiger (1961); Köhler (1969) |
| 1575 | Uhelmstedt-1575 | University of Helmstedt | Protestant | Mundhenke and Hillebrand (1926); Mundhenke and Hillebrand (1981); Mundhenke and Hillebrand (1979) |
| 1578 | Ualtdorf-1578 | University of Altdorf | Protestant | Steinmeyer (1912) |
| 1607 | Ugiessen-1607 | University of Giessen | Protestant | Klewitz and Ebel (1898) |
| 1636 | Uutrecht-1636 | Utrecht University | Protestant | Rijksuniversiteit Te Utrecht (1886) |
| 1648 | Ubamberg-1648 | University of Bamberg | Catholic | Spörlein (2014) |
| 1652 | Ukiel-1652 | University of Kiel | Protestant | Gundlach (1915) |
| 1654 | Uduisburg-1654 | University of Duisburg | Protestant | Rotscheidt (1938) |
| 1732 | Ufulda-1732 | University of Fulda | Catholic | Richter (1936) |
| 1734 | Ugottingen-1734 | University of Gottingen | Protestant | Gieseke and Kahle (1936); Selle (1937) |
| 1745 | Tubraunschweig-1745 | Braunschweig University of Technology | Protestant | Düsterdieck (1983) |

Notes: The table shows the universities covered in the matriculation list sample, their year of foundation, their ID in the [De La Croix \(2021\)](#) database, their name, and the sources consulted for the data collection. Additionally, I consult the RAG ([Hesse and Schwinges 2025](#)) database for information of students enrolled before 1550. I remove duplicate entries that are covered in multiple sources. Details on the data processing are discussed in Appendix Section [C.1](#).

Figure C.2: Digitization of university matriculation lists.

(a) Printed matriculation volume

| 982 | 1686. |
|--|-------|
| | |
| 54. Ignatius Hemerle Apfeltrachensis Suev. log. ann. 20. | |
| 55. Joan. Josephus Seemiller Eluacensis log. ann. 16. | |
| 56. Fr. Josephus Wahl Eluacensis Suev. min. synt. ann. 12. | |
| 57. Joan. Christophorus Wahl Eluacensis rud. ann. 11. | |
| 58. Joan. Franciscus Adamus comes a Thurndaxis rud. ann. 9 (24. Okt.). | |
| 59. Reinerus Reyemortes iur. ann. 23. | |
| 60. Arnoldus Fridericus Anderstatt Robolensis rud. ann. 12 fam. | |
| 61. Antonius Taglang Vienensis Austriacus log. ann. 20 (25. Okt.). | |
| 62. Joan. Christophorus Sartor Holding, Suev. log. ann. 18. | |
| 63. Christianus Gfall Griso log. ann. 21. | |
| 64. Fr. Adamus Mack Wertinganus Suev. log. ann. 18. | |
| 65. Matthias Hainle Rhoetus Wembdinganus log. ann. 18. | |
| 66. Carolus Fr. Bellia Domusolanus Mediolanensis Italus log. ann. 19 (26. Okt.). | |
| 67. Joannes Molitor Krumbacensis log. ann. 20. | |
| 68. Jacobus Luzenberger Krumbacensis log. ann. 18. | |
| 69. Joan. Andreas Bellia Domusolanus Mediolanensis phys. ann. 18. | |
| 70. Fr. Guilielmus Josephus Conradus l. b. a Stain poeta ann. 15. | |
| 71. Joan. Casparus Fridl Schwandorffensis Palatinus log. ann. 20. | |
| 72. Fr. Ludouicus Eberle Hochaldingensis log. ann. 18. | |
| 54. CP.: ph. B. 21. Aug. 1687. | |
| 55. CP.: ph. B. 21. Aug. 1687. | |
| 57. CP.: ph. B. 17. Aug. 1695, ph. M. 16. Juli 1697 (Wall, nob.). | |
| 63. CP.: ph. B. 21. Aug. 1687, ph. M. 14. Juli 1689 (Samnitensis Rhoetus). | |
| 64. CP.: ph. B. 19. Aug. 1688, ph. M. 13. Juli 1690. <i>Franz Adam Mack Pfarrer von Illerzell 1695, Oberhausen 1702, † 1720. Das Kapitel Weissenhorn, S. 25. 28.</i> | |
| 65. CP.: ph. B. 21. Aug. 1687, ph. M. 14. Juli 1689. | |
| 68. CP.: ph. B. 21. Aug. 1687, ph. M. 14. Juli 1689. | |
| 69. CP.: ph. B. 21. Aug. 1687, ph. M. 20. Juli 1688 (Pellia Diveriensis Italus). | |
| 71. CP.: ph. B. 21. Aug. 1687. | |

(b) Data extraction

| 983 | 1686 |
|--|------|
| 54. Ignatius Hemerle Apfeltrachensis Suev. log. ann. 20. | |
| 55. Joan. Josephus Seemiller Eluacensis log. ann. 16. | |
| 56. Fr. Josephus Wahl Eluacensis Suev. min. synt. ann. 12. | |
| 57. Joan. Christophorus Wahl Eluacensis rud. ann. 11. | |
| 58. Joan. Franciscus Adamus comes a Thurndaxis rud. ann. 9 (24. Okt.). | |
| 59. Reinerus Reyemortes iur. ann. 23. | |
| 60. Arnoldus Fridericus Anderstatt Robolensis rud. ann. 12 fam. | |
| 61. Antonius Taglang Vienensis Austriacus log. ann. 20 (25. Okt.). | |
| 62. Joan. Christophorus Sartor Holding, Suev. log. ann. 18. | |
| 63. Christianus Gfall Griso log. ann. 21. | |
| 64. Fr. Adamus Mack Wertinganus Suev. log. ann. 18. | |
| 65. Matthias Hainle Rhoetus Wembdinganus log. ann. 18. | |
| 66. Carolus Fr. Bellia Domusolanus Mediolanensis Italus log. ann. 19 (26. Okt.). | |
| 67. Joannes Molitor Krumbacensis log. ann. 20. | |
| 68. Jacobus Luzenberger Krumbacensis log. ann. 18. | |
| 69. Joan. Andreas Bellia Domusolanus Mediolanensis phys. ann. 18. | |
| 70. Fr. Guilielmus Josephus Conradus l. b. a Stain poeta ann. 15. | |
| 71. Joan. Casparus Fridl Schwandorffensis Palatinus log. ann. 20. | |
| 72. Fr. Ludouicus Eberle Hochaldingensis log. ann. 18. | |
| 54. CP.: ph. B. 21. Aug. 1687. | |
| 55. CP.: ph. B. 21. Aug. 1687. | |
| 57. CP.: ph. B. 17. Aug. 1695, ph. M. 16. Juli 1697 (Wall, nob.). | |
| 63. CP.: ph. B. 21. Aug. 1687, ph. M. 14. Juli 1689 (Samnitensis Rhoetus). | |
| 64. CP.: ph. B. 19. Aug. 1688, ph. M. 13. Juli 1690. <i>Franz Adam Mack Pfarrer von Illerzell 1695, Oberhausen 1702, † 1720. Das Kapitel Weissenhorn, S. 25. 28.</i> | |
| 65. CP.: ph. B. 21. Aug. 1687, ph. M. 14. Juli 1689. | |
| 68. CP.: ph. B. 21. Aug. 1687, ph. M. 14. Juli 1689. | |
| 69. CP.: ph. B. 21. Aug. 1687, ph. M. 20. Juli 1688 (Pellia Diveriensis Italus). | |
| 71. CP.: ph. B. 21. Aug. 1687. | |

Note: This figure illustrates the digitization process used to extract information from university matriculation lists. Panel A displays a sample page from an edited volume. Panel B depicts the same page overlaid with the table recognition algorithm result used to extract each matriculation entry. Each entry is then parsed into name, place of origin, and subject of study using OCR and regular expressions.

C.2 Data Processing and Sample Construction

The raw dataset from baptism records and matriculation lists is combined with indexed data from FamilySearch.com²³ and Computergenealogie (2025). I harmonize the raw data through several processing steps to create an analysis-ready dataset linking individuals to towns, confessions, and standardized first names.

Step 1: Initial Filtering. I drop entries with missing event years, missing or coarse place information (e.g., entered simply as "Germany" or "Bavaria"), and missing or non-informative first name (empty field, generic descriptions such as "a child" or "a daughter", or marked as stillborn.)

Step 2: Name standardization. I standardize first-name spelling variants to ensure comparability over time and across regions and create a clean name list. Specifically I use the following steps.

1. Correct obvious typos and OCR errors through manual inspection of high-frequency names
2. Standardize phonetic spelling variations (e.g., "th" and "t", "ph" and "f", "ck" and "k")
3. Consolidate latinizations (e.g., "Jacobus" and "Jakob")
4. Standardize abbreviations and diminutives (e.g., "Johannes" and "Johann")

Manual validation of high-frequency names consolidates the final naming list. I only keep names that occur at least 50 times in my sample. The restrictive standardization leads to a final list of 622 unique names. I then apply fuzzy string matching (Jaccard distance with 0.85 threshold) to match raw name strings to the clean name list. Name strings that cannot be matched with sufficient confidence to the cleaned naming (matching score below 0.85) are dropped from the sample. For the main analysis, I retain up to the first three given names of an individual.²⁴ I manually assign gender to names and remove inconsistencies where assigned gender and coded gender from indexed sources do not match.

Step 3: Name classification. I categorize names by identity type. I construct a set of *religious names* based on (i) a list of biblical first names from the Old and New Testament,²⁵ (ii) names of saints with major churches in Germany (Buringh et al. 2020), and (iii) names containing the element "Gott" (God), such as Gottfried and Gottlieb. I also identify *Germanic names* with pre-Christian Germanic roots that were revived during the early modern period, using etymological information from [Behind the Name](#) (2025).

Step 4: Geocoding and confession assignment. I precisely geolocate all parishes and birthplaces using historical GIS data and assign each to the nearest town in the *Deutsches Städtebuch*. I use the border polygons defined in [Bogucka, Cantoni, and Weigand](#) (2019). For observations where the parish is known, I use the confession of the parish in which the baptism occurred to determine the individual's confession, this is in particular relevant for the few bi-confessional towns (most importantly Augsburg) where the town's confessional status is not a one-to-one mapping to the parish confession. For cases where the parish is unknown, in particular for the matriculation records, I assign confession based on the town of origin's

²³I access the data through an agreement with the Church of Jesus Christ of Latter-Day Saints. The data contains information on baptism name, location, event time, and parents.

²⁴In a robustness check I only consider the first given name.

²⁵Source: https://de.wikipedia.org/wiki/Liste_deutscher_Vornamen_aus_der_Bibel (accessed January 15, 2025).

eventual confessional status. I use the confessional status of the parish or town in the year of baptism. For the period before 1546, I assign the eventual status by 1546 to create a fixed reference group.

Step 5: Deduplication and final sample restriction. I remove duplicate records both within and across sources. Duplicates are identified using combinations of name, birth year, and birthplace, with manual review of ambiguous cases. While the raw data span baptisms from 1100 to 1910, I restrict the main analysis to births between 1480 and 1806. This period captures the era of religious competition and polarization from almost 40 years before the Reformation began to the dissolution of the Holy Roman Empire. The final name sample used in the main analysis comprises 4,962,701 births in 2,210 towns with at least one birth. For the city-decade panel, I omit from the sample all city-decade observations with fewer than 10 births. This gives me 31,402 city-decades across 1,850 towns.

C.3 Sample Coverage and Representativeness

A central concern for any historical dataset is whether the observed sample accurately reflects the underlying population. The combined baptism-matriculation dataset covers a non-random subset of German towns and time periods, raising three questions: (1) What is the spatial and temporal coverage? (2) Do observed towns differ systematically from unobserved towns? (3) Do different data sources (elite vs. non-elite; male vs. female) produce consistent measures of religious identity?

Spatial and Temporal Coverage

Appendix Figure C.3 maps the spatial coverage of the baptism data. Each town is shaded according to the number of decades in which it appears with at least 10 baptisms. Coverage is sparser in Eastern regions reflecting differences in survival of church archives and existing indexation efforts.

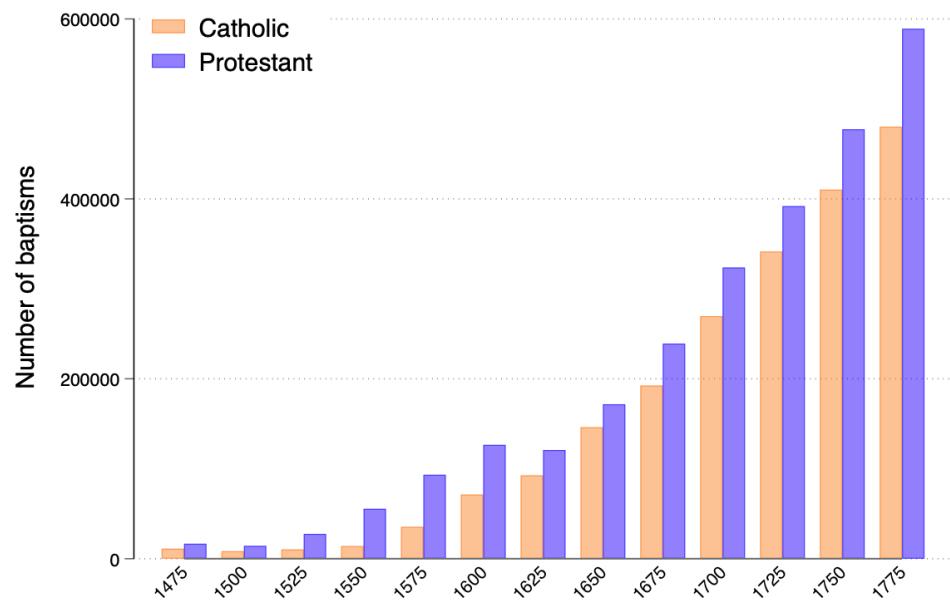
Appendix Figure C.4 plots the number of baptisms observed by 25-year intervals, separately for Catholics (orange) and Protestants (blue). The sample grows sharply after 1550, reflecting the post-Reformation adoption of systematic record-keeping. Protestant coverage begins earlier, consistent with Lutheran church ordinances mandating baptism registration from the 1530s onward. Catholic coverage expands after the Council of Trent (1563), which formalized record-keeping requirements. The sample remains substantial through 1800.

Figure C.3: Spatial coverage of baptism sample.



Note: This map depicts the spatial coverage of the first name data used in the analysis. Each town is shaded according to the number of decades in which it is observed with at least 10 baptisms. Darker shading indicates more complete temporal coverage. The map includes 2,390 towns from the *Deutsches Städtebuch* using the [Bogucka, Cantoni, and Weigand \(2019\)](#) city polygons.

Figure C.4: Temporal coverage of baptism sample.



Note: This figure plots the number of baptisms observed in the dataset for Catholics (orange) and Protestants (blue) by 25-year intervals between 1480 and 1800.

