Identity and Institutional Change: Evidence from First Names in Germany, 1700–1850

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Abstract

How does culture respond to institutional change? We study the collapse of the Holy Roman Empire (1789–1815), when half of Central Europe changed rulers. Using 15 million birth records from hundreds of cities between 1700 and 1850, we measure cultural traits in real time. Cities that experienced ruler change saw greater naming turnover, dispersion, and novelty. We construct control groups using diplomatic records to isolate these effects, which emerged immediately and persisted. The collapse of hegemonic authority weakened state-aligned identities while strengthening religiosity and nationalism. These shifts undermined subsequent state building, highlighting challenges of ideological integration after regime change.

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Here and today, a new epoch in the history of the world has begun, and you can say you were present at its birth.

Johann Wolfgang von Goethe, after the Battle of Valmy (1792)

It seems to me to be the greatest single shift in the consciousness of the West that has occurred, and all the other shifts which have occurred in the course of the nineteenth and twentieth centuries appear to me in comparison less important, and at any rate deeply influenced by it.

Isaiah Berlin

1 Introduction

Institutions impact culture. A rich literature examines both the persistence of cultural traits arising from institutional shifts (Voigtländer and Voth, 2012; Guiso et al., 2016; Becker et al., 2016) and the coevolution of institutions and culture (Lowes et al., 2017; Giuliano and Nunn, 2021; Bisin and Verdier, 2024). Effects are often measured in the long run, after uncertainty about institutional trajectories has been resolved, or when a reinforcing feedback loop between institutions and culture has occurred. In contrast, critical junctures — such as major institutional transitions (Acemoglu and Robinson, 2012) — are characterized by openness to multiple possible trajectories. How does culture respond and adapt in the immediate aftermath of such institutional shocks? How does identity accompany and potentially guide the selection of a new institutional equilibrium? And how do cultural shifts interact with state-building efforts?

Addressing these questions is central for understanding the dynamics of cultural and institutional change. However, a limiting factor is the scarcity of high-frequency, spatially disaggregated measures of cultural traits that enable consistent comparisons over time, combined with sharp and plausibly exogenous institutional variation (Callen et al., 2024).

In this paper, we study the collapse of the Holy Roman Empire following the French Revolutionary and Napoleonic Wars (1789–1815). Our setting presents a series of features that make it particularly suitable to study cultural evolution in the context of critical junctures. First, it marked a drastic and regionally varied political reordering. At its peak, the Empire was the largest political entity in Central and Western Europe. By 1815, more than half of the thirty million inhabitants of its constituent states had come under new rulers, creating large variation in how different cities experienced the transition — some changed rulers, while others did not. Second, this regime change was sudden, unexpected, and top-down, dictated by external powers rather than local populations or local rulers. The end of the Empire must be sought "in the sphere of high politics" (P. H. Wilson, 2006, p. 712). Third, the period marked a profound cultural disruption: contemporaries described the "tripled and quadrupled speed of life" (Schopenhauer, 1986, p. 30) in letters and diaries.[1] As a measure of cultural traits, we analyze first name choices for millions of individuals born between 1700 and 1850 across hundreds of towns and villages on an annual basis.

[1] In neighboring France, Émile Durkheim reflected on the consequences of this instability, arguing that "so grave and rapid an alteration as this must be morbid; for a society cannot change its structure so suddenly" (Durkheim, 1952 [1897], p. 369).

Our analysis proceeds in four steps. We first describe the historical context — the cultural landscape of the states of the Holy Roman Empire, the institutional collapse of a subset of these states, and its repercussions on the dominant cultural identities — and conceptualize our analysis through a formal framework. In our model, a (political and cultural) hegemon can pull the distribution of cultural traits toward his ideal point (Gramsci, 1971). The weakening or removal of the hegemon results in a cultural shift: chosen traits change, becoming more varied and extreme. The identities expressed in the newly chosen actions are less reflective of hegemon preferences, and more closely aligned with the underlying distribution of preferences in the population. We characterize the dynamic conditions under which new rulers will fail to re-consolidate hegemony.

Turning to our data, we next confront the model predictions with first name choices in German towns and villages between 1700 and 1850. We document how, in the immediate aftermath of the collapse of centuries-old dynasties, the distribution of names shifted immediately and persistently: name choices were less likely to follow prior patterns, became more dispersed, and were more likely to reflect novelty. These changes were particularly marked in locations that changed their rulers between 1789 and 1815. Employing a difference-in-differences approach, we compare cities that experienced ruler change with carefully constructed control groups. To strengthen identification, we leverage exogenous variation in diplomatic negotiations, specifically the role of family ties to decision-makers in determining which states survived and which were absorbed into new states.

In a third step, we examine mechanisms. Our framework suggests that the collapse of hegemony — the emergence of a state vacuum (Marchais et al., 2024) — opened the door for alternative identity choices. Consistent with this, we find that our main effects are more marked in areas where ruler capacity was initially higher and muted where the collapse was less severe. In contrast, we find no support for alternative mechanisms such as access to new ideas via economic change or war. We further test this hypothesis by measuring the ideological content of names, characterizing the direction of cultural change: treated cities saw a decrease in loyalist names, i.e. names linked to local rulers, and an increase in religious and nationalist names. These effects were particularly pronounced where local populations and post-1815 rulers were culturally mismatched.

Finally, we investigate the persistence of cultural shifts in the long run, beyond 1815. We find that fewer notable loyalist, and more nationalist and religious actors, originated from treated cities. These cities were also more likely to hold national festivals, establish national associations, and produce revolutionaries during the uprisings of 1848, suggesting that institutionalization reinforced long-run cultural change and undermined state-building.

Our paper contributes to several strands of research. First, we add to the growing literature that uses first names as a tool to measure cultural traits, including nationalism (Jurajda and Kovač, 2021; Assouad, 2021), religiosity (Andersen and Bentzen, 2022), individualism (Bazzi et al., 2020; Beck Knudsen, 2021), ethnicity (Fryer and Levitt, 2004), and immigrant assimilation (Abramitzky et al., 2020; Fouka, 2020; Algan et al., 2022). This literature is part of a broader effort in the social sciences to understand how cultural imprints are reflected in naming practices (Dupâquier et al., 1984; Lieberson and Bell, 1992; S. Wilson, 1998; Lieberson, 2000; Bloothooft and Onland, 2011).

Second, we contribute to the literature on the origins and persistence of cultural traits (Alesina and Giuliano, 2015; Giuliano and Nunn, 2021; Nunn, 2022; Voigtländer and Voth, 2012), with a specific focus on the interplay between institutions and culture (Grosjean, 2011; Grosfeld and Zhuravskaya, 2015; Lowes et al., 2017). While much of this literature documents the long-run persistence of cultural traits, our study highlights how institutional change can induce an immediate and rapid cultural shift in a panel setting.

Finally, our paper speaks to the literature on the formation and intergenerational transmission of identity (Bisin and Verdier, 2001; 2011), particularly in the context of 19th-century Central Europe (Kersting and Wolf, 2021; Dehdari and Gehring, 2022; Falck et al., 2012).[2] Unlike previous studies, which focus on specific dimensions of identity, we provide a comprehensive view of cultural traits, nesting multiple identity spheres, and tracing their evolution through naming practices, political movements, and institutional development.

The remainder of this paper is structured as follows. Section 2 provides a historical background on the Holy Roman Empire and its collapse. Section 4 describes the data and construction of treatment and control groups. Section 5 outlines our empirical strategy and main results. Section 6 explores the mechanisms behind cultural shifts, focusing on state vacuum and institutionalization. Section 7 concludes and discusses broader implications for state-building and nationalism.

2 Historical Background

2.1 Culture in the States of the Holy Roman Empire

The Holy Roman Empire comprised several hundred quasi-sovereign states in Central Europe. Although nominally subject to the Emperor, each state exercised autonomous control over taxation, justice, and policing; state capacity resided largely with individual rulers.[3] This political and ideological framework was characterized by remarkable stability: by 1789, the median city had experienced roughly 280 years of rule by the same dynasty. With this came considerable cultural influence of rulers, who appropriated Christian and Germanic symbolism to legitimize their authority and to align popular behavior with state objectives. Three core types of identities can be discerned here:

Loyalist Identity. To project cultural hegemony, local officials amplified court rituals — such as funerals, coronations, and birthdays — through illustrated broadsheets, pamphlets, and public ceremonies (Brüggemann, 2012). From the sevententh century, Prussia and other German states introduced compulsory elementary schooling designed to produce obedient, politically reliable subjects (Barkin, 1983; Töpfer, 2012; Paglayan, 2024).[4]

[2] Closest to our paper is Kersting and Wolf (2021), who examine short-term effects of nation-building policies in select Prussian cities.

[3] We subsume under the term 'ruler' all specific titles of the leaders of these individual states (king, prince-elector, margrave, prince-bishop,. . .).

[4] Reflecting on the underlying aims of Prussian education policy, Alexander (1919, p. v, cited in Paglayan, 2024, p. 102) observed: "The whole scheme of Prussian elementary education is shaped with the express purpose of making ninety-five out of every hundred citizens subservient to the ruling house and to the state."

Religious Identity. Religious identity was central to daily life in early modern Central Europe; public worship was compulsory and frequent. The 1555 Augsburg Settlement and later the Peace of Westphalia had enforced religious homogeneity within territories (Cantoni, 2015). Crucially, religious affiliation was closely tied to political loyalty: rulers styled themselves as divinely ordained, and intercessory prayers for their health and success were a staple of church liturgy (Planert, 2007). On dynastic anniversaries and birthdays, ministers were instructed to read specific biblical passages (Burgdorf, 2009, p. 216).

National Identity. Despite the political fragmentation of the Empire, cultural references to an abstract idea of "Germany" provided a sense of collective belonging. Linguistic unity and pre-Christian mythologies fostered a proto-national identity (Wehler, 2001).[5] Calls for greater political unity were thus heard through the 17th and 18th centuries (Herrmann, 1993; Hellmuth, 1998). Rulers countered and co-opted these currents by styling themselves as Germanic warriors, drawing on displays of pre-Christian myths (Schmidt, 2007).

The continuity of dynastic rule thus provided the backbone of cultural life in the states of the Holy Roman Empire. Loyalty to the state was constructed not merely through coercion, but by integrating the dominant religious and proto-national identities (Hardtwig, 1994). Section 4.2 documents historical evidence that naming practices reflected these pillars of identity prominently.[6]

2.2 The Collapse of the Holy Roman Empire

Between 1789 and 1815, the Holy Roman Empire collapsed. In just twenty-five years, its millennium-old political structure unraveled: 476 polities were dissolved or absorbed into larger units, reducing the total number of states to 41. Approximately twelve million individuals came under the rule of new sovereigns in Central Europe.

This transformation was catalyzed by a series of European wars driven by competition among the Great Powers — Austria, Britain, France, Prussia, and Russia. French forces first crossed the Rhine in 1794 and by 1801 had occupied territories on both sides of the river. Their advance triggered a sequence of territorial reorganizations. Between 1803 and 1815, successive peace settlements led to the dissolution of most Imperial cities, ecclesiastical domains, and minor secular principalities. Surviving states expanded, often exchanging territorial holdings for geographically contiguous ones.[7]

State outcomes were determined at the diplomatic table. The Great Powers prioritized strategic coherence and administrative efficiency over historical precedent or cultural boundaries. A central aim was to create more compact entities, a principle known as 'rounding off.'

[5] Greenfeld (1992, p. 3) notes that "the emergence of nationalism predated the development of every significant component of modernization." Wedding rituals, for example, often combined Christian rites with Germanic customary elements (Weber-Kellermann, 1974).

[6] Our empirical argument does not rely on these identity categories being exhaustive. Both historical scholarship and our data, however, suggest they constituted the most salient identity grouping at the end of the 18th century. Class and gender identities became more politically prominent only in the mid-19th century (Kocka, 1983; Nave-Herz, 1994). Enlightenment ideals, meanwhile, remained largely elite phenomena and were soon subsumed into a broader cultural nationalism. Regional identities were closely bound to local saints or rulers.