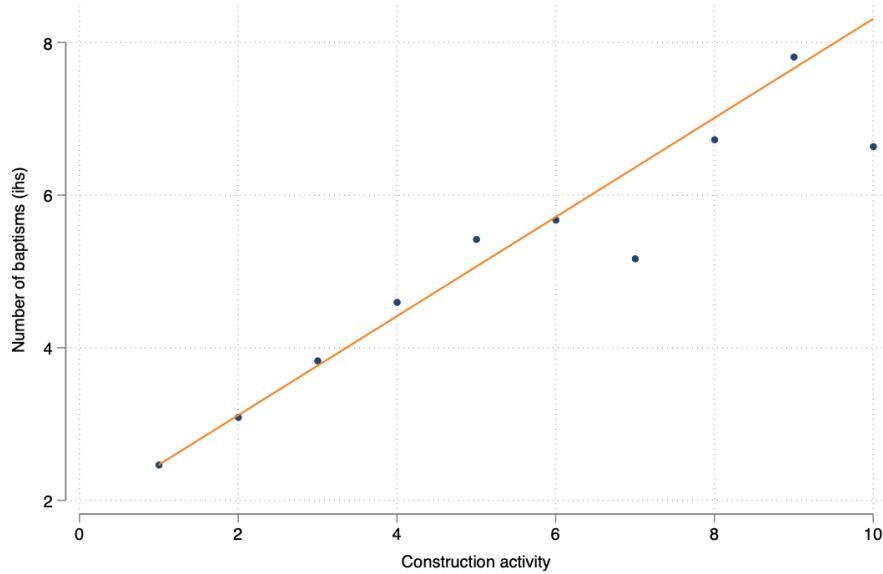
Representativeness Within and Across Towns

Appendix Figure C.5 assesses whether baptism coverage correlates with urban growth. The figure plots the inverse hyperbolic sine of baptisms observed (y-axis) against the number of construction events in that city-decade (x-axis), a proxy for economic activity and population growth provided by [Cantoni, Mohr, and Weigand \(2020\)](#). The strong positive correlation indicates that observation intensity tracks city dynamics.

Appendix Figure C.6 tests whether observed and unobserved towns differ systematically on baseline (1500) observables. The figure plots coefficients from regressing an indicator for whether a town appears in the 1650 sample on geographic characteristics (distance to water, ruggedness, agricultural suitability), demographic characteristics (population, market rights, university presence), and an indicator for Protestant affiliation. Most geographic coefficients are small and statistically insignificant, suggesting that archival survival is not strongly selected on these dimensions. City size and professional administrative infrastructure such as monasteries, schools, universities, city rights are positively correlated with coverage in the sample

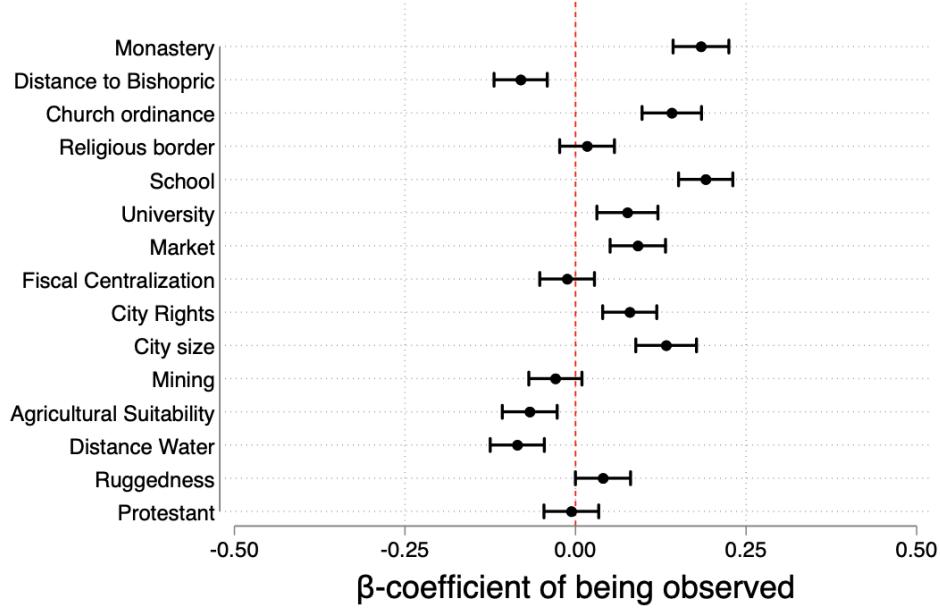
Finally, Appendix Table C.2 tests whether treatment status affects sample composition by regressing being observed (at least 10 baptisms observed in a city-decade) on a post-treatment indicator, controlling for city and year fixed effects. The coefficient is small (0.008) and statistically insignificant, indicating treatment itself does not systematically affect observational status.

Figure C.5: Baptism coverage and urban economic activity.



Note: This figure shows a binscatter plot of the inverse hyperbolic sine of the number of baptisms observed in a town-decade (y-axis) against the number of construction events recorded in that town-decade (x-axis). Construction events are from [Cantoni, Mohr, and Weigand \(2020\)](#) and serve as a proxy for urban economic activity and population growth.

Figure C.6: Baseline characteristics of observed versus unobserved towns.



Note: This figure plots coefficients from regressing an indicator for whether the town appears in the 1650 sample on baseline (1500) geographic and demographic town characteristics. Error bars show 95% confidence intervals.

Table C.2: Treatment and data coverage.

| | Observed | | |
|-----------------|------------------|-------------------|------------------|
| | (1) | (2) | (3) |
| | All towns | Catholic towns | Protestant towns |
| Treated | 0.008 (0.030) | -0.028 (0.040) | 0.025 (0.044) |
| Observations | 78,870 | 27,060 | 51,810 |
| Number of Towns | 2,390 | 820 | 1,570 |
| Outcome mean | 0.307 | 0.293 | 0.314 |
| Town FEs | ✓ | ✓ | ✓ |
| Decade FEs | ✓ | ✓ | ✓ |
| Cluster | Town | Town | Town |

Notes: This table examines whether treatment status and data coverage are systematically related. The dependent variable is an indicator equal one if town c is observed in decade t (at least 10 baptisms observed). Treatment is an indicator equal to one if either a Jesuit college or a Protestant academy had been founded in town c in or before decade t . Column 1 shows estimates for all towns. Column 2 reduces the sample to Catholic towns only. Column 3 reduces the sample to Protestant towns only. All specifications include town fixed effects and decade fixed effects. Standard errors are clustered at the town level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Representativeness Across Data Sources

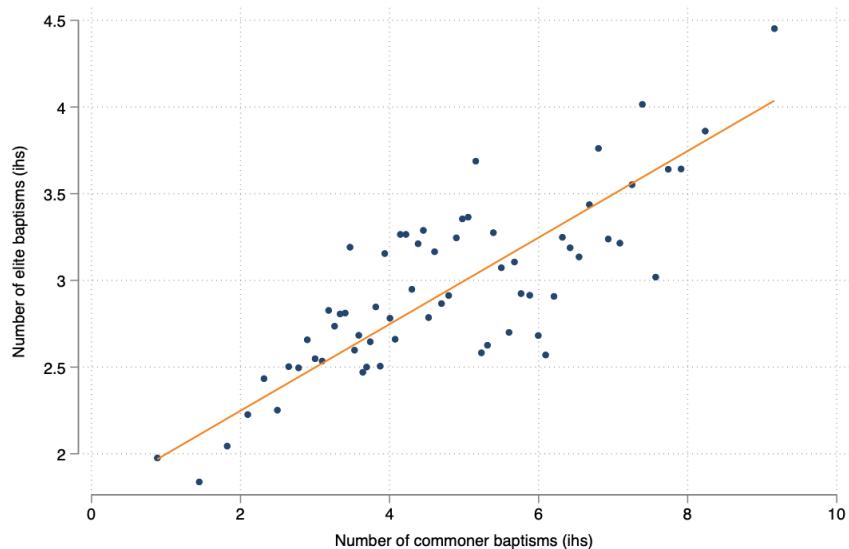
The dataset combines observations from different sources (parish registers, university matriculation lists, biographical databases) and social strata (elite students vs. general population). If measurement of religious identity differs systematically across sources, the Protestant name score might reflect sample composition rather than underlying identity patterns.

Appendix Figure C.7 plots the correlation between elite-source observations (matriculation lists and biographies) and general baptism records within town-decades. The strong positive correlation indicates that towns with many elite observations also have many baptism records, suggesting these sources are complementary rather than substitutes. Elite sources dominate the pre-1550 sample, while baptism records dominate post-1550.

Appendix Figure C.8 tests whether the Protestant name score is consistent across elite and non-elite sources. The figure plots average name scores for elite observations (y-axis) against scores for baptism-record observations (x-axis) within town-decades where both are available. The strong correlation, indicates that elite and non-elite naming patterns move together. This alleviates concerns that the measure reflects social stratification rather than confessional identity.

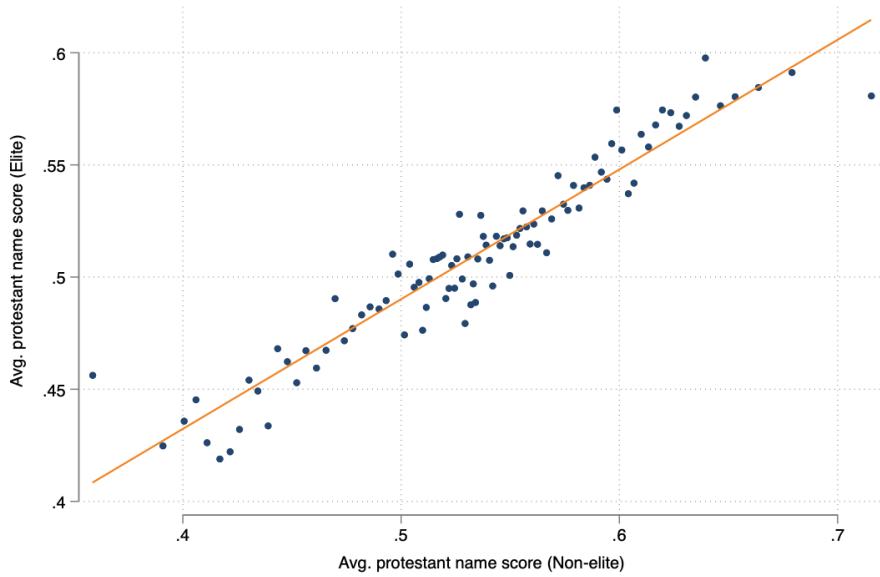
Appendix Figure C.9 assesses whether male and female naming patterns produce consistent measures of religious identity. The figure plots average Protestant name scores for females (y-axis) against scores for males (x-axis) within town-decades. The correlation indicates that male and female names polarize in parallel. This validates the decision to pool genders in the main analysis (I first compute sex-specific scores, then average them across individuals).

Figure C.7: Correlation between elite source and baptism record number of observations.



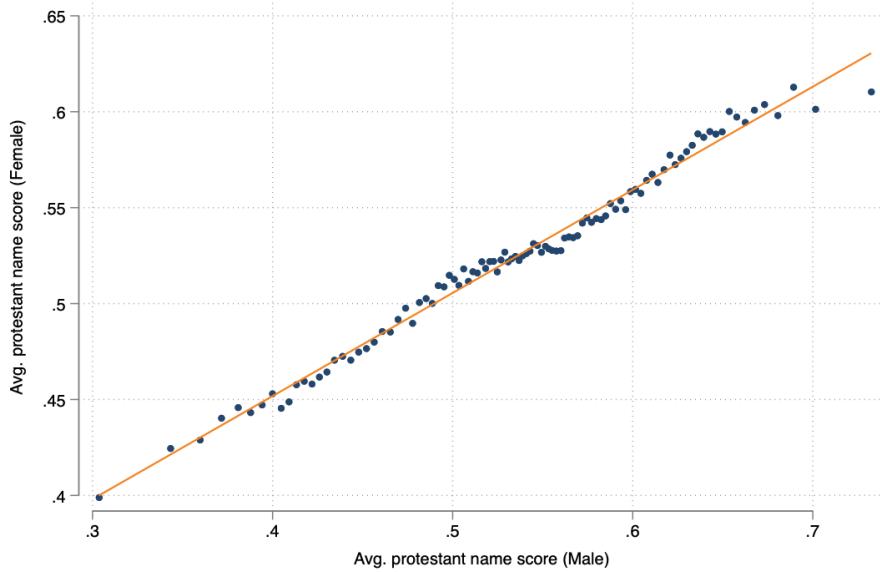
Note: This figure shows a binscatter plot of the inverse hyperbolic sine of the number of general baptism records observed in a town-decade (y-axis) against the inverse hyperbolic sine of the number of elite-source observations (university matriculations and biographies) in that town-decade (x-axis).

Figure C.8: Consistency of name scores: elite versus non-elite sources.



Note: This figure shows a binscatter plot of average Protestant name score among elite-source observations (y-axis) against the average Protestant name score among baptism-record observations (x-axis) in town-decades where both sources are available.

Figure C.9: Consistency of name scores: male versus female.



Note: This figure shows a binscatter plot of average Protestant name score among female observations (y-axis) against the average Protestant name score among male observations (x-axis) within town-decades.

C.4 Computation of Name-Based Partisanship

After harmonizing and geolocating names, I compute a measure of the "Protestant-ness" of each name following the logic of Fryer and Levitt (2004). The procedure proceeds in several steps.

Cell Definition

I define a *cell* as the combination of decade, sex, and—where relevant—geographic grouping (cluster, region, or city). For each cell, I tabulate the number of Catholic and Protestant births for each first name, keeping only names with at least 20 occurrences within the cell to ensure stable probabilities.

Protestant name score

For each name–cell combination, I compute the posterior probability that a newborn with name n is Protestant:

$$(29) \quad \text{ProtScore}_{n,c} = \frac{\Pr(\text{name} = n \mid \text{Protestant}, c)}{\Pr(\text{name} = n \mid \text{Protestant}, c) + \Pr(\text{name} = n \mid \text{Catholic}, c)}.$$

This score equals 0.5 if a name is used equally often by both confessions, 1 if used exclusively by Protestants, and 0 if used exclusively by Catholics. Intuitively, it is the Bayesian posterior probability of Protestant affiliation given the observed name, under a neutral prior.

Temporal Aggregation and Smoothing

I compute scores at multiple levels of temporal granularity:

- Decade-level scores, pooling across the entire sample
- Decade \times linguistic cluster scores (High, Middle, Low German), then take simple averages across clusters to measure the "typical" Protestantness of a name
- Rolling 20-year windows, both within clusters and pooled across clusters, to smooth short-term fluctuations

Random Benchmark

To gauge how much separation could arise by chance, I recompute $\text{ProtScore}_{n,c}$ after randomly permuting confessional labels (preserving the overall Protestant share within each cell) and average over 100 iterations. This yields a random benchmark.

Capped Implementation

To prevent towns with very large numbers of observations from dominating the results, I implement a capped version of the procedure: for each town–decade, I randomly draw at most 100 births, repeat the sampling 100 times, and store the mean $\text{ProtScore}_{n,c}$ across these draws with replacement. I also compute a capped random benchmark using the same procedure with shuffled labels.

Average Partisanship

Finally, I aggregate the name-level scores to construct the main measure of confessional differentiation in naming practices over time. For each individual observation i in decade t with true confessional label $y_i \in \{0, 1\}$, I compute the posterior probability of correct classification:

$$(30) \quad \text{CorrectPost}_i = y_i \text{ProtScore}_{name_i,t} + (1 - y_i)(1 - \text{ProtScore}_{name_i,t}).$$

The decade-level measure is then

$$(31) \quad \text{Average Partisanship}_t^{\text{name}} = \frac{1}{N_t} \sum_{i \in t} \text{CorrectPost}_i,$$

the mean posterior probability that a neutral observer would correctly infer confession after observing a randomly drawn name in decade t . By construction, $\text{Average Partisanship}_t^{\text{name}} = 0.5$ indicates that names carry no information about confession, while values approaching 1 indicate near-complete segregation of naming practices. I compute 95% confidence intervals using the empirical distribution of $\text{Average Partisanship}_t^{\text{name}}$. For the random benchmark, I replace $\text{ProtScore}_{name_i,t}$ with the score from permuted labels to obtain a random benchmark as a finite-sample check (Gentzkow, Shapiro, and Taddy 2019).

Regional and Multi-Group Extensions

As a robustness and validation exercise, I generalize the procedure to other group partitions beyond the Catholic–Protestant divide—e.g., linguistic clusters or historical regions. For a given partition, I compute for each name its within-group usage probability relative to the outside-group probability, using the same posterior-probability formula as above. This allows me to validate that the measure recovers historically documented regional or linguistic naming patterns and is not driven by a single group boundary.

C.5 Addressing Sparsity

A core challenge in comparing naming distributions across time and space is that observed names represent only a finite sample from the underlying cultural choice set available to parents. The number of children born in a town-decade is limited, while the potential choice set of names is large. This raises two concerns: (i) sampling noise may produce spurious differences in the observed distribution of names across confessions, and (ii) name-based measures of partisanship may mechanically vary with the number of births rather than reflecting true cultural divergence.

I address these concerns in several ways. First, I benchmark my results against a random-assignment null distribution. I randomly permute confessional labels within each decade 100 times and recompute the Protestant-name score, thereby capturing the amount of "partisanship" that would arise from chance alone. These placebo series are flat and close to 0.5 (random guessing) for all periods, suggesting that finite sample bias does not drive the observed patterns.

Second, as a complementary measure of distributional separation, I follow [Cantoni, Mohr, and](#)

Weigand (2025) and compute the bootstrap-adjusted normalized Theil index, a special case of the generalized entropy index frequently used to measure segregation. Let c_{ng} be the number of children given name n in group $g \in \{\text{Catholic, Protestant}\}$ in a given decade, and let $p_{ng} = c_{ng}/c$ be the joint probability of observing name n in group g , where c is the total number of baptisms in that decade. The mutual information between names and confessions is

$$(32) \quad M = \sum_{n=1}^N \sum_{g=1}^G p_{ng} \log \frac{p_{ng}}{p_{n\cdot} \cdot p_{\cdot g}},$$

where $p_{n\cdot}$ and $p_{\cdot g}$ denote marginal probabilities of names and groups. Normalizing by the entropy of the group distribution yields the Theil index

$$(33) \quad T = \frac{M}{-\sum_{g=1}^G p_{\cdot g} \log p_{\cdot g}},$$

which ranges from 0 (identical name distributions across confessions) to 1 (completely disjoint sets of names). In robustness checks, I show that the time path of the Theil index closely mirrors the Protestant-name score, confirming that my results are not an artifact of sparsity or model specification.

C.6 Validation

To validate the Protestant-name score as a meaningful measure of religious identity, I conduct a series of exercises that examine its predictive power, persistence, and internal consistency.

Comparison with Historical Evidence

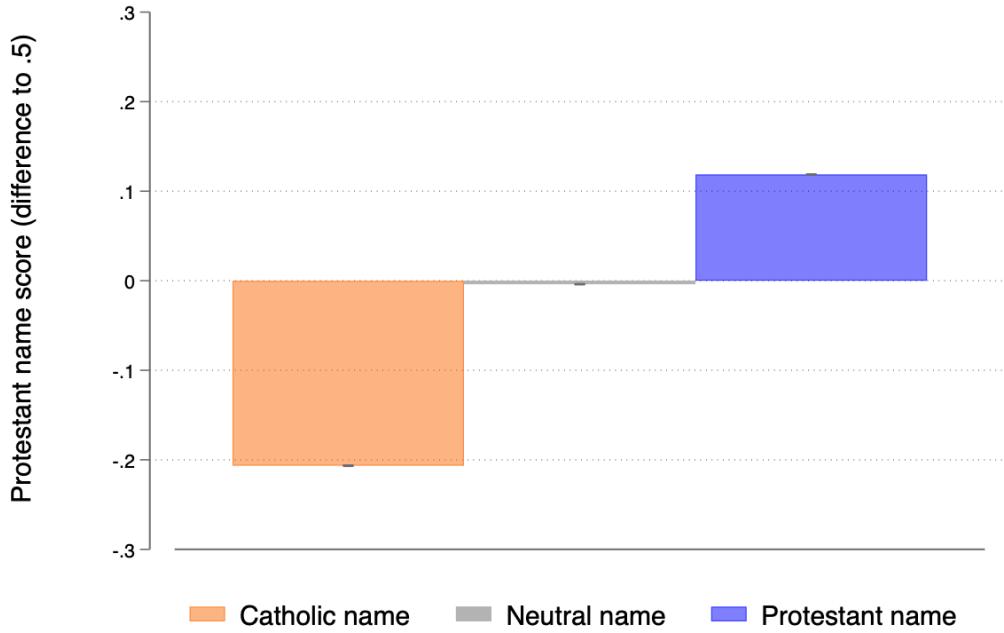
First, I benchmark the measure against historical qualitative evidence. Appendix Figure C.10 compares the data-driven Protestant name score to a list of typical Catholic and Protestant names compiled by historian François (1991) in his study of Augsburg. Reassuringly, names François classified as typically Catholic have an average Protestant name score of 0.3 in my data, while names he classified as typically Protestant have high scores (averaging 0.62). Names not specifically mentioned by François cluster near 0.5. This correspondence validates that the quantitative measure captures the same confessional associations documented in detailed historical case studies.

Internal Consistency Across Constructions

Second, I assess the internal consistency of the measure across alternative constructions. Appendix Figure C.11 plots correlations between the decade-level Protestant name score and four alternative name scores: the 20-year rolling window score (Panel A), the cluster average score (Panel B), the regional name score (Panel C), and the cluster-specific name score (Panel D).

The 20-year rolling window score (Panel A) computes the Protestant name score for each year taking the choice probabilities of the past 20-years as reference point in contrast to the main decade-level Protestant name score that relies on decade-by-decade choice probabilities. The cluster average score (Panel B) computes the Protestant name score for each name by decade but separately within the three major lin-

Figure C.10: Validation against historical evidence.



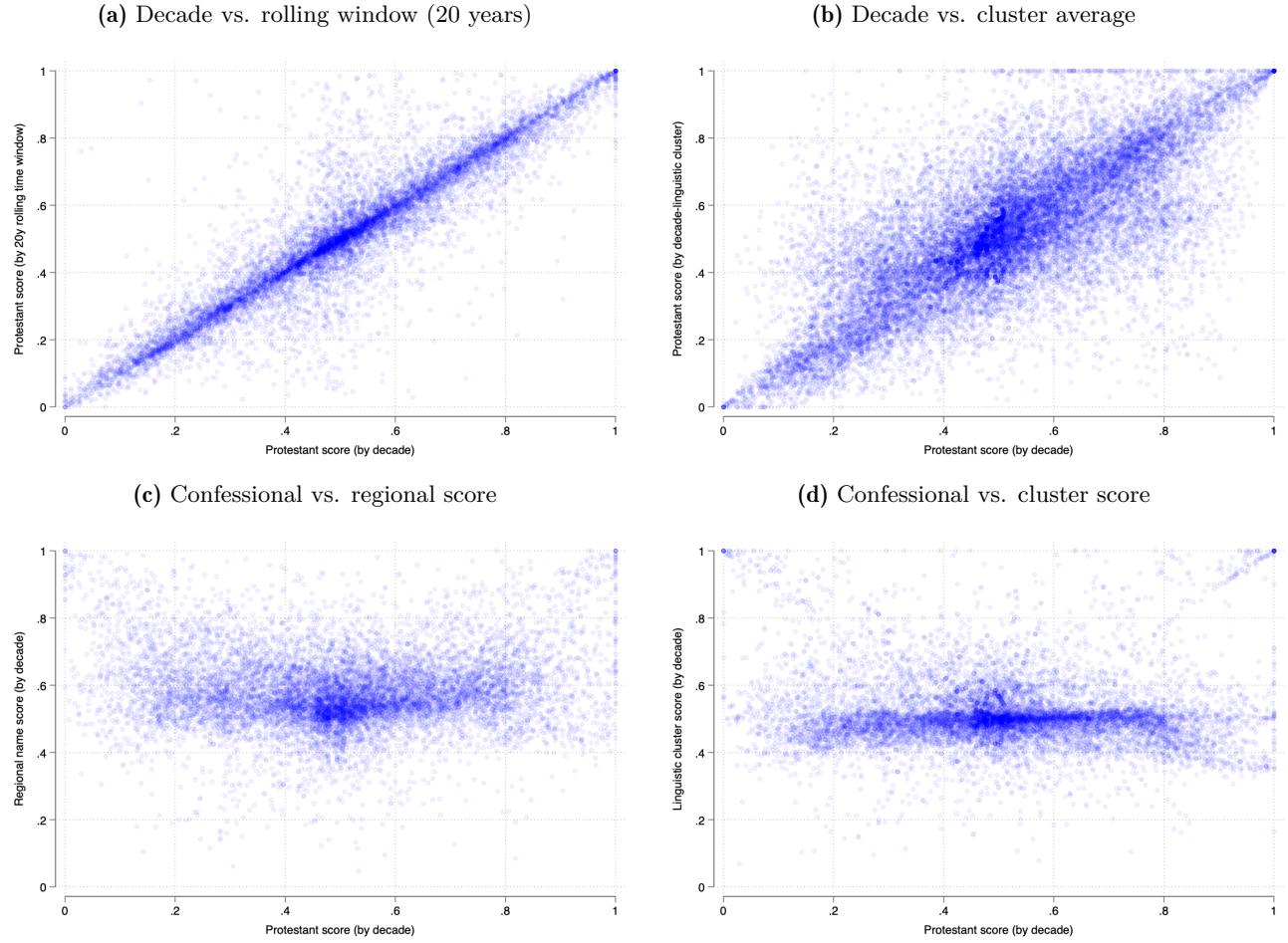
Note: This figure shows average Protestant name score deviation from 0.5 for names classified by François (1991) as typical Catholic (orange), typical Protestant (blue), or not classified (gray).

guistic clusters (High-, Middle-, and Low-German region). I then take the average score across the three clusters to obtain the cluster average Protestant name score by decade. The regional name score (Panel C) is computed using the standard name score formula but contrasting the choice probability in region i relative to all other regions $\neg i$. Regions are defined following the subdivision of *Deutsches Städtebuch* (Keyser et al. 1939) into 23 regions. It therefore captures how distinctly the name is for given region i . The cluster-specific score (Panel D) computes how distinct a name is for a given linguistic cluster relative to the other two.

Panels A and B show high correlations between the baseline decade-level measure and temporally or geographically smoothed variants. This indicates that the measure is not sensitive to the specific aggregation window or geographic unit.

Panels C and D show low correlations between the confessional Protestant name score and purely geographic scores (computed by treating regions or linguistic clusters as "groups" rather than confessions). This demonstrates that confessional differentiation in naming is distinct from geographic differentiation. The Protestant name score does not merely reflect naming differences between northern (Protestant) and southern (Catholic) Germany, but captures a confessional dimension orthogonal to geography.

Figure C.11: Internal consistency across alternative score constructions.



Note: This figure shows scatter plots to inspect correlation between alternative constructions of name-based identity scores. Panels A and B show the baseline decade-level Protestant name score on the x-axis and temporally/geographically smoothed variants on the y-axis. Panel A shows the 20-year rolling time window for computing the Protestant name score on the y-axis. Panel B shows the cluster average score obtained by computing the Protestant name score within linguistic cluster (high-, middle-, and low-German) and taking the average of the three scores. Panels C and D show the baseline decade-level Protestant name score on the x-axis and purely geographic scores (treating regions or linguistic clusters as groups) on the y-axis. Panel C shows the regional score of a name using the region categories in *Deutsches Stätdebuch* (Keyser et al. 1939) on the y-axis. Panel D shows the linguistic cluster (high-, middle-, and low-German) score on the y-axis. Details on the construction of the different scores are discussed in Sections C.4 and C.6.

C.7 Examples and Robustness

To illustrate the workings of the Protestant name score and build intuition for the results, I show the evolution of individual name choices over time. Appendix Figures C.12 and C.13 display choice probabilities of selected male and female names separately for Catholics and Protestants between 1450 and 1850. These examples make clear that certain names are strongly associated with one confession and display sharp shifts in relative popularity following the Reformation. For instance, names such as *Joseph* and *Maria* remain predominantly Catholic, while *Christian* and *Friedrich* become more common among Protestants. This provides a transparent illustration of the confessional content captured by the measure. Appendix Table C.3 complements these examples by systematically reporting the most partisan names by decade, ranked according to their Protestant name score.

I next assess the robustness of the aggregate partisanship patterns to alternative sample restrictions and constructions of the measure. Appendix Figure C.15 documents the evolution of naming polarization using the Theil index following [Cantoni, Mohr, and Weigand \(2025\)](#). The trajectory closely mirrors the main results, with rapid increase in segregation from 1580 to 1610 and remaining elevated thereafter, consistent with persistent confessional differentiation.

Appendix Figures C.16 and C.17 show that the patterns hold when restricting the sample to male and female names separately. I further explore heterogeneity by social status: Appendix Figure C.18 focuses on elites (university students and notable individuals), whereas Appendix Figure C.19 considers non-elites (baptism records). Both groups exhibit similar dynamics up until 1700.²⁶ This is particularly important because the sample for early periods (pre-1550) primarily relies on university matriculation lists, while systematic baptism records are only introduced in the aftermath of the Reformation in most places with different timing in adoption of reliable record keeping.

Finally, Appendix Figure C.20 zooms in on Augsburg, a bi-confessional city, which allows me to study differentiation in a geographically contained unit that rules out any concern of differentiation between regions driving the results. Reassuringly, even in this micro setting the differentiation pattern follows the general trends observed in the full sample of German towns.