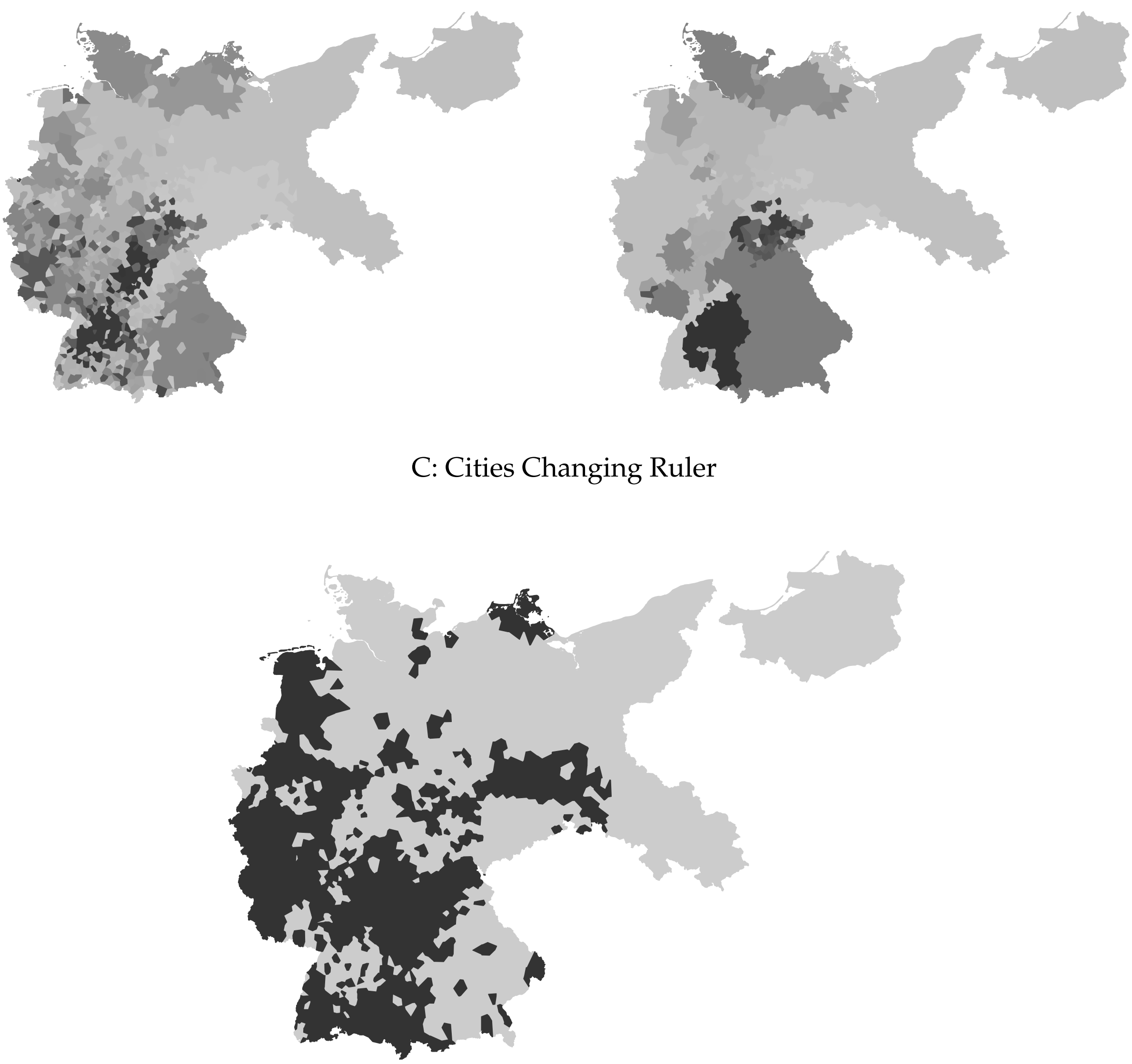
[7] Appendix Section B.1 provides a chronological overview of these territorial changes.

To facilitate this process, a dedicated *Statistical Commission* compiled population and territorial data to inform negotiations. Smaller states attempted to shape their fate through dynastic diplomacy, leveraging familial ties to major powers. Ruling families with stronger connections to the Great Powers were more likely to preserve their territorial holdings (Peterson, 1945).

Following a prolonged period of political instability, a new European order was established in 1815. A handful of states had emerged as permanent rulers in the restructured territories and set out to integrate the new territories. Figure 1 illustrates this transformation: Panel A shows the territorial configuration in 1789, Panel B the post-reorganization map of 1815, and Panel C highlights the 973 cities that changed rulers during this period. Appendix Figure A.1 shows the timing of the first ruler change for the cities in Panel C.

Figure 1: Territories and Ruler Change

A: Territories 1789 B: Territories 1815



Note The maps show the territories extant in our region of analysis in 1789 (Panel A) and 1815 (Panel B). Panel C shows cities that had a different ruler in 1789 than in 1815. Details on the data underlying the maps are given in Section 4.

2.3 Cultural Divergence During the Collapse

When new rulers assumed power after the French interlude, they found themselves in a weak position. With the notable exception of territories administered directly by the French state (Blanning, 1983; Acemoglu et al., 2011), administrative capacity had deteriorated. Identity structures of local populations had shifted away from established allegiances. The prescriptive role of state-aligned political and social structures, with their norms and customs, had weakened irreversibly. [8] This state vacuum (Marchais et al., 2024) had a lasting impact on established identity spaces:

Loyalist Identity. For subjects in the affected states, the collapse of secular authority was abrupt and disorienting. Public prayers for previous rulers continued for a long time after new states had taken over, for example in Augsburg. The removal of insignia from public spaces, the painting over of coats of arms, and the closure of schools undermined the legitimacy of secular governance. As the writer Caroline Schelling noted in 1806, "it is no pity for any of the rulers who are now going under" (cited in Burgdorf 2009, p. 198).

Religious Identity. The vacuum of authority created space for religious identity to expand beyond the reach of princely control. Clergy were no longer required to serve as symbolic intermediaries in the "divinely ordained connection between the people and their ruler" (Groote, 1955, p. 51), and personal piety underwent a marked resurgence (Carl, 2004). Religious institutions frequently resisted the new authorities.[9]

Nationalist Identity. The crisis also provided impetus to nationalism and a renewed search for national identity. As dynastic states vanished, calls for a political entity transcending dynastic particularism gained traction. Between 1814 and 1817, nationalist festivals were held across numerous localities, during which loyalist texts were ritually burned. These festivals lacked any centralized organization, even at the regional level, and were coordinated independently in several hundred cities and towns (Düding, 1987, p. 372). In 1819, the radical nationalist Karl Ludwig Sand assassinated the conservative playwright August von Kotzebue. By this point, "nationalism had developed into an oppositional strategy for those critical of the established order" (P. H. Wilson, 2016).

2.4 After 1815: (Non-)Restauration

States ultimately failed to suppress the momentum of alternative identities. Relying on a narrowly administrative mode of governance — so-called 'cabinet politics' — they were unable to articulate a compelling model of identity capable of reining in competing ideas (Aretin, 1994).

[8] Burgdorf (2009, p. 228f.) describes a "comprehensive identity confusion caused by the events between 1792 and 1815," during which the "collapse of the Empire provided space for polymorphic identity formation and sociocultural pluralization processes." Nipperdey (1996, p. 233.) writes, "Points of reference lost their former clarity, which led to the relatively rapid formation of new and specifically modern ones. Large, abstract groups became the focus for the individual — humanity or nation, the enlightened or the educated, the like-minded."

[9] In the mediatized imperial city of Ellwangen, priests refused to read sovereign decrees from the pulpit, and at the New Year's Day church assembly, participants declined to pay homage to the new royal family (Burgdorf, 2009, p. 214).

With the symbolic authority of the old order discredited, territorial rulers struggled to formulate a persuasive loyalist narrative.

Tensions were heightened in regions where state and local religious affiliations did not align.[10] A notable example is Catholic Cologne, which came under Protestant Prussian rule. Religious tensions escalated over the following decades and culminated in the 1837 arrest of the acting archbishop, Clemens August Droste zu Vischering, triggering widespread public protest.

Among nationalists, early festival culture soon gave way to more organized political mobilization. These initiatives gradually evolved into enduring forms of civic life. For example, local gymnastics clubs (*Turnvereine*) remained central to nationalist networks in the post-1815 order: in the words of Nipperdey (1996, p. 236), "[t]hey implied a private and autonomous sphere of activity free from state interference." The mounting cultural and political tensions ultimately culminated in the German Revolution of 1848/49 and the convening of the Frankfurt National Assembly.[11]

Taken together, the institutional realignments that followed the collapse of the Holy Roman Empire were accompanied by profound cultural transformation across the broader population. As one contemporary observed, "our era has brought together completely incompatible principles in the three generations alive. The enormous contrasts of the years 1750, 1789 and 1815 lack any form of transition" (Perthes, 1851, p. 146).

3 Framework

Building on the historical background, we develop a stylized framework to capture the collapse of rule, the resulting cultural realignment, and the dynamic consequences of these shifts. At the core of the model is the assumption that a hegemon can pull the distribution of cultural traits toward his ideal point, thereby influencing social behavior (Gramsci, 1971). We then analyze how culture evolves when this hegemonic influence weakens or disappears. Formal proofs are provided in Appendix Section C.

3.1 Model Setup

Timing. Time is discrete, indexed by $t \in \{0, 1, 2, \dots\}$. An initial ruler governs at $t = 0$. Rule collapses at $t = 1$. A new ruler assumes power for all $t \geq 2$.

Subjects. A continuum of subjects is indexed by $i \in [0, 1]$. Each subject has a fixed ideal point $\theta_i \in \mathbb{R}$ drawn from a distribution F with mean μ, variance $\sigma^2 > 0$, and continuous, strictly positive density f. In each period t, subject i chooses an action $a_i^{(t)} \in \mathbb{R}$.

Rulers. Each ruler has a fixed ideal point $\theta_{\text{rul}} \in \mathbb{R}$, with $\theta_{\text{rul}} \neq \mu$. The ruler's influence is captured by a scalar $\kappa^{(t)} \in [0, 1]$, representing the cultural power of the ruler in period t.

[10] Württemberg, for example, shifted from being overwhelmingly Lutheran to nearly one-third Catholic, and similar confessional imbalances emerged in Baden, Bavaria, Hessen-Darmstadt, and Nassau (P. H. Wilson, 2016, p. 659f.).

[11] Groote (1955) emphasizes the considerable personnel overlap between the leadership of early nationalist associations and the 1848 parliamentary delegates.