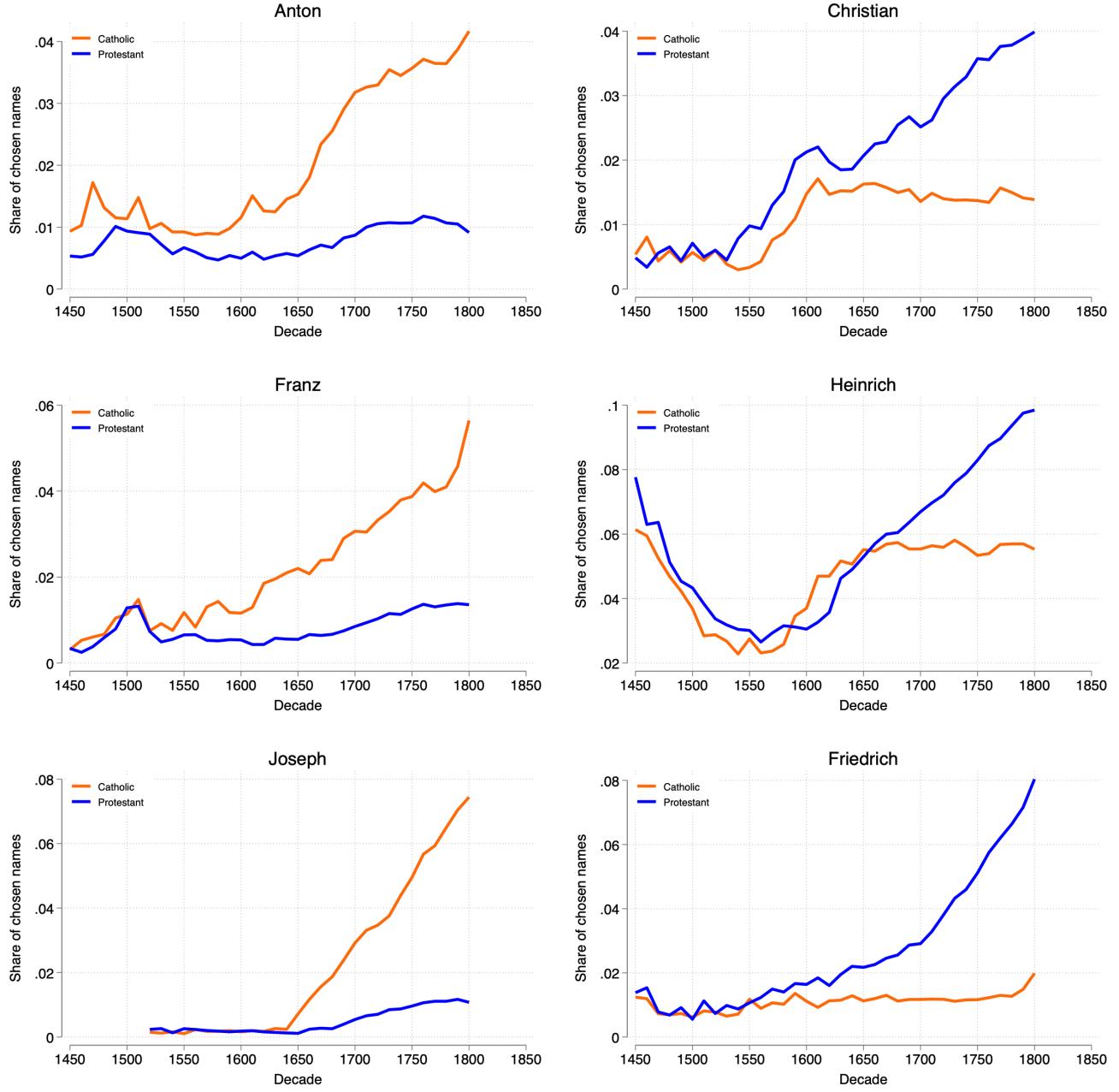
Appendix Figure C.21 shows the use of religious and germanic names by confession over time. Reassuringly, both groups exhibit similar dynamics in the main period of interest (1480 to 1700) where distinct markers emerge and group boundaries form. The difference in naming patterns is not simply driven by usage of religious or germanic names. The Protestant name score captures something distinct from group differences in religiosity or attachment to germanic identity that might be correlated with confessional group belonging. In the later period (1700 to 1800), I observe a clear increase in the use of germanic names among Protestants, likely driving the continued differentiation between confessional groups over the course of the 18th century.

Appendix Figure C.14 displays the distribution of Protestant name scores by confession for four selected decades (1510, 1560, 1610, 1760). In 1510, before the Reformation, both Catholic and Protestant distributions are centered near 0.5, indicating minimal differentiation. By 1560, the distributions have begun to separate, with Protestant names clustering above 0.5 and Catholic names below. By 1760, the

²⁶From 1700 onward elite polarization continues at much faster rate than the one observed in the baptism record sample, but constitute only a small fraction of the overall sample for this period.

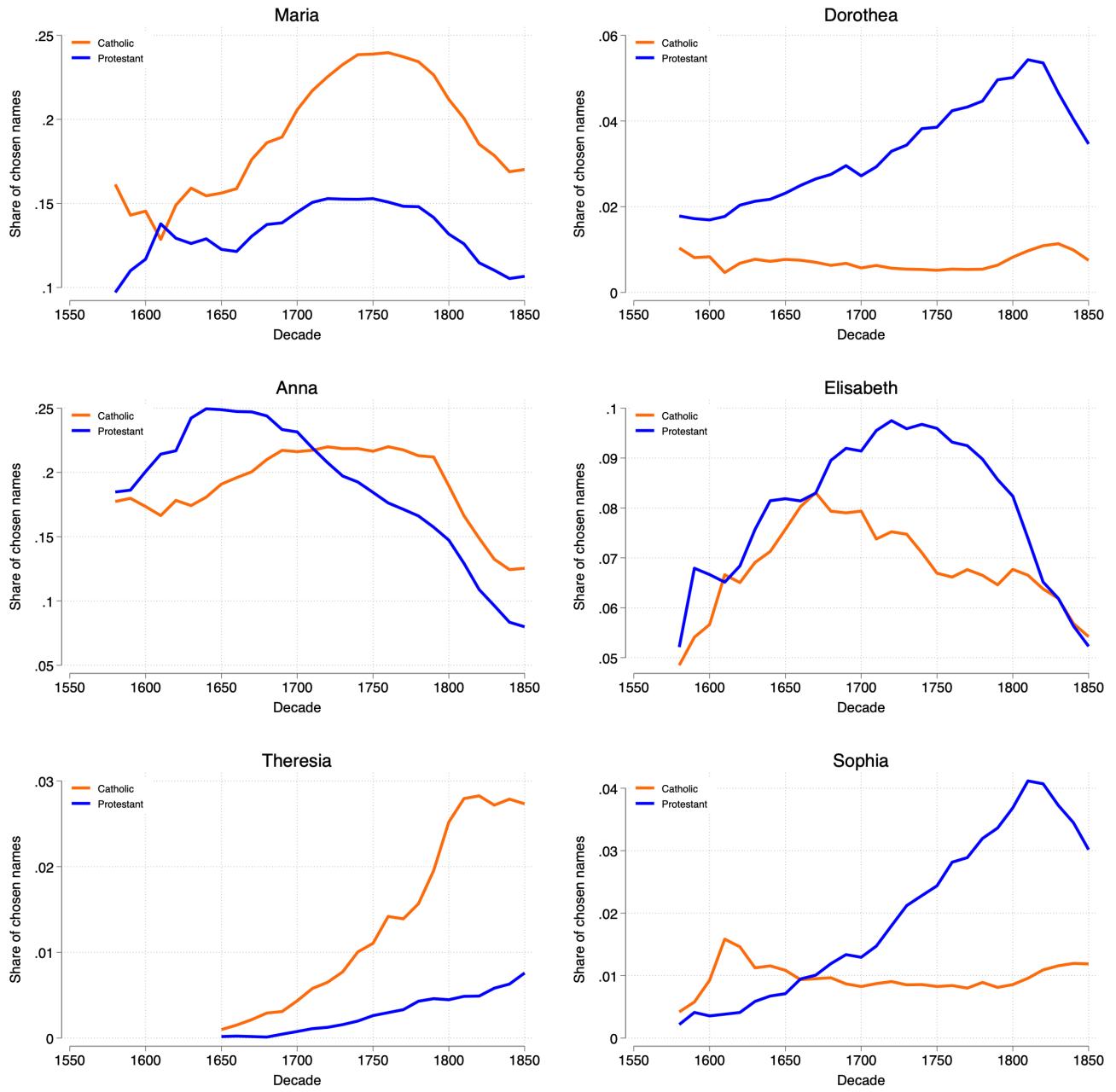
separation is pronounced, with distinct modes for each confession. The vertical dashed lines mark mean scores by confession, illustrating the widening gap over time.

Figure C.12: Choice probabilities of selected male names by confession over time.



Note: This plot shows choice probabilities by religious groups for selected male names between 1450 and 1850. The orange line shows the share of Catholics given name X in decade t . The blue line shows the share of Protestants given name X in decade t . Details on the construction of the data are given in Appendix Section C.1.

Figure C.13: Choice probabilities of selected female names by confession over time.



Note: This plot shows choice probabilities by religious groups for selected female names between 1550 and 1850. The orange line shows the share of Catholics given name X in decade t . The blue line shows the share of Protestants given name X in decade t . Details on the construction of the data are given in Appendix Section C.1.

Table C.3: Panel A. Most partisan male names by decade.

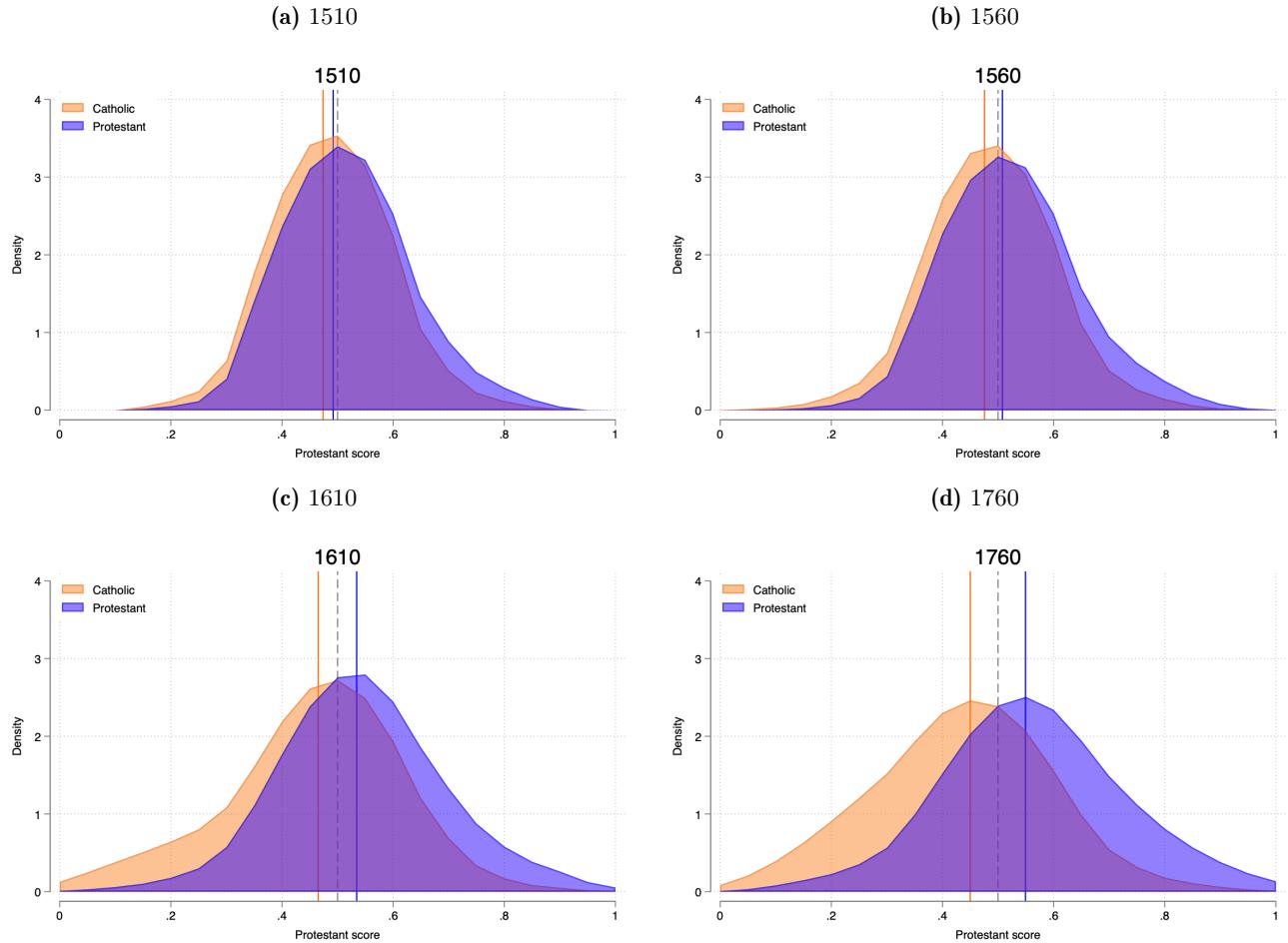
| Catholic | Pr(C) | Pr(P) | Protscore | Protestant | Pr(C) | Pr(P) | Protscore |
|-----------|-------|-------|-----------|------------|-------|-------|-----------|
| 1550s | | | | | | | |
| Sebastian | 1.6 | 0.8 | .32 | Joachim | 0.5 | 2.3 | .80 |
| Jacob | 4.5 | 3.7 | .45 | Andreas | 1.9 | 3.3 | .63 |
| Conrad | 1.6 | 1.4 | .46 | Martin | 1.8 | 2.6 | .58 |
| Johannes | 17.8 | 15.5 | .46 | Hans | 1.9 | 2.6 | .57 |
| Georg | 6.9 | 6.1 | .47 | Peter | 1.8 | 2.2 | .55 |
| 1650s | | | | | | | |
| Franz | 2.2 | 0.6 | .20 | Hans | 1.5 | 7.3 | .83 |
| Anton | 1.5 | 0.5 | .26 | Christoph | 1.5 | 3.2 | .68 |
| Matthias | 3.4 | 1.3 | .28 | Friedrich | 1.1 | 2.1 | .66 |
| Wilhelm | 2.9 | 1.3 | .29 | Andreas | 1.4 | 2.5 | .64 |
| Peter | 4.8 | 2.3 | .32 | Conrad | 1.2 | 1.9 | .61 |
| 1750s | | | | | | | |
| Joseph | 4.9 | 0.9 | .16 | Friedrich | 1.1 | 5.1 | .81 |
| Matthias | 3.9 | 0.9 | .19 | Christoph | 0.8 | 2.8 | .78 |
| Anton | 3.6 | 1.1 | .23 | Christian | 1.3 | 3.5 | .72 |
| Franz | 3.9 | 1.3 | .25 | Conrad | 0.7 | 1.7 | .68 |
| Peter | 6.4 | 2.4 | .28 | Georg | 2.2 | 4.4 | .67 |

Table C.3: Panel B. Most partisan female names by decade.

| Catholic | Pr(C) | Pr(P) | Protscore | Protestant | Pr(C) | Pr(P) | Protscore |
|-----------|-------|-------|-----------|------------|-------|-------|-----------|
| 1550s | | | | | | | |
| Rosina | 1.6 | 0.6 | .28 | Catharina | 5.8 | 10.7 | .65 |
| Regina | 2.0 | 0.9 | .30 | Dorothea | 1.0 | 1.7 | .64 |
| Susanna | 2.0 | 1.0 | .34 | Margaretha | 7.2 | 12.3 | .63 |
| Gertrud | 1.6 | 0.8 | .34 | Magdalena | 2.6 | 4.2 | .62 |
| Maria | 10.7 | 7.3 | .40 | Ursula | 2.6 | 4.0 | .61 |
| 1650s | | | | | | | |
| Sybilla | 1.6 | 0.3 | .16 | Dorothea | 0.7 | 2.3 | .75 |
| Gertrud | 5.3 | 1.9 | .27 | Barbara | 2.8 | 4.9 | .63 |
| Agnes | 2.1 | 1.1 | .35 | Anna | 19.1 | 24.9 | .57 |
| Christina | 2.8 | 2.1 | .43 | Magdalena | 2.1 | 2.5 | .55 |
| Maria | 15.6 | 12.2 | .44 | Margaretha | 9.1 | 10.1 | .53 |
| 1750s | | | | | | | |
| Gertrud | 4.6 | 1.6 | .25 | Dorothea | 0.5 | 3.9 | .88 |
| Maria | 23.8 | 15.3 | .39 | Sophia | 0.8 | 2.4 | .75 |
| Anna | 21.6 | 18.4 | .46 | Elisabeth | 6.6 | 9.6 | .59 |
| Magdalena | 2.1 | 2.2 | .51 | Christina | 2.2 | 3.1 | .58 |
| Catharina | 10.9 | 11.6 | .51 | Margaretha | 6.3 | 8.4 | .57 |

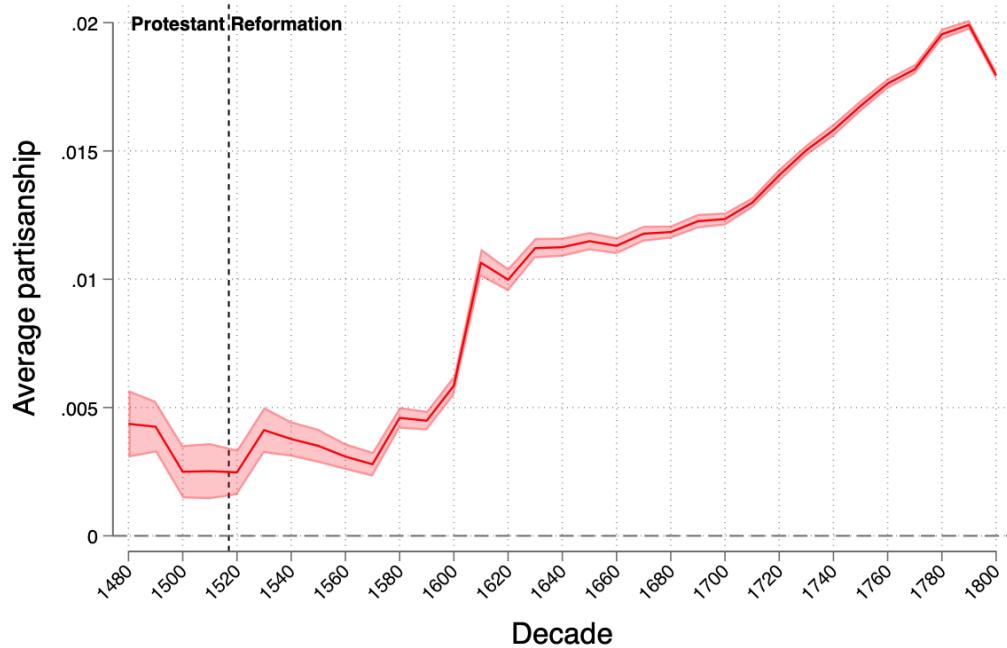
Notes: The table reports the top 5 most partisan names by selected decades for Catholics and Protestants. Panel A reports male names. Panel B reports female names.

Figure C.14: Name score distribution.



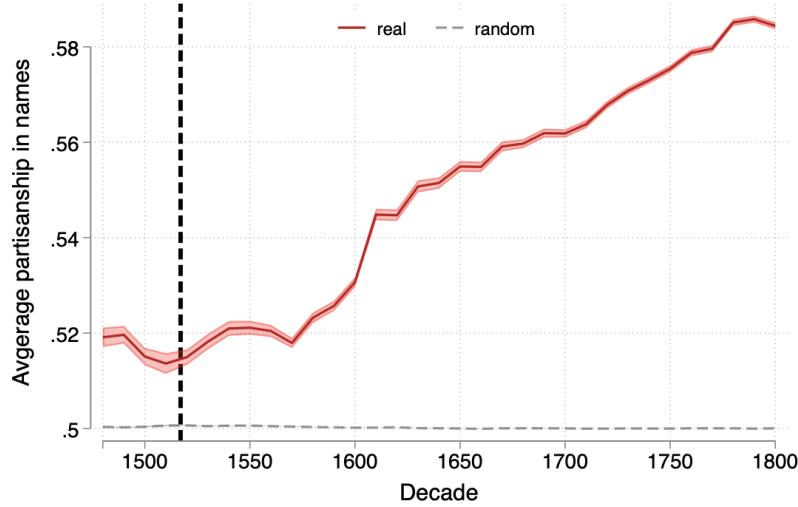
Note: The figure plots the distribution of the Protestant name score by group for four selected decades. The orange kernel density plot depicts the distribution of Protestant name scores of all names chosen by Catholics in the indicated decade. The blue kernel density plot depicts the distribution of Protestant name scores of all names chosen by Protestants in the indicated decade. The vertical dashed lines indicate the average name score for Catholics (orange) and Protestants (blue) respectively.

Figure C.15: Average partisanship in naming over time (Theil Index).



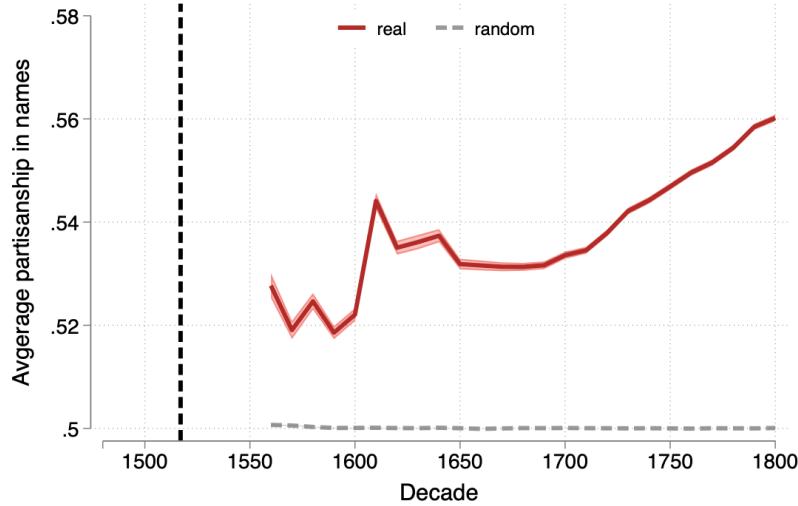
Note: This plot shows average partisanship measured by the Theil Index as described in Section C.5. The Theil index ranges from 0 (identical name distributions across confessions) to 1 (completely disjoint naming patterns).

Figure C.16: Average partisanship in naming over time (Male only).



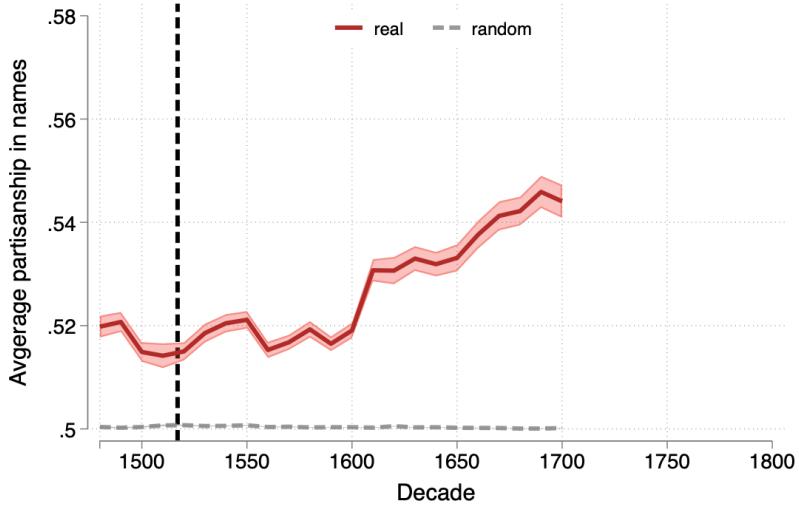
Note: This figure plots average name-based partisanship, $\text{Average Partisanship}_t^{\text{name}}$, by decade from 1480 to 1800 using male first names only, as defined in Equation 2. The solid red line reports the posterior probability that a neutral observer correctly infers confession from a randomly drawn male name, with 95% confidence intervals from the capped resampling distribution. The dashed gray line shows the average over 500 iterations with randomly reshuffled labels, providing a finite-sample benchmark. Names are classified using the parish's eventual confessional status. See Appendix Section C for details on data construction and robustness.

Figure C.17: Average partisanship in naming over time (female only).



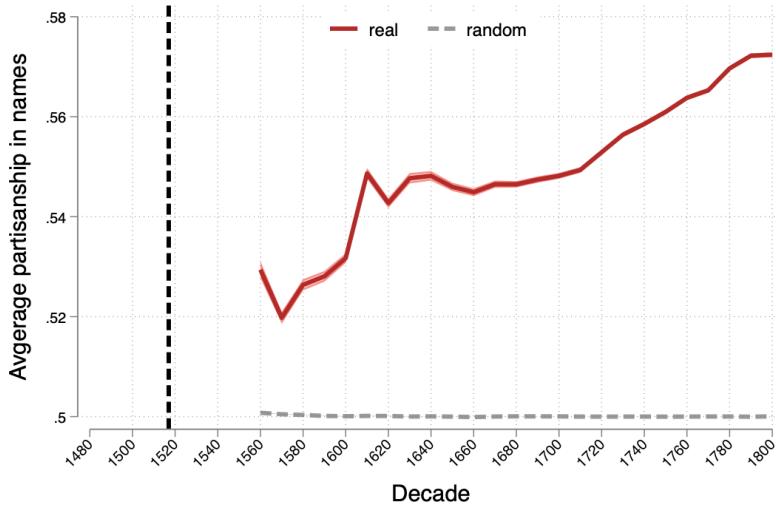
Note: This figure plots average name-based partisanship, $\text{Average Partisanship}_t^{\text{name}}$, by decade from 1480 to 1800 using female first names only, as defined in Equation 2. The solid red line reports the posterior probability that a neutral observer correctly infers confession from a randomly drawn female name, with 95% confidence intervals from the capped resampling distribution. The dashed gray line shows the average over 500 iterations with randomly reshuffled labels, providing a finite-sample benchmark. Names are classified using the parish's eventual confessional status. See Appendix Section C for details on data construction and robustness.

Figure C.18: Average partisanship in naming over time (elites only).



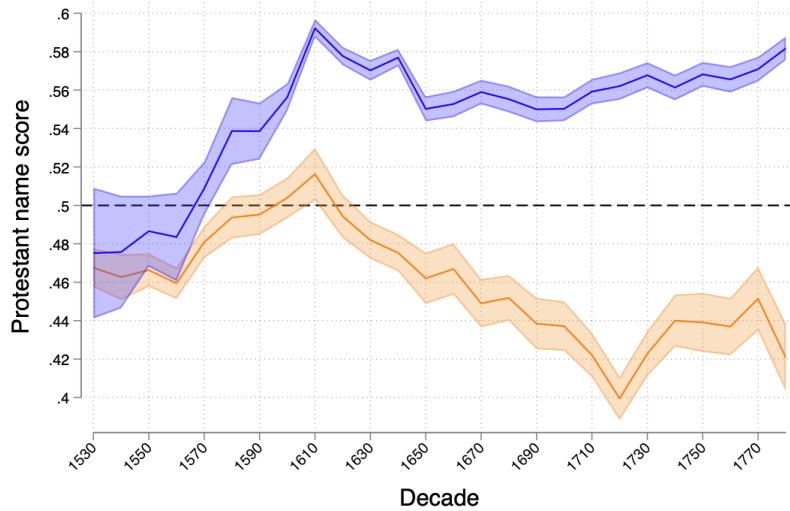
Note: This figure plots average name-based partisanship, $\text{Average Partisanship}_t^{\text{name}}$, by decade from 1480 to 1700 using elite (students and notable individuals) first names only, as defined in Equation 2. The solid red line reports the posterior probability that a neutral observer correctly infers confession from a randomly drawn elite name, with 95% confidence intervals from the capped resampling distribution. The dashed gray line shows the average over 500 iterations with randomly reshuffled labels, providing a finite-sample benchmark. Names are classified using the parish's eventual confessional status. See Appendix Section C for details on data construction and robustness.

Figure C.19: Average partisanship in naming over time (non-elites only).



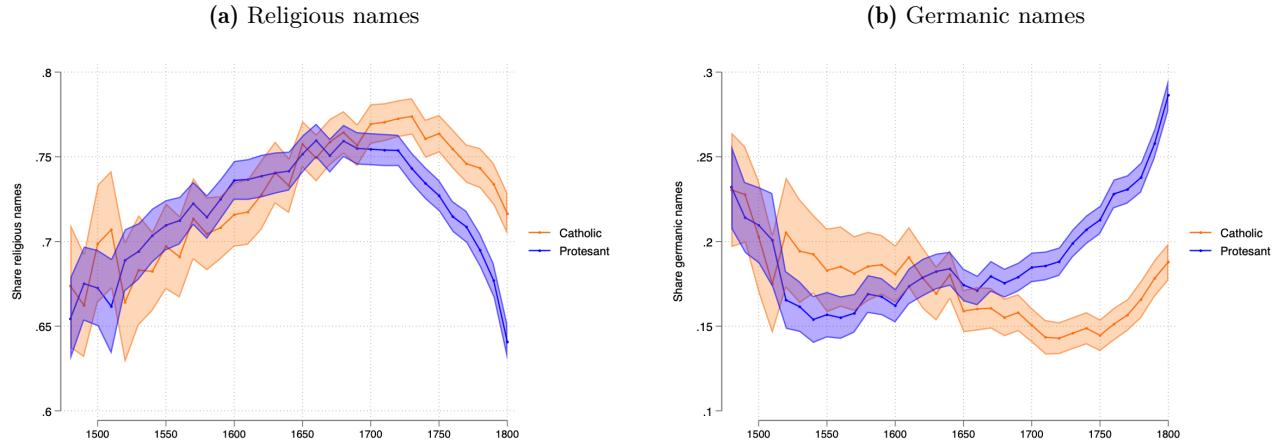
Note: This figure plots average name-based partisanship, $\text{Average Partisanship}_t^{\text{name}}$, by decade from 1480 to 1800 using non-elite (no students or notable individuals) first names only, as defined in Equation 2. The solid red line reports the posterior probability that a neutral observer correctly infers confession from a randomly drawn non-elite name, with 95% confidence intervals from the capped resampling distribution. The dashed gray line shows the average over 500 iterations with randomly reshuffled labels, providing a finite-sample benchmark. Names are classified using the parish's eventual confessional status. See Appendix Section C for details on data construction and robustness.

Figure C.20: Partisanship in naming over time (Augsburg only).



Note: This figure plots the average Protestant name score by confession in the bi-confessional city of Augsburg over time. The blue line and corresponding 95% confidence intervals depict the average score of Protestants baptized in Protestant parishes. The orange line shows the average score of Catholics baptized in Catholic parishes.

Figure C.21: Use of names over time.



Note: The figure plots the share of names classified as religious (Panel A) and germanic (Panel B) over time by confessional group. I report average share of names classified across cities per decade. The orange line and corresponding 95% confidence intervals show average across Catholic towns. The blue line and corresponding 95% confidence intervals show average across Protestant towns.

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D Short Titles

This section documents the construction and analysis of the printing dataset used to measure confessional differentiation in published texts. The dataset comprises 91,788 short titles from the *Universal Short Title Catalogue* (USTC), covering printed works produced in German towns between 1480 and 1700. I first describe the multi-stage data processing pipeline that transforms raw historical titles into machine-readable text suitable for quantitative analysis (Section D.1). I then detail the computation of document-level and aggregate partisanship measures using both embedding-based and bigram-based classification approaches (Section D.2). Finally, I present robustness checks and additional analyses examining the sensitivity of results to alternative specifications and exploring thematic patterns in confessional language (Section D.3).

D.1 Data Processing

Before computing partisanship measures, I implement a comprehensive seven-stage data processing pipeline to ensure the resulting text corpus is both historically faithful and suitable for machine learning methods. Each stage addresses specific challenges posed by early modern texts: non-standard spelling, Latin and old German orthography, extensive publication metadata, and reprints.