Subject Utility. In each period t, subject i selects $a_i^{(t)}$ to maximize:

$$u_i^{(t)}(a_i^{(t)}) = -\kappa^{(t)}(a_i^{(t)} - \theta_{\text{rul}})^2 - (1 - \kappa^{(t)})(a_i^{(t)} - \theta_i)^2.$$

The unique best response is:

$$a_i^{(t)} = \kappa^{(t)}\theta_{\text{rul}} + (1 - \kappa^{(t)})\theta_i.$$

3.2 Cultural Traits and Ruler Collapse

At $t = 1$, ruler authority vanishes: $\kappa^{(1)} = 0$. We characterize the resulting cultural shift:

Proposition 1 (Cultural traits after collapse)**.**

1. ***Turnover.*** *Actions change:*

$$\mathbb{E}[a_i^{(1)}] - \mathbb{E}[a_i^{(0)}] = \kappa^{(0)}(\mu - \theta_{rul}) \neq 0.$$

2. ***Dispersion.*** *Cultural variance increases:*

$$\text{Var}(a_i^{(1)}) > \text{Var}(a_i^{(0)}).$$

3. ***Novelty.*** *Extreme actions become more likely: there exists $\bar{\zeta} > 0$ such that for all $\zeta > \bar{\zeta}$,*

$$\mathbb{P}(|a_i^{(1)} - \mu| > \zeta) > \mathbb{P}(|a_i^{(0)} - \mu| > \zeta).$$

Corollary 1. *Cultural change intensifies in the ruler's initial cultural power $\kappa^{(0)}$, all else equal.*

3.3 Identity and Ruler Collapse

Assume F has a set of separate identity peaks $\{\theta_k\}_{k=1}^K \subset \mathbb{R}$, where $\theta_1 = \theta_{\text{rul}}$ is the identity associated with the ruler. An action a_i is *aligned with identity* k if $|a_i - \theta_k| < \delta$ for some fixed $\delta > 0$. Define the share of actions aligned with identity k in period t as:

$$S_k^{(t)} := \mathbb{P}\left(|a_i^{(t)} - \theta_k| < \delta\right).$$

Proposition 2 (Identity after collapse)**.**

1. ***Ruler alignment.*** *The share aligned with the ruler identity decreases:*

$$S_{rul}^{(1)} < S_{rul}^{(0)}.$$

2. ***Alternative identities.*** *For any $k \in \{2, \ldots, K\}$, there exists $\bar{\delta} > 0$ such that for all $0 < \delta < \bar{\delta}$,*

$$S_k^{(1)} \geq S_k^{(0)}.$$

3. ***Polarization.*** *If the pre-collapse culture is uniquely ruler-dominated and multiple alternatives strictly gain after the collapse, then polarization across identity groups increases.*

Appendix Figure A.2 illustrates key dynamics of the model in a numerical example.

Corollary 2 (Rule takeover)**.** *Suppose a new ruler enters at $t = 2$ with ideal point θ_{rul}^{new} far from the population mean, so that $|\theta_{rul}^{new} - \mu| \gg 0$. Then initial alignment with the new ruler, $S_1^{(2)}$, will be low.*

3.4 Persistence

Propositions 1 and 2 imply that cultural alignment initially shifts away from the ruler after collapse. To analyze long-run persistence, we let ruler power $\kappa^{(t)}$ evolve dynamically according to a trade-off between consolidation and cultural dispersion. Specifically,

$$\kappa^{(t+1)} = c\left(\kappa^{(t)}\right) - \mathrm{Var}\left(a_i^{(t)}\right)$$

if $0 < \kappa^{(t)} < 1$ and $\kappa^{(t+1)} = \kappa^{(t)}$ otherwise. We assume $c'(\kappa^{(t)}) > 0$.

Proposition 3 (Persistence under Weak Consolidation)**.** *For small $\kappa^{(2)}$, as well as $c(\cdot)$ sufficiently convex and spanning a range of κ:*

1. ***Ruler weakening.***
$$\lim_{t\to\infty} \kappa^{(t)} = 0.$$

2. ***Persistence of alternative identities.*** *For all k,*
$$\lim_{t\to\infty} S_k^{(t)} = S_k^{(1)}.$$

We take this framework to structure our empirical analysis.

4 Data

Our unit of analysis are the cities of the Holy Roman Empire, as depicted in the *Deutsches Städtebuch* (Keyser et al., 1939-2003).[12] Where relevant, we precisely geolocate smaller settlements and match them to the closest city in our data. We observe detailed information on territorial change, cultural change measured in naming practices, and institutional outcomes for these cities. Our main sample comprises the 690 cities for which we observe all outcomes, yearly between 1700 and 1850.[13]

4.1 Treatment: Changing Ruler

For each city, we construct an absorbing, time-varying indicator equal to one in year t if the city's pre-1789 territorial rule has been dissolved by that year (Cantoni et al., 2019). This vari-

[12] This source covers all settlements in the 1937 German borders that ever obtained city status.

[13] Where possible, we use information on all 2,390 cities. Results based on this full sample are qualitatively unaffected when subsetting to the main sample. Appendix Section D.1 details the sample composition.

able serves as our main treatment indicator. In total, 40% of cities in our sample were under a different ruler in 1815 compared to 1789.

To determine comparable control groups, we complement this treatment indicator with information about the diplomatic process that reshaped the Central European map. Our aim is to identify untreated cities that had a similar *ex ante* likelihood of ruler change. We also construct a measure of dynastic proximity by linking each ruling house to a comprehensive genealogical network of European noble families (Marek, 2018). This allows us to quantify the degree of kinship between each territory and the dominant dynasties negotiating the post-Napoleonic settlement. We discuss these identification approaches and the necessary data in section 5.3 below.

4.2 Names as an Expression of Culture

We use given names as markers of cultural identity, constructing city-year level measures of naming patterns. In early modern Central Europe, naming practices were closely tied to the expression of cultural traits.[14] Names were typically assigned by parents at baptism, which occurred shortly after birth, and recorded by local clergy in church registers.[15] Given that alternative modes for expressing identity (e.g. clothing or occupational choice) were limited during this period, naming carried particular cultural and symbolic weight. We briefly summarize historical evidence for three salient categories of names: those associated with local dynasties, names rooted in religious tradition, and names of Germanic origin.

Loyalism. Subjects expressed political loyalty by giving their children the names of the local dynasty (Angenendt, 2009). Princes were commonly referred to by their first names, and dynastic names were widely recognized (Noël, 1997): subjects encountered ruler names in church art and sermons, leaflets, and coinage.[16]

Religiosity. From the early Middle Ages onward, naming children after saints was a common expression of Catholic piety (Brückner, 1998). Protestant reformers rejected this practice (Benedict, 2009), circulating name booklets that promoted Old Testament alternatives. One such booklet, attributed to Martin Luther and aimed at a mass audience, first appeared in 1537 and remained in circulation until 1974. The Catholic Church responded by codifying an official list of saint names and days in the *Rituale Romanum* of 1614.

Nationalism. Pan-German nationalism invoked a shared cultural origin through allegedly Germanic naming traditions. Beneken (1816) compiled what he presented as the first comprehensive catalogue of authentically "Germanic" names. Earlier philological works had already

[14] Mitterauer (1993), Wolffsohn and Brechenmacher (1999), Gerhards (2010) analyze patterns and norms determining first name choices across German history; S. Wilson (1998) presents an overview of naming patterns across two millennia of Western societies. Lieberson (2000) and Twenge et al. (2010) study naming in the U.S.

[15] Importantly, the Church never issued legally binding naming guidelines (Blanke, 1962). Civil registration offices were only introduced after 1874 (Philler, 1875).

[16] Appendix Figure A.3 shows Bavarian and Saxon coins bearing dynastic names. The Bavarian coin further illustrates the close association between rulers and state-directed religion by displaying a Madonna as 'Patrona Bavariae' on the obverse.

traced the etymological roots of many names to purported Germanic origins (Krüger, 1611). Nationalist authors not only catalogued these names but also advocated standardized spelling intended to reverse what they perceived as "mutilations" caused by Latin, Greek, or Hebrew influences.[17]

4.3 Measuring Cultural Traits in Names

The base of our analysis are 15 million first names from birth and baptism records in and around 690 cities between 1700 and 1850, digitized by FamilySearch. Appendix Section D.1 describes the origin, processing, geolocation, and representativeness of the data.

Motivated by the framework in Section 3, we quantify turnover, dispersion, and novelty in the city-year name distribution (Proposition 1). We further classify names into identity groups (loyalism, religiosity, and nationalism), and compute identity polarization within cities (Proposition 2). We operationalize each measure by relying on a well-known functional form. We introduce alternative choices of functional form in Appendix Sections D.2 and D.3.

Distribution. *(1) Turnover.* Do naming practices change within cities over time? Our first objective is to compare the distribution of first names in a city i between any two time periods t_1 and t_2. Define as $\mathcal{A} = \{a_1, a_2, \ldots, a_A\}$ the set of possible naming actions a with size A. Define the frequency of a name in a given time period and city as F_{ait}, and $F_{it} = \sum_{a \in \mathcal{A}} F_{ait}$. We calculate the dissimilarity index (Duncan and Duncan, 1955) of names between two periods:

$$\frac{1}{2} \sum_{a \in \mathcal{A}} \left| \frac{F_{ait_2}}{F_{it_2}} - \frac{F_{ait_1}}{F_{it_1}} \right|.$$

$\mathcal{T}$ equals zero if the naming distribution is exactly the same in t_1 and t_2. In contrast, if the naming distribution does not overlap between the two time periods, then relative name frequencies are maximally different across groups, and $\mathcal{T} = 1$. We construct the period-by-period name turnover $\mathcal{T}_{it}$ for each city i and time period t, relative to $t - 1$.

(2) Dispersion. Do naming practices become more or less dispersed? Our second objective is to measure changes in the concentration of names. To capture this, we take the inverse of the Gini coefficient:

$$\mathcal{D}_{it} = \frac{2 \sum_{a \in \mathcal{A}} \mathbb{1}(F_{ait} > 0) F_{it}}{\sum_{a \in \mathcal{A}} \sum_{a' \in \mathcal{A}} |F_{ait} - F_{a'it}|},$$

where values closer to one indicate few names capturing large shares of births, and larger values indicate higher dispersion.

(3) Novelty. Does the name distribution feature more novel names? We adapt Voth and Yanagizawa-Drott (2024) to our setting, defining whether the backward-looking cumulative name count of a name in a city is below 1%:

[17] Wiarda (1800, p. 78), for instance, rejects "foreign names (...) from the New Testament, from the legends of saints, and also from the Old Testament," and calls instead for a return to names considered "purely Germanic".

$$\mathcal{N}_{ait} = \begin{cases} 1 & \text{if } \frac{\sum_{\tau=t_0}^{t} F_{ai\tau}}{\sum_{a'\in\mathcal{A}} \sum_{\tau=t_0}^{t} F_{a'i\tau}} \leq 0.01 \\ 0 & \text{otherwise,} \end{cases}$$

and then calculate the share of these 'tail' names in city i and period t:

$$\mathcal{N}_{it} = \frac{\sum_{a\in\mathcal{A}} \mathcal{N}_{ait} F_{ait}}{F_{it}}$$

Appendix Sections D.2 introduces alternative functional forms for each measure. Comparing distributions across cities and time periods raises the potential of finite-sample bias in these comparisons (Gentzkow and Shapiro, 2019). We account for this by omitting city-years with fewer than 100 births from our estimation sample. We furthermore show the invariance of our results to using a more loose or stringent cutoff in Appendix Section E.

Identity. For each identity group $k \in \{\text{loyalist}, \text{religious}, \text{nationalist}\}$, we construct an indicator function $\mathbb{1}(k(a) = k)$ that equals 1 if name a is associated with identity group k, and 0 otherwise. We digitize the earliest available list for each identity category from Section 4.2 and introduce alternative measures in Appendix Section D.3.

(1) Name Shares. For each identity group $k \in \{\text{loyalist}, \text{religious}, \text{nationalist}\}$, define the number and share of births associated with group k in city i and time period t as

$$S_{it}^{k} = \sum_{a\in\mathcal{A}} \mathbb{1}(k(a) = k) F_{ait}, \qquad s_{it}^{k} = \frac{S_{it}^{k}}{\sum_{k'=1}^{K} S_{it}^{k'}}.$$

(1.1) Loyalism. We collect all first names given at least twice in ruling families between 1600 and 1850 from Marek (2018). Since our focus is on the rejection of new rulers, we restrict the list to all dynasties of the *German Confederation*.[18]

(1.2) Religiosity. We use the first available German translation of the officially sanctioned saint name list in the *Rituale Romanum* (Schwenger, 1753). We extend this list with names in the earliest surviving German edition of Martin Luther's *Seel. Vielfältig verlangtes Namen-Büchlein* (Luther, 1674).

(1.3) Nationalism. We digitize all names listed in Beneken (1816), *Teuto oder Urnamen der Teutschen gesammelt und erklärt*, the first comprehensive compendium of names identified as adhering to national Germanic ideals.