Stage 1: Translation

Short titles in the USTC appear in old German, Latin, and occasionally other languages, with non-standardized spelling reflecting pre-orthographic conventions. To enable consistent analysis, I translate all titles into modern German and English using OpenAI’s `gpt-4o-mini` model with zero temperature (ensuring deterministic outputs). The translation prompt explicitly instructs the model to preserve historical content while modernizing language:

```
You are an expert on Early Modern German history and handwritings. Translate the
following text into modern [German/English]. Output only a valid JSON object with
a single key 'translation' that contains the translated text. Do not include any
additional text or explanation.
```

Responses are parsed as JSON, with failed calls retried up to five times using exponential backoff. I process translations in parallel batches of 1,000 titles using a multithreaded executor, completing the full corpus in approximately 6 hours.

Stage 2: Metadata Removal

Historical short titles contain extensive publication metadata (author names, university affiliations, publication places, dedicatory formulas, disputation details) that would dominate any text analysis but do not reflect the substantive content of works. To isolate semantic content, I submit each translated title to OpenAI with a structured cleaning prompt:

Clean the following historical German title by removing all formal or technical publication metadata. This includes names of authors, supervisors, presenters; dates and places of publication or presentation; university names; edition details; references like 'Seite 368', 'Anmerkung 347', or '5. Kapitel des Matthäus'; and any formal dedications or disputation formulas. Keep the remaining wording in German as close to the original as possible. Do not paraphrase or summarize. Output only a valid JSON object with a single key 'cleaned' that contains the cleaned German title as a string.

This process yields four parallel versions of each title: (i) original text, (ii) modern German translation, (iii) modern English translation, and (iv) cleaned German translation with metadata removed.

Stage 3: Lemmatization and Linguistic Processing

I lemmatize all four text versions using spaCy's large German (`de_core_news_lg`) and English (`en_core_web_lg`) language models. Lemmatization reduces inflected forms to dictionary headwords (e.g., German *glaubten* → *glauben*; English *believing* → *believe*), improving comparability across texts.

I then apply extensive filtering to remove noise:

- **Stopword removal:** Eliminate function words (articles, prepositions, pronouns) using extended stopword lists
- **Named entity filtering:** Remove person names, places, and organizations identified by spaCy's named entity recognizer
- **Custom stemming:** Merge near-duplicate lemmas sharing roots (e.g., *evangelisch*, *evangelium* → *evangel*)
- **Generic term removal:** Drop academic (*disputation*, *professor*, *dissertation*) and geographic terms (*Leipzig*, *Wittenberg*, *Ingolstadt*) that dominate frequency distributions but carry no content.

The output consists of tokenized, lowercased, lemmatized texts ready for quantitative analysis.

Stage 4: TF-IDF Filtering

To focus on semantically informative words for the bigram-based approach, I apply term frequency-inverse document frequency (TF-IDF) filtering. This retains words that are common within individual documents but not ubiquitous across the corpus—precisely the terms most likely to differentiate Catholic from Protestant texts.

Filtering criteria:

- Minimum document frequency: 5 (excludes extremely rare words likely to be OCR errors or idiosyncrasies)
- Maximum document frequency: 90% (excludes filler terms appearing in nearly all documents)

- Within-document TF-IDF threshold: 0.05 (retains only terms with sufficient weight)
- Inverse document frequency ceiling: 8 (excludes terms too rare to be informative)

Stage 5: Embedding Construction

I create dense vector representations of titles using OpenAI’s `text-embedding-3-small` model, which produces 1,536-dimensional embeddings. These embeddings capture semantic content in a continuous vector space, enabling machine learning classification. I generate three parallel embedding sets:

1. **Raw translation embeddings:** Based on full translated titles including metadata
2. **Cleaned semantic embeddings:** Based on metadata-removed titles
3. **TF-IDF filtered embeddings:** Based on texts after stopword and rare-term removal

Embeddings are computed in parallel batches and serialized in a single `.pkl` file for efficient access. The main analysis uses cleaned semantic embeddings to balance content preservation with noise reduction.

Stage 6: Deduplication

Historical printing includes many reprints and near-duplicate editions (e.g., second edition with minor revisions, reprints in different cities). To prevent overweighting popular works, I perform near-duplicate detection:

- Compute cosine similarity between all title pairs sharing the same author
- Group titles with similarity > 0.95 into connected components using graph clustering
- Within each group, retain only the earliest publication (by year)

This removes 37,942 reprints and near-duplicates, reducing the final corpus to 53,846 unique substantive titles.

Stage 7: Topic Modeling

Finally, I enrich the dataset with topic assignments using BERTopic, a transformer-based topic modeling approach. I fit the model on cleaned semantic embeddings using a UMAP–HDBSCAN pipeline to identify latent thematic clusters. The algorithm initially identifies 90+ topics, which I reduce to 30 clusters through hierarchical clustering of related topics.

D.2 Computation of Partisanship Measures

With the cleaned and deduplicated corpus prepared as described in Section D.1, I compute measures of confessional partisanship at both the document and decade level. I employ two complementary approaches: (1) an embedding-based logistic regression classifier that captures semantic content in high-dimensional vector space, and (2) a bigram-based classifier following Gentzkow, Shapiro, and Taddy (2019) that provides interpretable linguistic features. Both approaches yield consistent results, validating that the measured differentiation reflects genuine confessional content rather than methodological artifacts.

Document-Level Predicted Probabilities

For each decade t , I estimate the probability that each title originates from a Protestant town using the following procedure:

Step 1: Balanced sampling. Draw a balanced sample of Catholic and Protestant titles (downsampling the majority group if necessary to achieve 50-50 balance). This prevents the classifier from simply learning that one confession produced more titles.

Step 2: Classifier training. Fit an ℓ_2 -penalized (ridge) logistic regression using the 1,536-dimensional embedding vectors as features. The ridge penalty ($\lambda = 1.0$) prevents overfitting in the high-dimensional feature space. The model estimates:

$$(34) \quad \Pr(y_i = \text{Protestant} \mid \mathbf{x}_i) = \frac{1}{1 + \exp(-\mathbf{x}'_i \boldsymbol{\beta})},$$

where \mathbf{x}_i is the embedding vector for title i and $\boldsymbol{\beta}$ is the coefficient vector.

Step 3: Prediction. For each title i in decade t , compute the predicted probability $\hat{p}_i^{(r)}$ in repetition r .

Step 4: Bootstrap aggregation. Repeat steps 1-3 for $n = 500$ bootstrap iterations, each time resampling the training data. Compute the mean predicted probability:

$$(35) \quad \hat{p}_i = \frac{1}{n} \sum_{r=1}^n \hat{p}_i^{(r)}.$$

The distribution across repetitions provides bootstrap-based standard errors and 95% confidence intervals.

Step 5: Placebo benchmark. To assess whether observed differentiation could arise from chance alone, repeat steps 1-4 with randomly permuted Protestant/Catholic labels (preserving the within-decade confession share). This generates a null distribution of predicted probabilities under the hypothesis of no confessional differentiation.

The resulting document-level dataset contains, for each title: mean predicted probability \hat{p}_i , standard error, confidence interval, and placebo prediction. Appendix Table D.1 reports examples of highly predictive titles by decade.

Decade-Level Average Partisanship

I aggregate document-level predictions to construct the main time-series measure of confessional differentiation. For each title i with true confessional label $y_i \in \{0, 1\}$ (where 1 = Protestant), compute the posterior probability of correct classification:

$$(36) \quad \text{CorrectPost}_i = y_i \hat{p}_i + (1 - y_i)(1 - \hat{p}_i).$$

This equals \hat{p}_i if the title is Protestant, and $1 - \hat{p}_i$ if Catholic—i.e., the probability that an observer who sees only the title text would correctly infer its confessional origin.

The decade-level measure is:

$$(37) \quad \text{Average Partisanship}_t^{\text{text}} = \frac{1}{N_t} \sum_{i \in t} \text{CorrectPost}_i,$$

the mean probability of correct classification across all titles in decade t . By construction:

- Average Partisanship $_t^{\text{text}} = 0.5$ indicates no information: titles are equally likely Catholic or Protestant regardless of content
- Average Partisanship $_t^{\text{text}} \rightarrow 1$ indicates nearly perfect separation: titles' confessional origin is evident from text alone

I compute 95% confidence intervals from the bootstrap distribution of \hat{p}_i across 500 repetitions. For the placebo benchmark, I replace \hat{p}_i with predictions from permuted labels to obtain a null distribution. Appendix Figure D.3 plots the resulting time series with confidence intervals and placebo bands.

Out-of-Sample Performance (AUC)

As a complementary measure robust to class imbalance, I compute the area under the receiver operating characteristic curve (AUC). In each of the 500 bootstrap repetitions:

1. Randomly split decade t 's titles into 80% training and 20% hold-out test sets
2. Train the classifier on the training set
3. Evaluate performance on the held-out test set
4. Compute the AUC: the probability that a randomly chosen Protestant title receives a higher predicted probability than a randomly chosen Catholic title

I report the mean AUC across 500 repetitions, along with bootstrap confidence intervals and the placebo distribution under permuted labels. The AUC provides a fully out-of-sample measure of predictive power, ensuring results are not driven by overfitting. Values near 0.5 indicate random guessing; values near 1.0 indicate perfect discrimination.

Bigram-Based Classification

For interpretability, I replicate the analysis using bigram frequencies as features instead of embeddings. This approach sacrifices some predictive power (bigrams cannot capture long-range semantic relationships) but provides transparent linguistic markers of confessional affiliation.

For each decade, I:

1. Construct a document-term matrix of bigram frequencies (e.g., "heilig geist," "göttlich gesetz")
2. Retain bigrams appearing in at least 5 documents (reducing noise from rare terms)
3. Fit ℓ_2 -penalized logistic regressions on balanced samples

4. Compute predicted probabilities and aggregate to average partisanship using the same formula

Additionally, I record the mean coefficient $\bar{\beta}_{\text{bigram}}$ for each bigram across 500 bootstrap iterations and rank bigrams by absolute coefficient magnitude. Appendix Table D.2 lists the ten most predictive bigrams for Protestant and Catholic affiliation by decade, providing a transparent view of the linguistic markers driving differentiation.

D.3 Robustness and Thematic Analysis

This section documents robustness checks and additional analyses that complement the main results on partisanship in printing presented in Section 4. I first assess sensitivity to methodological choices (text representation, out-of-sample validation, finite-sample bias). I then explore thematic patterns in confessional language using moral foundations dictionaries.

Robustness to Text Representation

A key concern is whether results depend on the specific text representation (embeddings vs. bigrams). If so, findings might reflect artifacts of the embedding model rather than genuine confessional differentiation. Appendix Figure D.2 reports average partisanship using bigram-based ℓ_2 -penalized logistic regression instead of embeddings. Panel A shows results for all titles; Panels B and C split by religious versus non-religious subjects.

The bigram-based series closely mirrors the embedding-based measure (Figure D.1). This robustness across feature representations confirms that observed differentiation reflects genuine confessional content rather than methodological choices.

Most Predictive Titles and Bigrams

To verify that classifiers capture meaningful theological content rather than noise, Appendix Tables D.1 and D.2 list the most predictive titles and bigrams by decade.

Out-of-Sample Validation (AUC)

To ensure results are not driven by overfitting, I re-estimate decade-level partisanship using held-out test sets and report the area under the ROC curve (AUC). Appendix Figure D.3 plots AUC by decade for all titles (Panel A), religious titles (Panel B), and non-religious titles (Panel C). The temporal pattern remains qualitatively unchanged. This out-of-sample validation confirms that classifiers genuinely learn confessional patterns rather than overfitting training data.

Finite-Sample Benchmark

A concern with any classification exercise is whether observed differentiation could arise from chance alone given finite sample sizes. To assess this, I benchmark results against a random-label placebo. In each bootstrap iteration, I randomly permute Protestant/Catholic labels within each decade and re-estimate

the classifier. The resulting placebo distribution captures the amount of "partisanship" that would arise purely from sampling variability.

The gray series in Appendix Figures D.2 and D.3 plot the mean placebo measure with 95% confidence intervals. The observed series lies well outside the placebo distribution in all decades after 1520, with the gap widening through 1560 and remaining large thereafter. This indicates that the measured increase in average partisanship is not driven by finite-sample bias (Gentzkow, Shapiro, and Taddy 2019).

Thematic Patterns: Universalism vs. Communitarianism

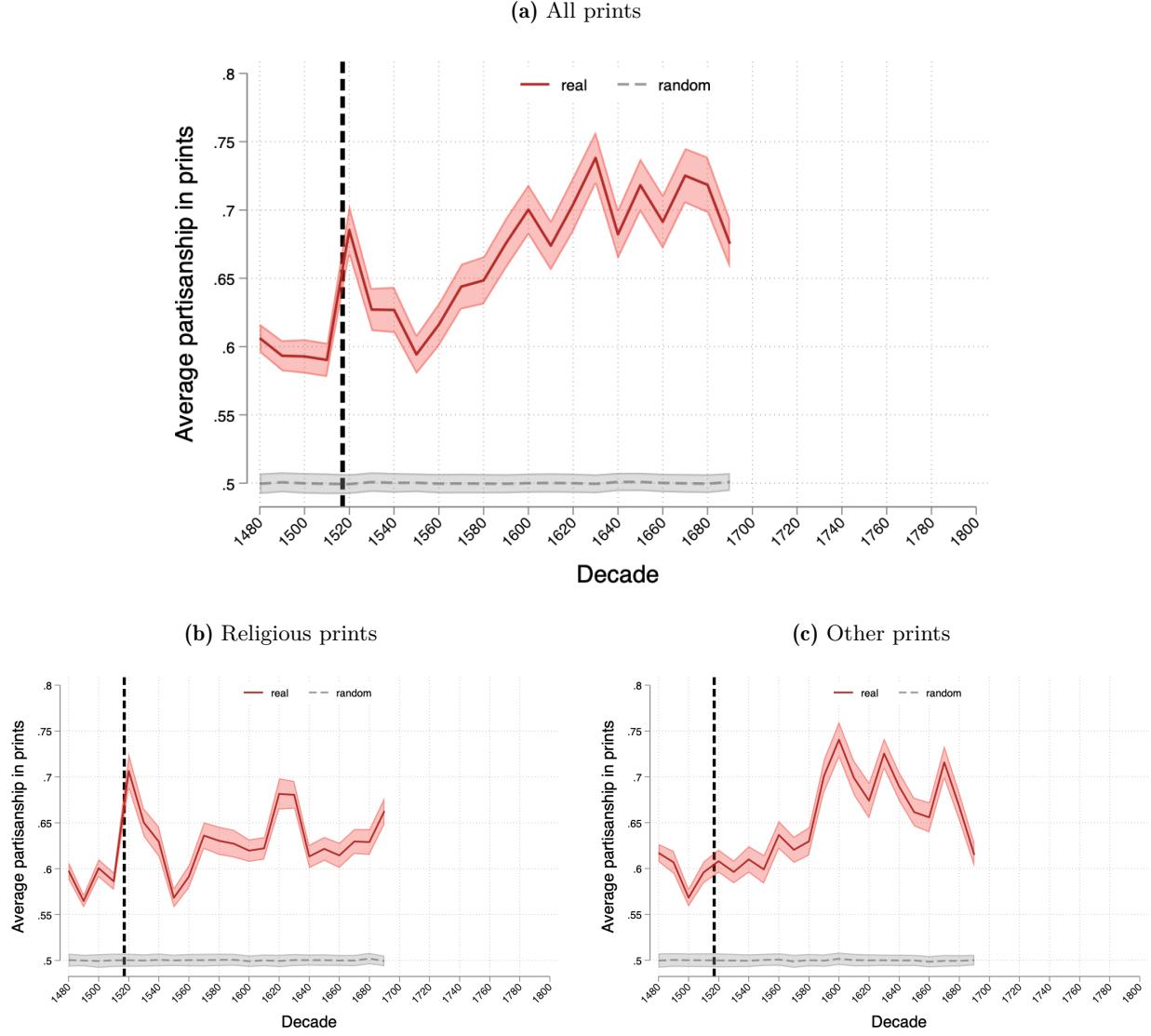
Finally, I explore what moral and ideological themes associate with confessional differentiation. Following Figueroa and Fouka (2023), I use the Moral Foundations Dictionary to compute the relative frequency of universalist (emphasizing shared humanity, individual rights, abstract principles) and communitarian (emphasizing group identity, tradition, collective obligations) terms in short titles. While applying modern moral dictionaries to early modern texts is necessarily anachronistic, this exercise provides suggestive evidence on thematic patterns.

Appendix Figure D.4 plots mean universalist scores (Panel A), communitarian scores (Panel B), and net universalism (Panel C) by 25-year intervals for Catholic and Protestant prints. Panel B reveals a sustained increase in communitarian language in Protestant prints from 1550 onward, especially after the start of the Thirty Years' War (1618). Catholic prints maintain relatively stable communitarian scores. Panel C shows that Protestant prints exhibit declining net universalism, driven primarily by rising communitarianism rather than falling universalism.

To formalize this pattern, Appendix Table D.3 regresses the predicted Protestant score of each title on its universalism score (universalist minus communitarian term frequency). Columns differ by included fixed effects (decade, linguistic region, subject, topic, author). Across all specifications, universalism negatively predicts Protestant classification: titles emphasizing universalist themes are less likely to be classified as Protestant, even controlling for subject matter, author, and time period.

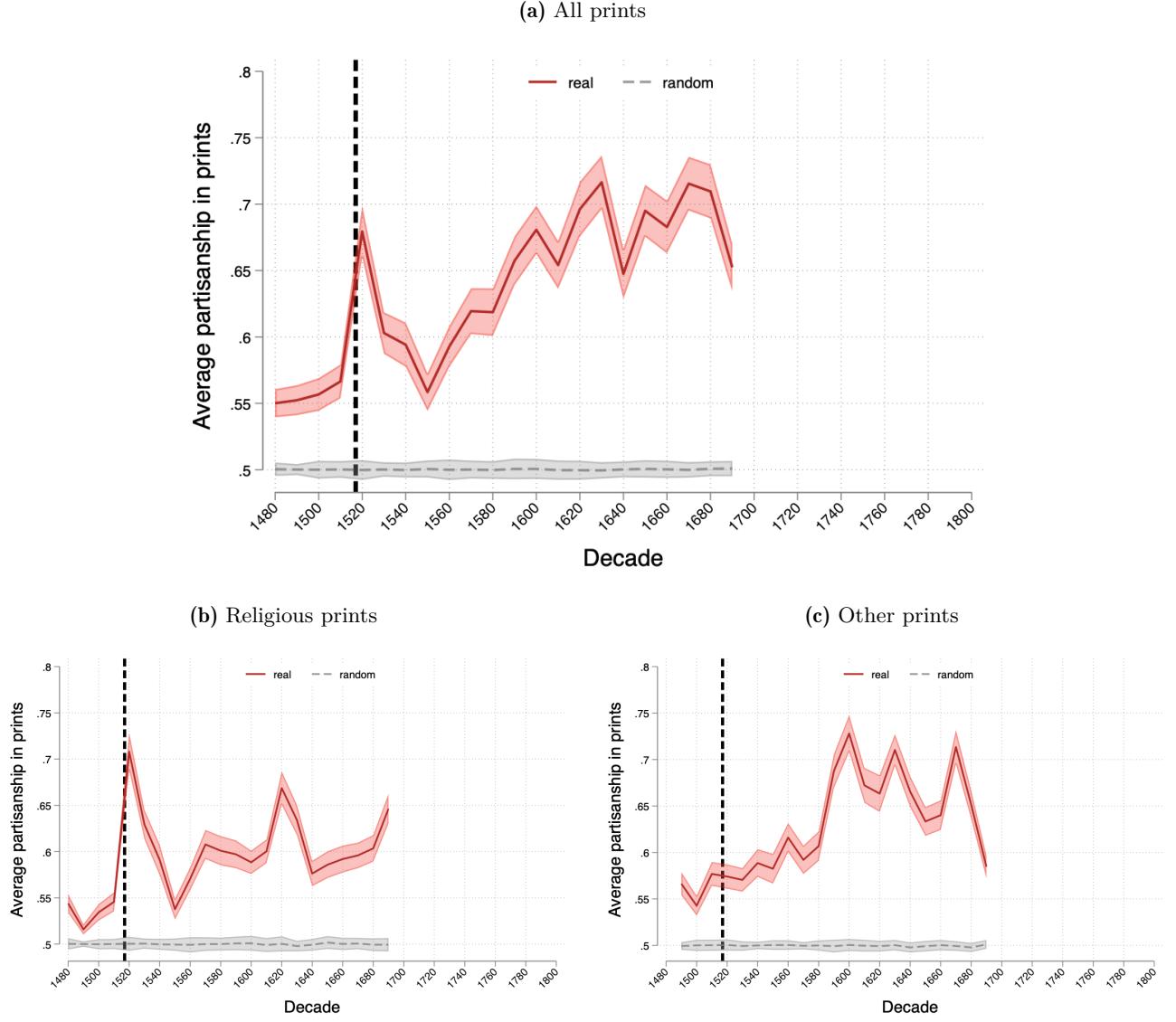
This pattern supports the interpretation that confessional differentiation reflects substantive ideological divergence: Protestant texts increasingly emphasize communal identity, group boundaries, and collective obligations, while Catholic texts maintain more universalist framing.

Figure D.1: Partisanship in short titles over time.



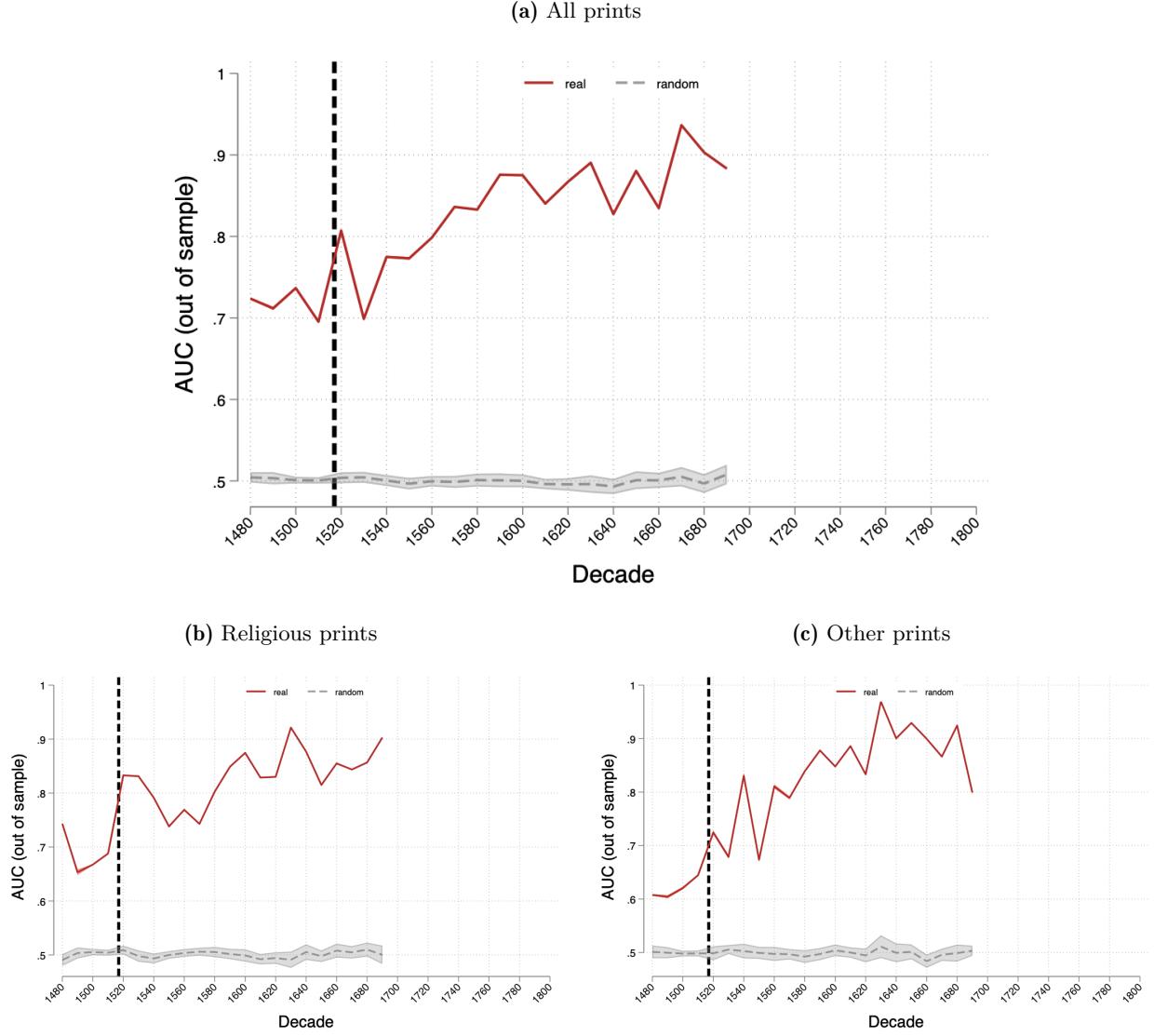
Note: This figure plots the average partisanship in print: Average Partisanship_t^{text} = $\frac{1}{N_t} \sum_{i \in t} [y_i \cdot \hat{p}(x_i) + (1 - y_i) \cdot (1 - \hat{p}(x_i))]$, where $\hat{p}(x_i)$ is the predicted probability that title i was published in a Protestant location. The red line shows estimates based on true Protestant and Catholic labels, with 95% confidence intervals from 500 bootstrap iterations. The gray line shows the distribution under randomly reshuffled labels (500 iterations), providing a reference for finite-sample informativeness. Partisanship scores are estimated using a penalized logistic classifier on short-title embeddings. Panel A reports results for all short titles; Panel B restricts to religious subjects; Panel C to all other subjects. Short titles are from the *Universal Short Title Catalogue* ([Universal Short Title Catalogue 2025](#)) and cover the period 1480–1700. Details on data construction are provided in Appendix Sections D.1–D.2.

Figure D.2: Partisanship in short titles over time (bigram-based approach).



Note: This figure plots average partisanship of short titles Average Partisanship_t^{text} by decade using bigram frequencies as features. The red line shows estimates from 500 iterations of an ℓ_2 -penalized logistic regression classifier, with 95% confidence intervals. The dashed gray line shows the corresponding placebo distribution based on randomly permuted labels. Panel A reports results for all short titles; Panel B restricts to titles with subject "Religious"; Panel C to all other subjects. The temporal pattern closely mirrors the embedding-based results (Figure D.1), with correlation 0.94 between decade-level measures, confirming robustness across text representations. Short titles are from the *Universal Short Title Catalogue* (2025) and cover 1480–1700.

Figure D.3: Partisanship in short titles over time (out-of-sample AUC).



Note: This figure plots the predictive accuracy of short titles measured by the out-of-sample area under the ROC curve (AUC). For each decade, I repeatedly split the sample into an 80% training set and a 20% hold-out test set, fit an ℓ_2 -penalized logistic regression classifier on the embedding vectors, and compute the AUC on the hold-out set. The red line shows the mean AUC across 500 iterations with 95% confidence intervals; the dashed gray line shows the corresponding placebo distribution from 500 iterations with randomly permuted labels. Panel A reports results for all short titles; Panel B restricts to titles with subject "Religious"; Panel C to all other subjects. AUC rises from 0.5 (random guessing) pre-1520 to 0.75-0.80 post-1560, indicating that titles' confessional origin becomes increasingly predictable from content alone. The out-of-sample validation confirms results are not driven by overfitting. Short titles are from the *Universal Short Title Catalogue* (2025) and cover 1480–1700.

Table D.1: Most partisan short titles by decade (embedding-based).

| Catholic | | | | Protestant | | | |
|----------|-------------------------|--|-------|------------|--------------------|---|-------|
| Decade | Author | Text | Pr(P) | Decade | Author | Text | Pr(P) |
| 1520s | Eck, Johannes | <i>Handbook of Common Places Against the Lutherans</i> | 0.19 | 1520s | Luther, Martin | <i>A sermon. On the unjust mammon, Luke 16, and how we should do good works that are pleasing to God and that He desires from us.</i> | 0.89 |
| 1570s | Peltanus, Theodor Anton | <i>Catholica. An explanation of the number of canonical books, their authority, and legitimate interpretation.</i> | 0.10 | 1570s | Hamelmann, Hermann | <i>A sermon. Against the accusers, deceivers, crystal seekers, sorcerers, witnesses, and seers.</i> | 0.96 |
| 1620s | Rader, Matthäus | <i>On the Life of Peter Canisius of the Society of Jesus, the First Companions from Germany, Three Books</i> | 0.08 | 1620s | Arndt, Johann | <i>Apologetic Repetition. That is: Repetition and Defense of the Doctrine of True Christianity: for further information or instruction of those who love Christ and piety, so that they may not be led astray by the godless world.</i> | 0.88 |
| 1670s | Haunold, Christoph | <i>Four Books of Speculative Theology Adapted to Scholastic Lectures and Exercises: Responding to the Parts of the Summa of St. Thomas, in which Selected Opinions of Recent Theologians are Discussed to Address Major Difficulties</i> | 0.06 | 1670s | Strauch, Aegidius | <i>The days of Purim, of the Evangelical-Lutheran named Christian hearts: for their holy observance, initiated by Luther for the expulsion of the papist sourdough, has been encouraged by Aegidius Strauch out of a sense of duty.</i> | 0.81 |