Our three name lists capture a substantial share of naming choices: 95% of all births in our data include at least one name that appears in any of the three lists.[19] We carefully deduplicate names that appear in multiple lists using a variety of approaches, described in detail in Appendix Section D.3. In addition, we construct alternative naming identity measures, some of which are not list-based (e.g. derived from reference populations or the timing of births relative

[18] In alternative measures, we use all dynasties of the Holy Roman Empire. Also, while dynasty names were salient also for ruler siblings, our results are robust to just using names of rulers (excluding siblings) in a sample of male names.

[19] Section 5 demonstrates robustness to scaling S_{it}^{k} by F_{it} instead.

to saint days). Finally, we introduce measures that disentangle the local rejection of post-1815 states from broader trends in dynastic names (and demonstrate that names of the specific pre-1789 dynasty similarly decline in relevance).

(2) Polarization. Following Esteban and Ray (1994) and Bazzi and Gudgeon (2021), we measure cultural polarization as

$$\mathcal{P}_{it} = \sum_{k=1}^{K} \left(s_{it}^{k}\right)^{\alpha}$$

with $\alpha = 2$. In Section E.5, we show robustness to the parametrization of α.

Appendix Table A.2 describes the treatment variable and the seven outcome variables. Throughout the analysis, all distribution and identity measures are standardized for comparability.

4.4 Identity Persistence

We measure the embeddedness of these identity groups in cities over time. First, we use biographical records from the *Deutsche Biographie*, the authoritative German biographical dictionary, which includes entries on over 818,044 individuals from German-speaking territories. For our purposes, we restrict the sample to persons born between 1700 and 1850 and link each to the city nearest their place of birth. Based on biographical entries and professional titles, we manually classify individuals into three identity categories: nationalists, religious figures, and loyalists. This yields a dataset of 11,081 notable individuals. For each category k, we construct a count variable $\mathcal{B}_{k,it}$ capturing the number of individuals from city i who were alive in year t. We collect this information in a city-year panel.

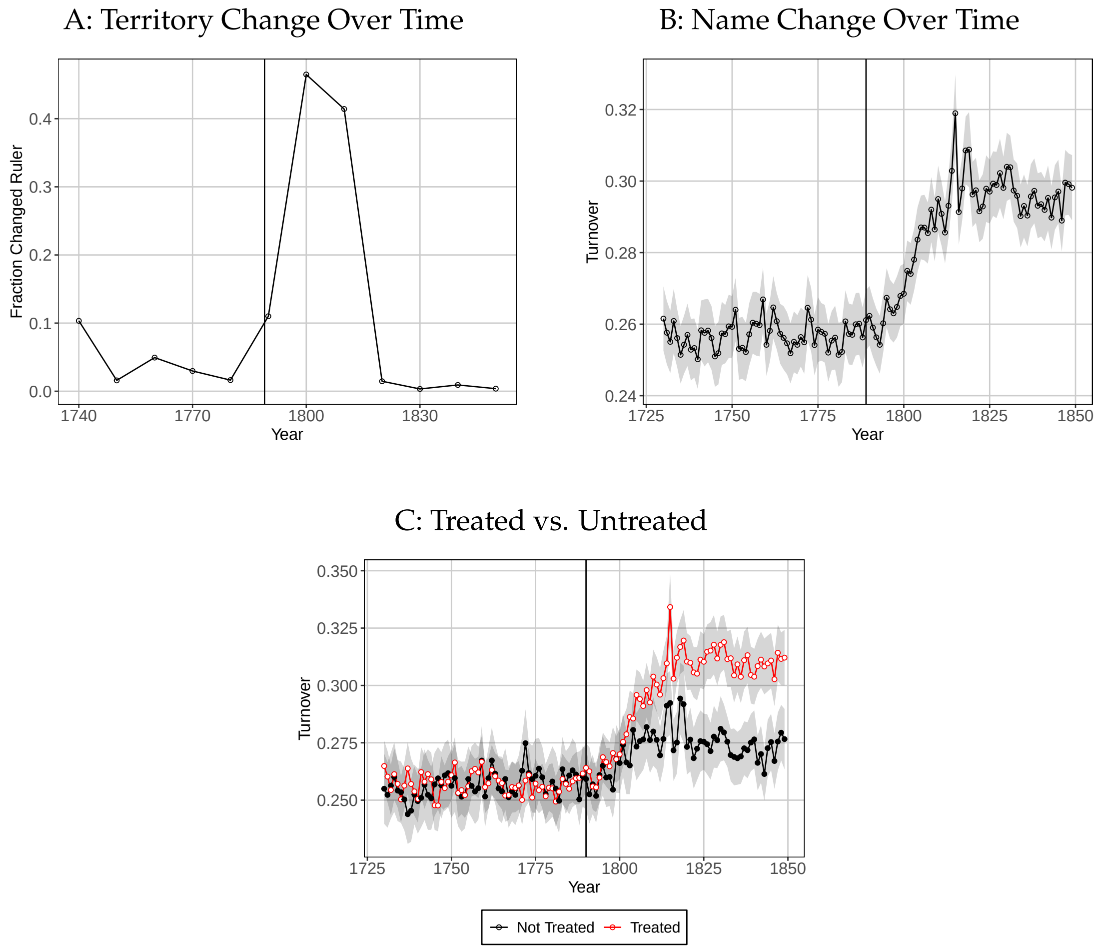
Second, we measure challenges to the existing political order through three cross-sectional indicators of nationalist mobilization. We begin with a database of 564 nationalist festivals held between 1814 and 1815, drawn from contemporary accounts in Hoffmann (1815). For each city, we code whether such a festival occurred nearby. We supplement this with data from regional histories identifying 110 nationalist gymnastics associations founded between 1800 and 1848. Finally, we record the birthplaces of all 809 delegates to the 1848 Frankfurt National Assembly.

5 Main Results

5.1 Empirical Strategy

Is the institutional transition between 1789 and 1815 reflected in cultural change? Figure 2 motivates this question with two time series. Panel A shows the fraction of cities in our sample that changed ruler in a given decade. While before 1789 less than five percent of cities would change ruler in a given decade, from 1789 until 1815 around 30 percent of cities changed ruler in a decade. Panel B shows the unstandardized name turnover measure $\mathcal{T}_{it}$ averaged across cities for the same time frame. Before 1789, the naming distribution changed at a constant rate each decade. Starting in the 1790s, this measure of turnover rose by 16% relative to the pre-period mean, remaining high over the next decades. Panel C demonstrates that this aggregate

Figure 2: Ruler and Name Change



Note Panel A shows the fraction of cities in our sample that change ruler in a given decade. Panel B shows the name change measure T_{it} averaged across cities for each decade. Panel C shows the same measure separately for cities that changed ruler between 1789 and 1815 and those that did not. The vertical line is at $t = 1789$.

increase was driven by cities that changed ruler between 1789–1815.

In the following, we analyze how this institutional change related to persistent shifts in naming practices, using a city-year panel. A potential concern is selection into treatment: cities on a different cultural trajectory might have been more likely to experience ruler change, for instance by actively toppling the regime. However, as outlined in Section 2, the collapse of the Holy Roman Empire was largely exogenous: diplomatic settlements were sudden, top-down, and externally driven; territorial change was determined by considerations outside of the scope of culture. Nevertheless, our empirical strategy takes a number of steps to address potential endogeneity concerns in section 5.3.

Our baseline specification is

$$NamingMeasure_{it} \quad = \beta Treated_{it} + \alpha_i + \alpha_t + \varepsilon_{it}, \tag{1}$$

where $NamingMeasure_{it}$ refers to one of the three naming outcomes $\mathcal{T}_{it}$ (*Change*), $\mathcal{D}_{it}$ (*Dispersion*), or $\mathcal{N}_{it}$ (*Novelty*) for city i in year t. In the regressions, all outcome variables are standardized to facilitate comparisons of effect magnitudes. The variable $Treated_{it}$ is an absorbing indicator equal to one if city i has undergone a ruler change by year t (relative to 1789). City fixed effects α_i absorb time-invariant heterogeneity across locations, and year fixed effects α_t capture common trends in naming practices. We cluster standard errors at the city level.

To examine dynamic effects around the treatment, we estimate an event study version of equation (1):

$$\begin{aligned} NamingMeasure_{it} \quad &= \textstyle\sum_{\tau=-50}^{40} \beta_\tau Treated_i \times RelativeDecade_{\tau(it)} \\ &\quad + \alpha_i + \alpha_t + \varepsilon_{it}, \end{aligned} \tag{2}$$

where $RelativeDecade_{\tau(it)}$ denotes a set of indicators of the decades before and after the onset of treatment, and $Treated_i$ denotes cities ever treated in the sample. All other variables are as defined above.[20]

5.2 Baseline Results

Table 1 shows results of estimating equation (1). Column 1 shows a relative increase in the year-to-year dissimilarity index in treated cities at around 0.39 standard deviations, compared to untreated cities. Column 2 shows that dispersion of names increased by 0.22 standard deviations in treated city-years. Finally, column 3 shows that naming novelty increased by 0.42 standard deviations in treated city-years relative to the control group. All three coefficients are significant at the one percent level.

Figure 3 shows the event study counterparts of these results, estimating equation (2). The increases in all four outcomes are immediate after treatment and not led by pre-trends over the preceding periods (Panels A–C). Across all three outcomes, estimated coefficients remain large and statistically significant in the decades after treatment. We devote Section 6.3 to explore the sources of this persistence.

Overall, this set of results suggests a distinct cultural shift: higher rates of naming turnover reflect a move away from established patterns. In addition, the increase in naming dispersion and the emergence of new names are consistent with the weakening of the cultural dominance of traditional hegemonic forces. This allowed for the choice of identities more consistent with heterogeneous underlying preferences.[21]

5.3 Robustness and Identification

We next show that our results are robust to inspecting at samples with more comparable treatment and control groups. Then, we estimate an instrumental variable regression that uses plausibly random variation in diplomatic ties.

[20] Our results are robust to alternative specifications for staggered treatment adoption, as discussed in Appendix Section E. We omit the decade immediately preceding treatment ($\tau = -10$) as the reference category. We aggregate the data to the decade level, a choice that does not affect the estimated dynamics.

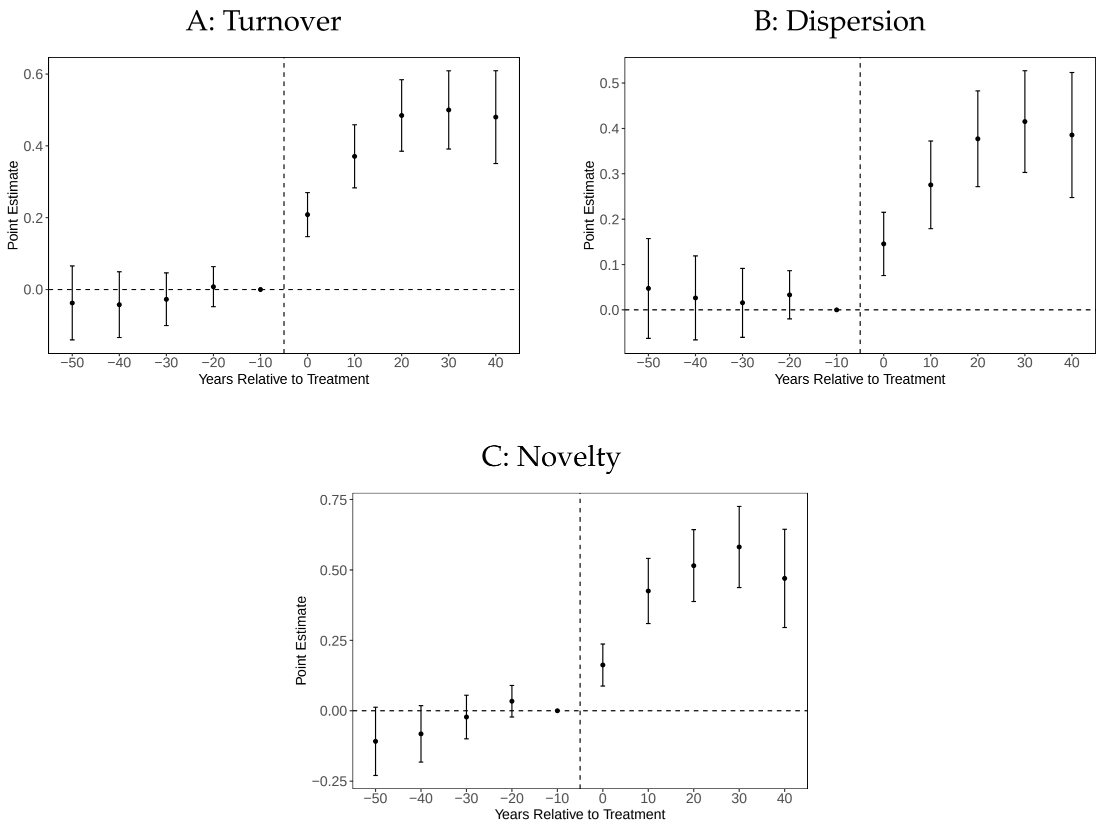
[21] Describing the strong hegemonic pull of society in the Holy Roman Empire, Nipperdey (1996, p. 232) writes, "'Culture' was tied to social functions, especially the church and the court, rather than a reality that confronted and shaped the individual. It was a world in which initiatives and aims, even consciousness, were largely prescribed. Customs and traditions rather than individual reflection tended to provide the basis for belief and behaviour through the medium of images and symbols by providing models. [...] The structure of society was static, and personal roles were fixed and were not varied enough to lead to tension and thereby to the growth of individuality."

Table 1: Territory Change and Naming Practices

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.3863***	0.2249***	0.4247***
	(0.0457)	(0.0545)	(0.0656)
Observations	53,624	53,624	53,624
R^2	0.65	0.70	0.64
Number of Units	690	690	690
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1). Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Figure 3: Territory Change and Naming Practices (Event Studies)



Note The plot shows results of estimating the event study regression in equation (2), with 95 percent confidence intervals. Observations are at the city-decade level. The sample comprises 15 decades. The dependent variables are standardized values of (A) turnover $\mathcal{T}_{it}$, (B) dispersion $\mathcal{D}_{it}$, and (C) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level.

Table 2 addresses potential selection into treatment by constructing comparable control groups. We examine five increasingly restrictive subsets of the data, re-estimating equation (1) on each subset.

The first subset in Panel A of Table 2 focuses on the role of territorial negotiations in a holistic matching strategy, pairing each treated city with an untreated counterpart based on a rich set of geographic, economic, and cultural characteristics.[22]

Second, in Panel B, we rely on the fact that negotiations prioritized the 'rounding off' of borders. For each treated city, we identify an untreated city with similar strategic value in shaping compact post-1815 territories. Specifically, we simulate territorial borders designed to maximize compactness while preserving the distribution of territory sizes in 1815. Using these simulations, we compute the ex ante likelihood of ruler change by calculating the fraction of simulations in which each city falls within a new territory across 1,000 draws.[23] We then match treated cities to its untreated 'roundedness' counterpart using a nearest-neighbor algorithm.

Third, in Panel C we restrict the sample to the set of cities in 'complier' territories: We exclude cities that lay in ecclesiastical territories (all of which disappeared), and cities that lay in Prussia (which would likely never have disappeared entirely).

Fourth, Panel D focuses on the intensive margin: the *Statistical Commission* of the Congress of Vienna collected disaggregated information on areas that could potentially be moved to different territories. Using the *Statistical Commission* report (Klüber, 1815), we can restrict our analysis to cities that were considered to be moved into and out of Prussia. While not all of these cities ultimately changed rulers, they represent the universe of locations considered at risk of reassignment.

Finally, in Panel E, we construct a border sample, limiting the data to cities located along internal boundaries of territories that were split as a result of post-1789 diplomatic negotiations. Specifically, we identify 25 cities that belonged to the same territory in 1789 but were separated by a newly drawn internal border after 1815.

Panels A–E show that the results remain qualitatively robust and largely statistically significant, even under these increasingly restrictive specifications.

Furthermore, we construct an instrumental variable that influenced which states ceased to exist and thus which cities in our dataset are treated. Territories with closer kinship ties to one of the Great Powers (Austria, Britain, Napoleonic France, Prussia, and Russia) had a higher probability of surviving, because they had a more direct diplomatic access to the decision mak-

[22]We measure a broad set of pre-existing city characteristics that may have influenced their attractiveness to negotiators: agricultural suitability (Fischer et al., 2002), terrain ruggedness, distance to the coast and to the nearest navigable river, location on historical trade routes, and the number of officially recognized markets. See Appendix Table A.1 for an overview over the variables used in propensity-score based nearest neighbor matching and their respective data sources.

[23]This approach follows the logic of Borusyak and Hull (2023) and randomization inference. Each simulation centers territories on their pre-period centroids and randomizes the order in which territories are 'queued' for compactness. The first territory faces no constraints, while subsequent territories maximize compactness conditional on prior assignments.

Table 2: Territory Change and Naming Practices (Subsets)

	Nearest Neighbor (1)	Rounding Off (2)	Complier Territories (3)	Statistical Commission Cities (4)	Border Cities (5)
Panel A: Turnover					
Treated	0.3708***	0.3779***	0.3371***	0.3628**	0.7207***
	(0.057)	(0.054)	(0.055)	(0.152)	(0.171)
R^2	0.61	0.64	0.65	0.55	0.63
Panel B: Dispersion					
Treated	0.1795***	0.1856***	0.1565**	0.2635	0.7077***
	(0.066)	(0.063)	(0.066)	(0.203)	(0.181)
R^2	0.68	0.69	0.69	0.72	0.73
Panel C: Novelty					
Treated	0.4090***	0.4088***	0.4462***	0.7066***	0.3399
	(0.077)	(0.076)	(0.077)	(0.150)	(0.293)
R^2	0.61	0.62	0.63	0.67	0.63
Observations	41809	42837	31152	2974	2678
Number of Units	550	550	383	44	25
Unit FEs	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓
Cluster	City	City	City	City	City

Note Table presents results of estimating equation (1) in subsets of the data as described in the respective panel header. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

ers.[24] For our analysis, we measure the marriage network of a territory in 1789.[25] Dynastic closeness, of course, also reflects the underlying financial and administrative ability of territories. We thus rely on a plausibly exogenous shift in the diplomatic success of a territory: the elimination of the French ruling dynasty in 1793 and the conversion to a Republic, which meant that dynastic ties to France were not helpful during the negotiations after 1793. From the perspective of 1789, this was not forseeable. We hence calculate the average dynastic proximity of a territory to the Great Powers *including* and *excluding* France. Our identifying assumption is that rulers of secular territories in the Holy Roman Empire would have been indifferent between being dynastically closer to France as compared to another Great Power as of 1789. When controlling for the former, the difference between these measures describes the shift in diplomatic connectedness owing to the execution of the French king. Our thought experiment thus compares two territories with the same diplomatic connectedness in 1789: the territory with a more French-biased marriage portfolio found itself in a more difficult position in negotiations.

In Panel A of Table 3, we first show that our baseline regression results hold up when just considering observations for which we can calculate this marriage network subset. Panel B then shows the main results of the IV approach for the same sample: Our results are qualitatively unchanged compared to Table 1, and all coefficients remain significant at the 1 percent level.

We conduct extensive robustness checks to complement these results. Appendix Section E tests the sensitivity of results to the inclusion of restrictive controls (Appendix Section E.1), heterogeneous effects and outliers (Appendix Section E.2), treatment anticipation (Appendix Section E.3), alternative outcome measures (Appendix Section E.4), and mechanical biases through finite samples or spatial correlation (Appendix Section E.6). The patterns remaing qualitatively unchanged throughout.

6 Mechanisms

6.1 State Vacuum vs. Access to New Ideas

Naturally, a change in political rulers constitutes a bundled treatment. Our empirical results in the previous section align with the evolution of cultural traits following a weakening of ruler authority, as formalized in Proposition 1 of the framework in Section 3. Corollary 1 provides an additional, testable implication: cultural change should be more pronounced in areas where ruler capacity was initially strong but subsequently collapsed, and more muted where authority persisted.

Guided by the historical context outlined in Section 2, we construct three proxies for the path of ruler capacity $\kappa^{(t)}$. First, we use an indicator for whether city i hosted ruler administrative buildings in 1789 (Cantoni, 2020); and second, an indicator for whether the state governing

[24]For example, Katharina Pavlovna, the widowed Duchess of Oldenburg, and Maria Pavlova, the wife of the Hereditary Prince of Saxe-Weimar-Eisenach, were both related to the Habsburg dynasty and were thus invited to live at the *Hofburg* (the principal imperial residence of the Austrian dynasty) during the Congress of Vienna. Both small territories survived the Congress, Saxe-Weimar-Eisenach even with territorial gains (Schneider et al., 2015, p. 34).

[25]This restricts our data to secular territories, since city states and ecclesiastical territories did not form dynastic ties.

Table 3: Territory Change and Naming Practices (IV)

	Turnover (1)	Dispersion (2)	Novelty (3)
Panel A: OLS (Marriage Network Subset)			
Treated	0.3867***	0.2326***	0.4640***
	(0.057)	(0.070)	(0.081)
R^2	0.67	0.72	0.63
Panel B: Instrumental Variable			
Treated	0.8598***	1.0715***	0.9332***
	(0.175)	(0.226)	(0.258)
R^2	0.66	0.69	0.62
Number of Observations	36169	36169	36169
Number of Units	471	471	471
Unit FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City
First-Stage Coefficient: 7.30 (0.75)			
First-Stage F-Statistic: 95.4			

Note Table presents results of estimating equation (1). Panel A shows OLS results in the sample of cities belonging to a secular territory. Panel B uses an instrumental variable based on the dynastic marriage network in the same sample. Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

city i had implemented compulsory schooling by 1789.[26] Both serve as proxies for initial authority $\kappa^{(0)}$. Third, to capture variation in post-collapse authority $\kappa^{(1)}$, we use an indicator for whether city i was incorporated into the French state between 1789 and 1815, seeing increased investment in state capacity, rather than a full breakdown of authority (Rowe, 2003).

We incorporate these heterogeneity measures by interacting each with the treatment indicator in equation (1). To account for underlying trends, we separately interact the measures with a $Post1789$ indicator. Table 4 presents the results. Name turnover and dispersion (columns 1 and 2) are significantly higher in cities that were administrative centers or subject to mandatory schooling prior to the transition (Panels A and B). Novelty (column 3) also increased, although the interaction effect is estimated more noisily. In contrast, Panel C shows that turnover, dispersion, and novelty were significantly lower in cities that came under French rule.

In addition to testing Corollary 1, we also consider a set of alternative mechanisms: instead of working through dynamics in ruler authority $\kappa^{(t)}$, treatment might have changed the access to new ideas and thus altered culture. Three canonical explanations prevail in the literature. First, trade integration is associated with the diffusion of cultural values (Tabellini and Magistretti, 2024). Second, migration might drive cultural change (Fouka and Serlin, 2024). Third, direct exposure to war and soldiers may transmit new cultural norms (Ottinger and Rosenberger, 2023; Jha and Wilkinson, 2023).

[26]Using a wide range of sources, we check for the presence of compulsory schooling laws by 1789 for 130 territories. Sources available upon request.