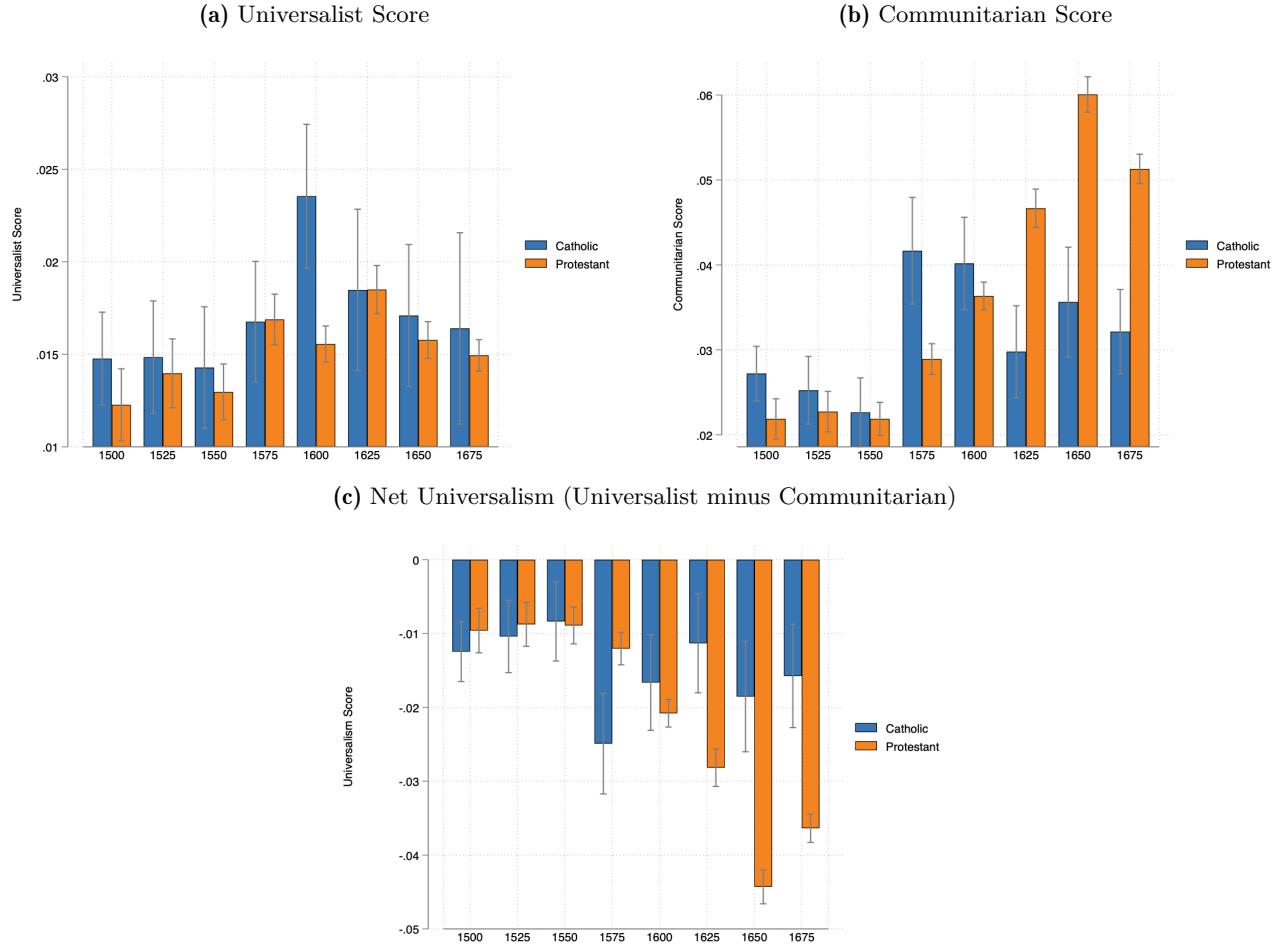
Notes: This table lists the most partisan short titles by decade, based on the embedding-based ℓ_2 -penalized logistic regression classifier. For each selected decade, the table reports the title, author, and predicted probability of being from a Protestant town (\hat{p}_i). The left panel displays the top Catholic-leaning titles (lowest \hat{p}_i), and the right panel displays the top Protestant-leaning titles (highest \hat{p}_i). Predictions are averaged over 500 bootstrap iterations; ties are broken by earliest publication date. Examples confirm that the classifier captures genuine theological content: Protestant titles emphasize scripture, evangelical teaching, and critiques of Catholic practice, while Catholic titles emphasize sacraments, church authority, and Counter-Reformation themes. See Appendix Section D.2 for details on model construction.

Table D.2: Most partisan bigrams by decade.

| Catholic | | Protestant | |
|--------------|-------------------------|------------|-------------------|
| Rank | Bigram | Rank | Bigram |
| 1520s | | | |
| 1 | enkiridion gemeinsam | 1 | predigen evangel |
| 2 | christ glauben | 2 | auslegung evangel |
| 3 | gebrauch kind | 3 | predigen sonntag |
| 4 | gott buch | 4 | prosodie syntax |
| 5 | gemeinsam ort | 5 | christ freiheit |
| 1570s | | | |
| 1 | postill auslegung | 1 | unser herr |
| 2 | latein sprache | 2 | heilig abendmahl |
| 3 | schön christ | 3 | folgend thes |
| 4 | christ welt | 4 | versuchen folgend |
| 5 | heilig christ | 5 | alt testament |
| 1620s | | | |
| 1 | diskussion unterbreiten | 1 | heilig buch |
| 2 | spanisch kanzlei | 2 | gott wort |
| 3 | theologie philosophie | 3 | unser herr |
| 4 | ursprung fortschritt | 4 | alt testament |
| 5 | verehrung heilig | 5 | wahr christentum |
| 1670s | | | |
| 1 | theologie these | 1 | akademisch bürger |
| 2 | kanonisch recht | 2 | heilig geist |
| 3 | historisch politik | 3 | studierend jugend |
| 4 | bemerkenswert ereignis | 4 | alt neu |
| 5 | jurist diskurs | 5 | kapitel vers |

Notes: This table reports the five most predictive bigrams by decade, estimated using an ℓ_2 -penalized logistic regression on bigram frequencies. For each decade, the left panel lists the top Catholic-associated bigrams (most negative coefficients), and the right panel lists the top Protestant-associated bigrams (most positive coefficients). Coefficients are averaged across 500 bootstrap iterations, and bigrams are ranked by absolute coefficient magnitude. Linguistic patterns align with known theological differences: Protestant bigrams emphasize "göttlich wort" (divine word), "evangelisch lehr" (evangelical teaching), and scripture, while Catholic bigrams emphasize "heilig sakrament" (holy sacrament), "römisch kirch" (Roman church), and church authority. See Appendix Section D.2 for details on model construction and averaging procedure.

Figure D.4: Moral foundations in short titles: universalism vs. communitarianism.



Note: This figure plots mean moral foundation scores with 95% confidence intervals by 25-year interval for Catholic (orange) and Protestant (blue) short titles. Panel A shows the average universalist score (emphasizing shared humanity, individual rights, abstract principles); Panel B shows the average communitarian score (emphasizing group identity, tradition, collective obligations); Panel C shows net universalism (universalist minus communitarian scores). Scores are computed using the Moral Foundations Dictionary following Figueroa and Fouka (2023). Protestant prints show a sustained increase in communitarian language from 1550 onward, especially after the Thirty Years' War (1618), while Catholic prints maintain relatively stable scores. This suggests Protestant texts increasingly emphasize confessional community boundaries, consistent with historical accounts of Protestant identity formation.

Table D.3: Universalism and predicted Protestant score of titles.

| | Probability Protestant | | | | | | | |
|-----------------------|------------------------|----------------------|----------------------|---------------------|----------------------|----------------------|--------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Universalism Score | -0.254*** [0.010] | -0.194*** [0.010] | -0.182*** [0.007] | -0.023** [0.009] | -0.143*** [0.010] | -0.048*** [0.007] | -0.015* [0.006] | -0.043*** [0.007] |
| Decade FEs | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Linguistic region FEs | No | No | Yes | No | No | No | No | No |
| Subject FEs | No | No | No | Yes | No | No | Yes | No |
| Topic FEs | No | No | No | No | Yes | No | No | Yes |
| Author FEs | No | No | No | No | No | Yes | Yes | Yes |
| <i>R</i> ² | 0.012 | 0.062 | 0.558 | 0.298 | 0.157 | 0.629 | 0.716 | 0.645 |
| Observations | 53846 | 53846 | 53399 | 51829 | 53846 | 52771 | 50827 | 52771 |

Notes: This table reports estimates from regressions of the predicted Protestant score of a document (from the embedding-based ℓ_2 -penalized logistic regression classifier) on its universalism score, defined as the difference between normalized universalist and communitarian word frequencies. Columns differ by the set of fixed effects included: decade, linguistic region, subject (USTC classification), topic (from the BERTopic model), and author. The negative coefficient indicates that titles emphasizing universalist themes are less likely to be classified as Protestant, even controlling for subject matter, authorship, and time period. This supports the interpretation that confessional differentiation reflects substantive ideological divergence: Protestant texts increasingly emphasize communal identity and group boundaries, while Catholic texts maintain more universalist framing. Standard errors are clustered at the author level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Appendix D References

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- Gentzkow, Matthew, Jesse M. Shapiro and Matt Taddy (2019). “Measuring Group Differences in High-Dimensional Choices: Method and Application to Congressional Speech”. *Econometrica* 87(4), pp. 1307–1340.
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E Conceptual Framework: Technical Details

This appendix provides formal derivations and extensions of results stated in Section 7. Section E.1 derives individual choice, aggregation, and steady-state dynamics. Section E.2 sketches how doctrine and enforcement could arise from church competition.

E.1 Framework Derivations

This subsection provides technical details supporting the conceptual framework in Section 7.

E.1.1 Individual Choice and Aggregation

Individual i 's utility maximization yields the first-order condition:

$$(38) \quad \frac{\partial u_{i,\ell,t}}{\partial a} = -2\kappa_{\ell,t}(a - \theta_g) - 2\lambda(a - \bar{a}_{g,\ell,t-1}^{\text{local}}) - 2\gamma(a - \theta_i) = 0$$

Rearranging terms yields the optimal identity:

$$(39) \quad a_{i,\ell,t}^* = \frac{\kappa_{\ell,t}\theta_g + \lambda\bar{a}_{g,\ell,t-1}^{\text{local}} + \gamma\theta_i}{\kappa_{\ell,t} + \lambda + \gamma}$$

Interior Solutions. Since $0 \leq \theta_g, \bar{a}_{g,\ell,t-1}^{\text{local}}, \theta_i \leq 1$ and parameters $\kappa, \lambda, \gamma > 0$, the solution is a convex combination of inputs bounded in $[0, 1]$.

Taking expectations over individuals in confession g , town c :

$$(40) \quad \bar{a}_{g,\ell,t} = \mathbb{E}_{i \in g,\ell}[a_{i,\ell,t}^*] = \frac{\kappa_{\ell,t}\theta_g + \lambda\bar{a}_{g,\ell,t-1}^{\text{local}} + \gamma\mu}{\kappa_{\ell,t} + \lambda + \gamma}$$

where $\mu = \mathbb{E}[\theta_i]$. Since both Catholics and Protestants draw from the same distribution F , differences in group means emerge solely from θ_g and $\bar{a}_{g,\ell,t-1}^{\text{local}}$.

E.1.2 Steady State Logic

In a steady state where enforcement is constant $\kappa_{\ell,t} = \kappa_\ell$ and expectations have converged ($\bar{a}_t = \bar{a}_{t-1}$):

$$(41) \quad \bar{a}_{g,\ell}^{ss} = \frac{\kappa_\ell\theta_g + \lambda \sum_{\ell'} w_{\ell\ell'} \bar{a}_{g,\ell'}^{ss} + \gamma\mu}{\kappa_\ell + \lambda + \gamma}$$

Let \mathbf{a}_g^{ss} be the vector of location means, \mathbf{W} the spatial weight matrix, and \mathbf{K} the diagonal matrix of enforcement intensities. In matrix notation:

$$(42) \quad [(\mathbf{K} + \gamma\mathbf{I}) + \lambda(\mathbf{I} - \mathbf{W})]\mathbf{a}_g^{ss} = [\mathbf{K}\theta_g + \gamma\mu]\mathbf{1}$$

Solving for the steady state vector:

$$(43) \quad \mathbf{a}_g^{ss} = [(\mathbf{K} + \gamma\mathbf{I}) + \lambda(\mathbf{I} - \mathbf{W})]^{-1}[\mathbf{K}\theta_g + \gamma\mu]\mathbf{1}$$

The matrix is invertible provided the spectral radius of \mathbf{W} is appropriately bounded and $\kappa, \gamma > 0$.

E.1.3 Feedback and Divergence

The feedback loop driving acceleration relies on the relationship between beliefs and realized outcomes. Let $\pi_{n|g}$ be the average probability a member of group g chooses name n . The realized Protestant share in usage at time $t - 1$ is:

$$(44) \quad \tilde{s}_{n,\ell,t-1} = \frac{N_P \pi_{n|P,t-1}}{N_P \pi_{n|P,t-1} + N_C \pi_{n|C,t-1}}$$

where N_P and N_C are Protestant and Catholic population sizes. For the analysis I assume parents observe these realized frequencies perfectly.

The framework suggests but does not prove the following mechanism. If a name has a slightly Protestant reputation ($s_{n,t-1} > 0.5$), and assuming $\bar{a}_{P,t-1} > \bar{a}_{C,t-1}$, then $\pi_{n|P,t-1} > \pi_{n|C,t-1}$ due to sorting utility. This implies $\tilde{s}_{n,\ell,t-1} > s_{n,\ell,t-1}$. The update equation then increases $s_{n,t}$, making Protestants at time t even more likely to choose name n . Whether this feedback generates instability around neutral signals, and under what conditions names tip toward one confession versus the other, remains to be characterized formally. The framework provides a structure for thinking about these dynamics but does not yet prove them.

E.1.4 Connections to Literature

Learning on networks. The belief-updating mechanism builds on DeGroot (1974), where agents form beliefs as weighted averages of neighbors' beliefs. I adapt this to learn about name meanings from observed aggregate patterns. Golub and Jackson (2010) show DeGroot dynamics converge under complete networks but exhibit path-dependence under incomplete observation. The spatial network structure introduces persistent divergence across regions. The innovation is embedding learning in a choice model where beliefs determine individual actions that aggregate to generate the frequencies being learned—creating potentially self-fulfilling dynamics.

Identity and conformity. Stage 1 follows Shayo (2009), where individuals balance external pressure and internal preferences. I add spatial conformity to peer behavior. The quadratic specification generates tractable weighted-average solutions standard in spatial models.

Cultural persistence without vertical inheritance. Unlike Bisin and Verdier (2001), the framework

generates persistence through accumulated beliefs and spatial patterns rather than parent-child transmission of preferences. Individual preferences θ_i are drawn fresh each period, yet system-level patterns persist through conformity operating on individual choices and learned conventions about name meanings.

E.2 Endogenizing Doctrine and Enforcement

The main model takes church doctrinal positions θ^C, θ^P and enforcement capacity κ_ℓ as exogenous. This section sketches how these parameters could emerge from church competition dynamics, providing intuition rather than a formal equilibrium model.

Core Mechanism

Pre-Reformation (Catholic Monopoly): Without competition, the Catholic Church faced limited pressure to foster sharp confessional identity. Doctrine remained moderate, enforcement capacity for identity formation was minimal.

Post-Reformation (Competitive Entry): Protestant entry creates incentives for: (i) doctrinal differentiation to distinguish from competitors and reduce ruler defection risk, and (ii) enforcement investment to prevent member defection and maintain commitment.

Why differentiation over convergence? Two complementary forces drive divergence. First, a *club good mechanism* (Iannaccone 1992): more stringent requirements screen out free-riders, generating higher-quality congregations. Clearer doctrinal positions create stronger boundaries. Second, *political stability*: under *cuius regio, eius religio*, greater doctrinal distance reduces the ruler's temptation to switch allegiances, stabilizing each church's revenue base. This parallels product differentiation in oligopoly—minimal differentiation leads to intense competition for the same clients.

Implications

This logic suggests competition generates: (i) divergent doctrines ($\theta^C \neq \theta^P$), (ii) positive enforcement ($\kappa > 0$), and (iii) complementarity between doctrine and enforcement—extreme positions require enforcement capacity to actualize.

Improvements in enforcement technology (printing press, educational infrastructure) reduce the cost of building capacity, amplifying equilibrium divergence once competition arrives. Later moderation (post-1650) could reflect declining differentiation benefits as territorial boundaries stabilized.

Spatial variation in enforcement arises from differential access to technology: proximity to theological colleges, administrative capacity for visitation systems, printing infrastructure, political support from territorial rulers, and local institutional presence.

Connection to Main Framework

This sketch suggests why the Reformation triggered doctrinal polarization and enforcement investment, but does not provide full microfoundations. The main analysis takes doctrine and enforcement as given institutional features and focuses on their consequences for identity formation.

Appendix E References

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