Table 4: Territory Change and Naming Practices (Heterogeneity)

	Turnover (1)	Dispersion (2)	Novelty (3)
Panel A: Prior Admin Center			
Treated	0.3100***	0.1469**	0.3551***
	(0.056)	(0.071)	(0.081)
Treated × Admin Center	0.1692**	0.1729*	0.1542
	(0.079)	(0.089)	(0.104)
R^2	0.65	0.70	0.64
Panel B: Prior Compulsory Schooling			
Treated	0.2546***	0.0763	0.2447***
	(0.052)	(0.067)	(0.070)
Treated × Compulsory Schooling	0.3118***	0.5007***	0.2762**
	(0.098)	(0.106)	(0.136)
R^2	0.65	0.70	0.64
Panel C: French Rule			
Treated	0.5335***	0.3158***	0.6154***
	(0.060)	(0.069)	(0.081)
Treated × French Rule	-0.2960***	-0.1648*	-0.3773***
	(0.079)	(0.092)	(0.105)
R^2	0.65	0.70	0.64
Number of Observations	53624	53624	53624
Number of Units	690	690	690
Unit FEs	✓	✓	✓
Time FEs	✓	✓	✓
Saturated Interaction	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1) augmented with a heterogeneity interaction. Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

We empirically assess each of these potential channels. To capture trade integration, we construct a measure of city-level market access within territorial borders. The political restructuring between 1789 and 1815 reshaped internal borders, thereby altering the relative market size and accessibility of cities. Following Donaldson and Hornbeck (2016), we compute market access for each city in 1789 and 1815 based on access to other cities within the same territory.[27] We then classify cities into above- and below-median market access growth groups based on the change over this period.

Second, to proxy for migration in the absence of regional migration statistics, we use growth in local birth rates as a demographic proxy. Specifically, we construct an indicator for whether a city experienced above- or below-median growth in births over the study period.

Third, to measure exposure to military conflict, we digitize all major battles of the 1789–1815 wars using data from Bodart (1908). For each city, we calculate the distance to the nearest battle and record an indicator equal to one if this distance is below the sample median.

Appendix Table A.3 presents the results. None of the three heterogeneity interactions show significant effects across our three measures of name distribution. This pattern aligns with historical accounts suggesting that large-scale trade integration and migratory flows only accelerated in later decades of the 19th century in Central Europe (Born, 1963).

6.2 Identity and Ideal Points

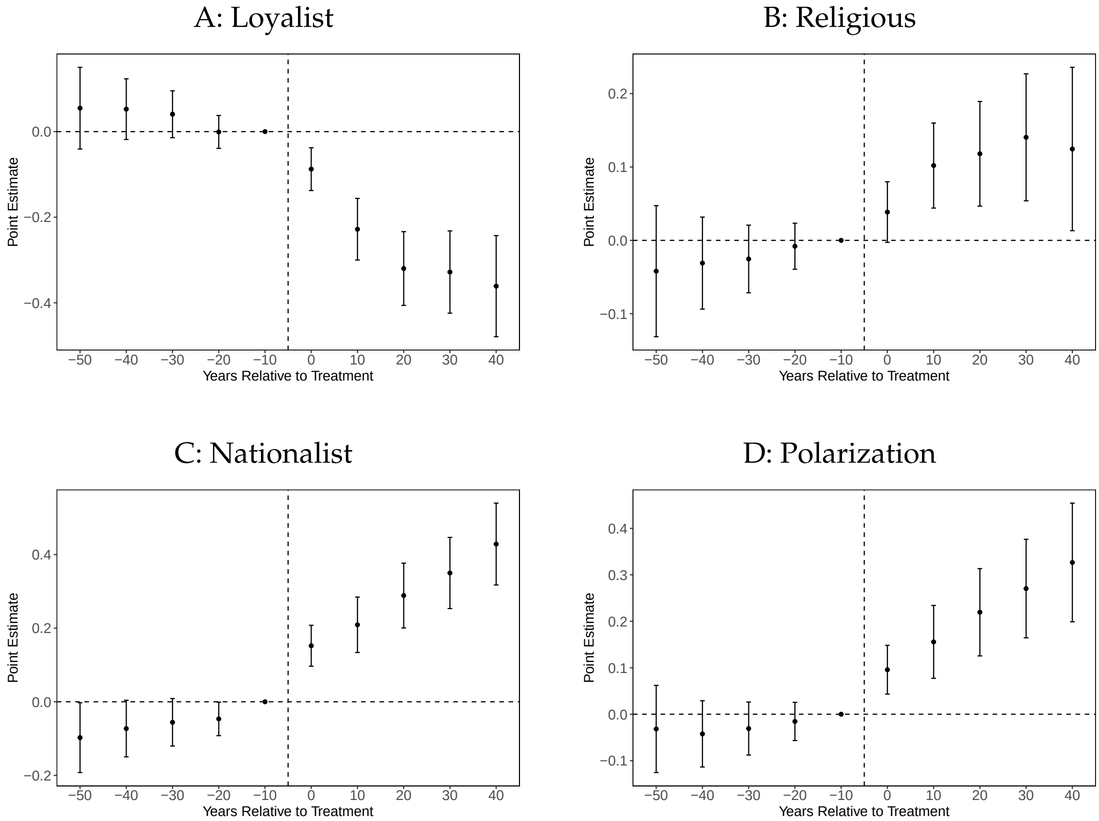
The framework in Section 3 also generates predictions about the direction of cultural change, formalized in Proposition 2, which concerns the identity content of naming practices. To test these predictions, we modify regression equation (1) by using our three identity-based measures s_{it}^{k} as outcome variables: the shares of loyalist, religious, and nationalist names. Columns 1–3 of Table 5, Panel A, report the results. Treated cities experienced a statistically significant decline in loyalist naming and significant increases in both nationalist and religious naming relative to untreated cities. Column 4 presents results for identity polarization, measured by $\mathcal{P}_{it}$, which also increased significantly in treated cities.

Figure 4 presents the corresponding event study estimates: the observed shifts are not driven by pre-trends and appear both immediate and persistent following treatment. In Appendix Section E.5, we demonstrate the robustness of these results to the choice of specific definitions of identity measures.

Cultural mismatch between the identity of post-1815 rulers and the local population could limit alignment. To test this implication, implied by Corollary 2 of Section 3, we interact our treatment indicator with a binary indicator of whether a city located in a majority-Catholic area came under Protestant rule in 1815, or vice versa. Panel B of Table 5 presents the results. Cities exposed to such a religious mismatch exhibit a significantly stronger decline in loyalist naming (column 1), a more pronounced increase in religious naming practices (column 2), and a weaker shift toward nationalist names (column 3), compared to treated cities without mismatch. As a result, polarization also increases in cities with religious mismatch (column 4).

[27] Due to the absence of systematic and disaggregated population data for this period, we use the stock of known buildings from Cantoni (2020) as a proxy for population. Travel costs are assumed to be linear in straight-line distance between cities.

Figure 4: Territory Change and Identities (Event Studies)



Note The plot shows results of estimating the event study regression in equation (2), with 95 percent confidence intervals. Observations are at the city-year level. The sample comprises 150 years. The dependent variables are standardized values of (A) s_{it}^{loyalist}, (B) $s_{it}^{\text{religious}}$, (C) $s_{it}^{\text{nationalist}}$, and (D) $\mathcal{P}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level.

Table 5: Territory Change and Identities

	Loyalist (1)	Religious (2)	Nationalist (3)	Polarization (4)
Panel A: Main Effect				
Treated	-0.2171***	0.1176***	0.3280***	0.2064***
	(0.044)	(0.043)	(0.043)	(0.052)
R^2	0.85	0.85	0.72	0.82
Panel B: Religious Tension				
Treated	-0.1826***	0.0826*	0.3151***	0.1730***
	(0.046)	(0.044)	(0.046)	(0.054)
Treated × Religious Tension	-0.2206***	0.2234***	0.0823	0.2134**
	(0.070)	(0.070)	(0.071)	(0.085)
R^2	0.85	0.85	0.72	0.82
Number of Observations	53624	53624	53624	53624
Number of Units	690	690	690	690
Unit FEs	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓
Cluster	City	City	City	City

Note Table presents results of estimating equation (1) without modification (Panel A), or interacting treatment with an indicator whether the resulting rule arrangement of 1815 resulted in a tension between the dominant local and territorial denomination (Panel B). Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) s_{it}^{loyalist}, (2) $s_{it}^{\text{religious}}$, (3) $s_{it}^{\text{nationalist}}$, and (4) $\mathcal{P}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

6.3 Persistence and State Building

Finally, we turn to the persistence of these identity shifts and their implications for state building. Proposition 3 in Section 3 posits a self-reinforcing dynamic in which diverging local identities undermine the ability of the state to consolidate authority.

Empirically, we extend regression equation (1) to examine changes in elite composition. Specifically, we analyze the prevalence of loyalist, religious, and nationalist individuals using our dataset of notable biographies. Table 6 presents the results. Treated cities produced fewer loyalist (column 1; significant at the 10 percent level), but more nationalist and religious individuals (columns 2 and 3; both significant at the 1 percent level).[28]

Furthermore, in Table 7 we examine the relationship between the treatment and three outcomes reflecting the revolutionary activities leading up to 1848. We do so in a simple, cross-

[28] Appendix Figure A.4 compares our profession-based measure of identity affiliation to our name-based measure of identity. We restrict the biography sample to individuals whose professions and first names can both be classified into one of the three identity groups. For each profession–name pair (i, j), we calculate log odds ratios:

$$\log\left(\frac{N_{ij}}{\frac{\sum_i N_{ij} \sum_j N_{ij}}{\sum_{ij} N_{ij}}}\right),$$

where N_{ij} is the observed frequency of persons with profession i and name class j. Positive values (blue) indicate that a given profession–name pairing occurs more frequently than expected under independence, while negative values (red) indicate a weaker-than-expected association. The measure loads on the diagonal, consistent with an alignment of name- and profession-based identity.

sectional regression setup:

$$Institution_i \quad = \beta Treated_i + X_i\gamma + \alpha_i^{1789} + \alpha_i^{1815} + \varepsilon_i \tag{3}$$

where $Institution_i$ denotes whether a city i (1) hosted a nationalist festival in 1814-1815, (2) formed a nationalist gymnastics associations before 1848 or (3) was the birthplace of a member of the Frankfurt National Assembly of 1848. Since the analysis is conducted in a cross-sectional framework, we include a set of geographical control variables X_i, and fixed effects for the territory a city belonged to in 1789 and 1815, respectively: α_i^{1789} and α_i^{1815}.

Throughout the specifications of Table 7, we find that treated cities were significantly more likely to host nationalist festivals, associations, and revolutionaries. Taken together, our results thus suggest that the initial cultural shift persisted due to self-reinforcing institutional shifts.

Table 6: Territory Change and Identities: Deutsche Biographie

	Loyalist (1)	Religious (2)	Nationalist (3)
Treated	-0.0371*	0.0837***	0.1308***
	(0.0209)	(0.0232)	(0.0307)
Observations	35,850	35,850	35,850
R^2	0.39	0.32	0.31
Number of Units	2,390	2,390	2,390
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1). Observations are at the city-decade level, with the number of cities indicated in the table. The sample comprises 15 decades. The dependent variables are standardized values of (1) $\mathcal{B}_{it}^{\text{loyalist}}$, (2) $\mathcal{B}_{it}^{\text{religious}}$, and (3) $\mathcal{B}_{it}^{\text{nationalist}}$, where $\mathcal{B}$ counts the number of notable individuals born in city i in year t for a given category. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table 7: Territory Change and Nationalist Institutions

	Festivals (1)	Associations (2)	Revolutionaries (3)
Treated	0.0931***	0.0331***	0.0443***
	(0.0251)	(0.0064)	(0.0136)
Observations	2,390	2,390	2,390
R^2	0.30	0.19	0.14
Outcome Mean	0.1314	0.0460	0.1075
Territory 1789 FEs	✓	✓	✓
Territory 1815 FEs	✓	✓	✓
Cluster	Territory (1789)	Territory (1789)	Territory (1789)

Note Table presents results of estimating equation (1). Observations are at the city level, with the number of cities indicated in the table. The dependent variables are (1) an indicator whether city *i* had a nationalist festival in 1814-15, (2) an indicator whether city *i* had a gymnastics association before 1848, and (3) an indicator whether city *i* was the birthplace of a member of the Frankfurt National Assembly of 1848. Standard errors are clustered at the territory (1789) level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

7 Conclusion

This paper provides novel evidence on the long-run cultural consequences of institutional change. Drawing on the collapse of the Holy Roman Empire as a large-scale historical shock, we document persistent shifts in naming practices in German cities that experienced a change of ruler. Using a novel dataset of 15 million birth records, we show that treated cities experienced greater turnover, dispersion, and novelty in names, adopting fewer loyalist and more nationalist and religious names. These shifts reflect a broader cultural transformation, with religious and nationalist actors filling the void left behind by the collapse of ruler authority.

Identity shifts extended beyond cultural markers to institutional development. Nationalist identity, in particular, became embedded in new organizations, such as national festivals and gymnastic associations, which served as platforms for mobilization. Treated areas were more likely to establish such organizations and produce revolutionaries during the 1848 uprisings.

Our paper highlights 1789 as a critical juncture. The year of 1848 marked another turning point: rulers, responding to revolutionary uprisings, reoriented policies to reassert cultural hegemony. This involved re-integrating alternative identities into loyalist identity, infusing it with nationalist and religious elements. Nationalism became a state-led project, "a willed merger of nation and dynastic empires" (Anderson, 1983, p. 85), no longer framed in opposition to dynastic power (Winkler, 2000, p. 217). Religiosity was similarly absorbed, particularly through the ideology of a "Protestant German Empire" after unification in 1871. Liberal nationalists and religious dissenters were marginalized. This fusion of state authority and alternative identities resonated deep into the 20th century.

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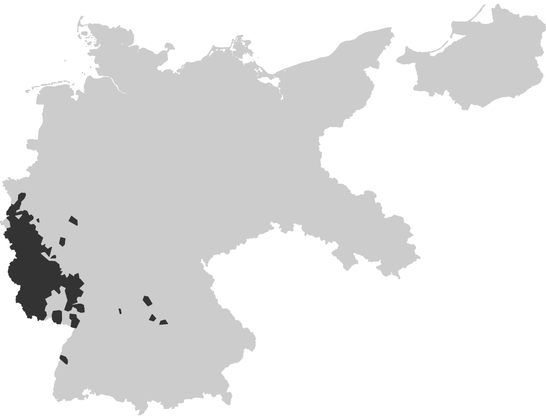
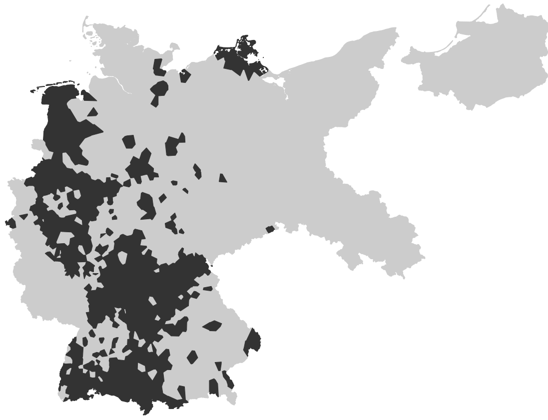
A Additional Tables and Figures

Figure A.1: Ruler Change Over Time

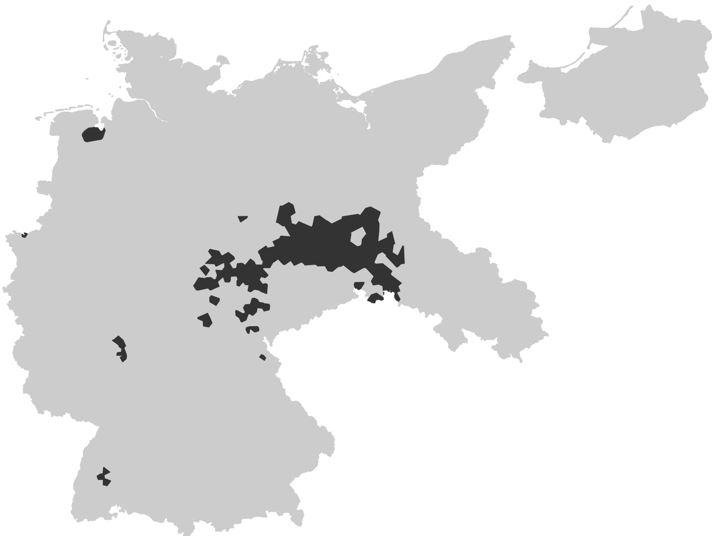
A: 1789–1799



B: 1800–1809

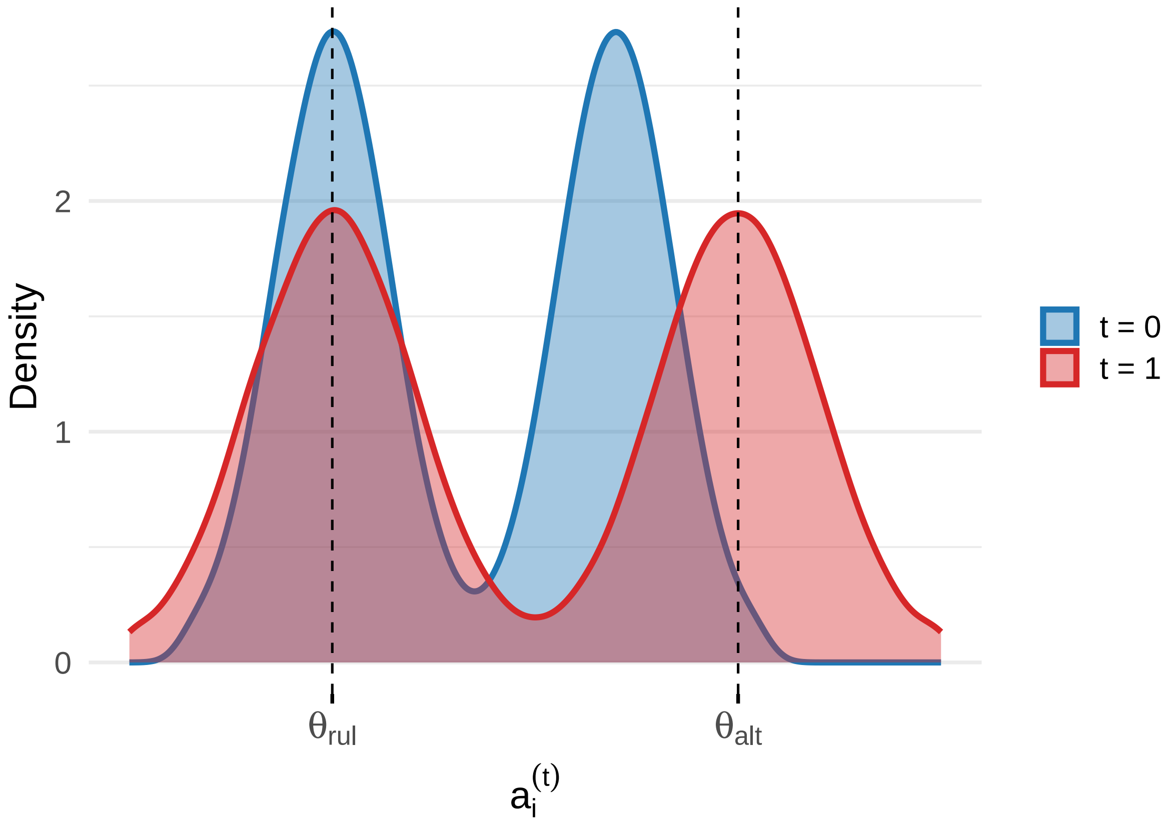


C: 1810–1815



Note The maps shows the cities in Panel C of Figure 1 by decade of ruler change. Panel A shows cities that first changed hands in 1789–1799, Panel B for 1800–1809, and Panel C for 1810–1815. Details on the data underlying the maps are given in Section 4.

Figure A.2: Model Illustration



Note The figure shows an illustration of the model with $\theta_{rul} = 0.25$, $\theta_{alt} = 0.75$, $\sigma = 0.1$, $\kappa^{(0)} = 0.3$ and $\kappa^{(1)} = 0$.

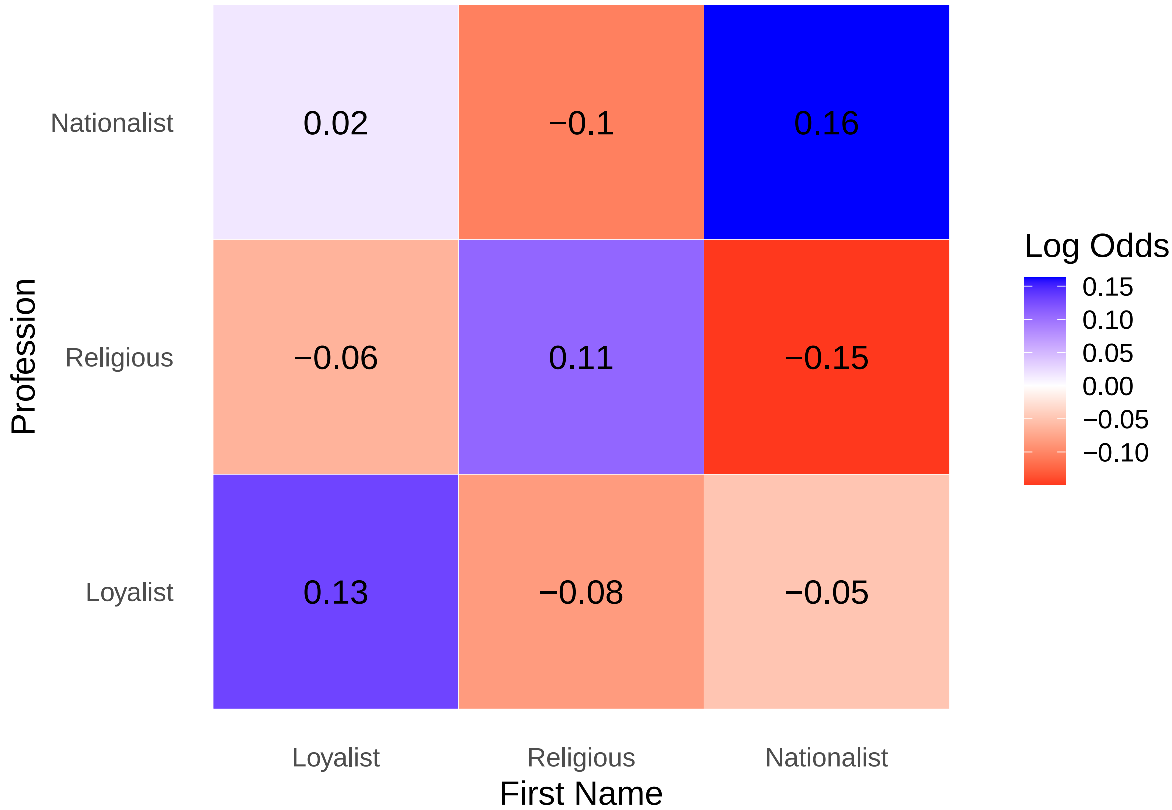
Figure A.3: Ruler Authority: Coins

Panel A: Bavaria, 1764

Panel B: Saxony, 1610

Note: Panel A shows the obverse and reverse of a Bavarian taler struck under Elector Maximilian III Joseph (r. 1745–1777) in 1764. The obverse bears his bust, name, and titles; the reverse depicts the Virgin Mary as *Patrona Bavariae*. Panel B shows a Saxon taler minted in 1610 under Duke Johann Ernst of Saxe-Weimar, depicting him alongside his seven brothers — Friedrich, Wilhelm, Albrecht, Johann Friedrich, Ernst, Friedrich Wilhelm, and Bernhard.

Figure A.4: Profession- and Name-Based Identity



Note Figure shows results from calculating log odds ratios between profession- and name-based identity classification of biographical entries. The sample includes all individuals whose professions and first names can both be classified into one of the three identity groups. For each profession–name pair (i, j), we calculate log odds ratios:

$$\log\left(\frac{N_{ij}}{\frac{\sum_i N_{ij} \sum_j N_{ij}}{\sum_{ij} N_{ij}}}\right),$$

where N_{ij} is the observed frequency of persons with profession i and name class j. Positive values (blue) indicate that a given profession–name pairing occurs more frequently than expected under independence, while negative values (red) indicate a weaker-than-expected association.

Table A.1: City Covariate Data Sources

Variable	**Source**
Agricultural suitability	Fischer et al. (2002)
Longitude	Bogucka et al. (2019a)
Latitude	Bogucka et al. (2019a)
City area	Bogucka et al. (2019a)
Ruggedness index	Bogucka et al. (2019a)
Distance to border	Bogucka et al. (2019a)
Distance to coast	Bogucka et al. (2019a)
Distance to river	Kunz (1999)
Total construction stock	Cantoni (2020)
Religious construction stock	Cantoni (2020)
Administrative construction stock	Cantoni (2020)
Infrastructure construction stock	Cantoni (2020)
Military construction stock	Cantoni (2020)
Growth in administrative construction	Cantoni (2020)
Growth in infrastructure construction	Cantoni (2020)
Growth in military construction	Cantoni (2020)
City mentioned in historical records	Cantoni et al. (2020a)
City features	Cantoni et al. (2020a)
Official city status	Cantoni et al. (2020a)
Presence of a market	Cantoni et al. (2020b)
Imperial city status	Cantoni et al. (2019)
Location in a Catholic territory (in 1789)	Cantoni et al. (2019)
Ecclesiastical territory indicator	Cantoni et al. (2019)
Catholic majority	Keyser et al. (1939-2003)

Note: The table shows individual sources for city-level covariates used in analysis.

Table A.2: Description of Main Variables

Variable	Mean	Min	Max	SD
Panel A: Treatment				
Treated	0.25	0.00	1.00	0.43
Panel B: Distribution (Non-Standardized)				
Turnover	0.27	0.05	0.94	0.09
Dispersion	1.64	1.15	5.42	0.29
Novelty	0.21	0.00	0.87	0.10
Panel C: Identity (Non-Standardized)				
Loyalist	0.69	0.08	1.00	0.16
Religious	0.23	0.00	0.82	0.13
Nationalist	0.08	0.00	0.35	0.06
Polarization	0.42	0.00	0.67	0.14

Note Table presents descriptive statistics of the main treatment variable, as well as the naming distribution and identity variables (pre-standardization) described in Section 4.3. The sample comprises of 53,624 observations at the city-year level.

Table A.3: Territory Change and Naming Practices (Alternative Channels)

	Turnover (1)	Dispersion (2)	Novelty (3)
Panel A: Economic Integration			
Treated	0.4133***	0.3868***	0.2931**
	(0.103)	(0.116)	(0.138)
Treated × Market Access Growth	-0.0125	-0.1598	0.1791
	(0.109)	(0.121)	(0.146)
R^2	0.65	0.70	0.63
Panel B: Demographic Change			
Treated	0.3842***	0.2139***	0.4202***
	(0.049)	(0.058)	(0.071)
Treated × Birth Growth	-0.0602	-0.0076	-0.0124
	(0.111)	(0.129)	(0.120)
R^2	0.62	0.66	0.62
Panel C: War Exposure			
Treated	0.3918***	0.1904***	0.4077***
	(0.060)	(0.065)	(0.080)
Treated × Close Battle	-0.0094	0.0686	0.0351
	(0.078)	(0.089)	(0.104)
R^2	0.65	0.70	0.64
Number of Observations	48926	48926	48926
Number of Units	690	690	690
Unit FEs	✓	✓	✓
Time FEs	✓	✓	✓
Saturated Interaction	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1). Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) name change $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

B Historical Background: Details

B.1 A Chronology of the Dissolution of the Holy Roman Empire

- **1792–1797:** War of the First Coalition
  War between France and several European powers, including the Holy Roman Empire, Prussia, and Habsburg.
  - **1793–1794**: France conquers and controls areas in the Holy Roman Empire west of the Rhine
  - **1795**: Peace of Basel: Prussia recognizes French control of areas west of the Rhine and France returns all areas east of the Rhine
- **1798–1802:** War of the Second Coalition
  War between France and several European powers, including Bavaria
  - **1801**: Treaty of Lunéville: Entire area west of the Rhine was ceded to France
  - **1803:** Reichsdeputationshauptschluss (Imperial Recess):
    Secularization of ecclesiastial territories and mediazation of smaller secular territories east of the Rhine to compensate secular princes for their territorial losses west of the Rhine to France
- **1805–1806**: War of the Third Coalition
  War between France supported by European powers, including Bavaria, Württemberg and Baden, and other European powers
  - **1805**: Treaty of Pressburg: ends War of Third Coalition in Central Europe
    Austria cedes territories to Baden and Württemberg, Bavaria gains Augsburg
  - **1806:** Formation of the Confederation of the Rhine.
    Western territories leave the Holy Roman Empire and form a new alliance of German states siding with France
- **1806:** Francis II formally abdicates as Holy Roman Emperor
- **1806–1807**: War of the Fourth Coalition
  War between France, supported by several European powers, including the Confederation of the Rhine and Saxony (until 1806), and other European powers, including Prussia and Saxony (from 1806)
  - **1806**: Treaty of Posen: Saxony annexes territories that formerly belonged to Prussia and becomes part of the Confederation of the Rhine
  - **1807:** Treaties of Tilsit: Prussia cedes massive parts of their territory, some of which become part of the newly founded French client state Kingdom of Westphalia
- **1809:** War of the Fifth Coalition
  War between France, supported by European territories including the Confederation of the Rhine, Bavaria, Saxony and Westphalia, and several other European powers, including Austria
  - Austria cedes territories to Bavaria
- **1813–1814:** War of the Sixth Coalition (Wars of Liberation)
  War between France, supported by the several European powers including the Confederation of the Rhine, and several European powers, including Prussia, Hanover and Mecklenburg-Schwerin

- **1814–1815:** Congress of Vienna.
  Diplomatic discussions between the “Great Powers” Austria, United Kingdom, Russia, and Prussia, as well as France and other minor powers that tried to exert some influence; eventually, congress establishes a new territorial and political order in Central Europe
  - **1815:** Foundation of German Confederation (Deutscher Bund), consisting of 39 sovereign states

C Framework: Proofs

C.1 Culture

Proposition 1.1

$$a_i^{(0)} = \kappa^{(0)}\theta_{rul} + (1-\kappa^{(0)})\theta_i \Rightarrow \mathbb{E}[a_i^{(0)}] = \kappa^{(0)}\theta_{rul} + (1-\kappa^{(0)})\mu,$$

$$a_i^{(1)} = \theta_i \Rightarrow \mathbb{E}[a_i^{(1)}] = \mu.$$

$$\therefore \mathbb{E}[a_i^{(1)}] - \mathbb{E}[a_i^{(0)}] = \kappa^{(0)}(\mu - \theta_{rul}).$$

□

Proposition 1.2

$$a_i^{(0)} = \kappa^{(0)}\theta_{rul} + (1-\kappa^{(0)})\theta_i \Rightarrow \mathrm{Var}(a_i^{(0)}) = \left(1-\kappa^{(0)}\right)^2\sigma^2,$$

$$a_i^{(1)} = \theta_i \Rightarrow \mathrm{Var}(a_i^{(1)}) = \sigma^2,$$

$$\therefore \mathrm{Var}(a_i^{(1)}) - \mathrm{Var}(a_i^{(0)}) > 0.$$

□

Proposition 1.3

Statement. Let $Y = a_i^{(0)} - \mu$, $X := a_i^{(1)} - \mu$, $\kappa^{(0)} := \kappa$, and $c := (1-\kappa)(\theta_{rul} - \mu)$.
We can then restate Proposition 1.3 as follows:
Let X be a real-valued random variable with a continuous, strictly positive density f, finite mean, and finite variance. Define an affine transformation of X as

$$Y = \kappa X + c,$$

where $\kappa \in (0,1)$ and $c \in \mathbb{R}$. We claim that there exists $\bar{\zeta} > 0$ such that for all $\zeta > \bar{\zeta}$,

$$\mathbb{P}(|X| > \zeta) > \mathbb{P}(|Y| > \zeta).$$

Proof. Since $\kappa \in (0,1)$, the following inequality holds:

$$|Y| = |\kappa X + c| \leq \kappa|X| + |c|.$$

Hence, for any $\zeta > 0$, this implies

$$\mathbb{P}(|Y| > \zeta) \leq \mathbb{P}\left(|X| > \frac{\zeta - |c|}{\kappa}\right).$$

We now compare this upper bound to $\mathbb{P}(|X| > \zeta)$. Define

$$\delta(\zeta) := \frac{\zeta - |c|}{\kappa}$$

and note that $\delta(\zeta) > \zeta$ for all sufficiently large ζ. Since f is continuous and strictly positive, the distribution function of $|X|$ is strictly increasing on $[0,\infty)$, and hence the tail probabilities strictly decrease:

$$\text{for } s > \zeta, \quad \mathbb{P}(|X| > s) < \mathbb{P}(|X| > \zeta).$$

Thus, for all sufficiently large ζ (specifically, for all $\zeta > \bar{\zeta}$ such that $\delta(\zeta) > \zeta$),

$$\mathbb{P}(|X| > \zeta) > \mathbb{P}\left(|X| > \frac{\zeta - |c|}{\kappa}\right) \geq \mathbb{P}(|Y| > \zeta).$$

Hence, there exists $\bar{\zeta} > 0$ such that for all $\zeta > \bar{\zeta}$,

$$\mathbb{P}(|X| > \zeta) > \mathbb{P}(|Y| > \zeta).$$

□

C.2 Identity

Proposition 2.1

Statement. We aim to show that

$$S_1^{(1)} = \mathbb{P}\left(\left|a_i^{(1)} - \theta_{\text{rul}}\right| < \delta\right) < \mathbb{P}\left(\left|a_i^{(0)} - \theta_{\text{rul}}\right| < \delta\right) = S_1^{(0)}.$$

Proof. From the best response functions,

$$S_1^{(1)} = \mathbb{P}\left(|\theta_i - \theta_{\text{rul}}| < \delta\right),$$

and

$$S_1^{(0)} = \mathbb{P}\left(\left|(1-\kappa^{(0)})(\theta_i - \theta_{\text{rul}})\right| < \delta\right) = \mathbb{P}\left(|(\theta_i - \theta_{\text{rul}})| < \frac{\delta}{1-\kappa^{(0)}}\right) > S_1^{(1)}.$$

□

Proposition 2.2

Statement. Let $\theta_i \sim F$ be a real-valued random variable with finite mean and variance, and density f that is continuous and strictly positive on its support. Assume that f has $K \geq 2$ distinct strict local modes $\{\theta_k\}_{k=1}^K \subset \mathbb{R}$. Fix any constant $\theta_1 \in \mathbb{R}$ and any $\kappa \in (0,1)$, and define the affine transformation

$$Y := \kappa\theta_1 + (1-\kappa)\theta_i.$$

Then for any $k \in \{2, \dots, K\}$, there exists $\bar{\delta} > 0$ such that for all $0 < \delta < \bar{\delta}$,

$$\mathbb{P}(|\theta_i - \theta_k| < \delta) > \mathbb{P}(|Y - \theta_k| < \delta).$$

Proof. Let $k \in \{2, \dots, K\}$ be fixed. Since θ_k is a strict local mode of f, there exists $\varepsilon > 0$ such that

$$f(\theta_k) > f(x) \quad \text{for all } x \in (\theta_k - \varepsilon, \theta_k + \varepsilon) \setminus \{\theta_k\}.$$

Since $\theta_i \sim f$, the density g of Y is given by the standard change of variables:

$$g(y) = \frac{1}{1-\kappa} f\left(\frac{y - \kappa\theta_1}{1-\kappa}\right), \quad \text{for } y \in \mathbb{R}.$$

Now consider the probabilities

$$\mathbb{P}(|\theta_i - \theta_k| < \delta) = \int_{\theta_k-\delta}^{\theta_k+\delta} f(x)\,dx,$$

$$\mathbb{P}(|Y - \theta_k| < \delta) = \int_{\theta_k-\delta}^{\theta_k+\delta} g(y)\,dy = \int_{\theta_k-\delta}^{\theta_k+\delta} \frac{1}{1-\kappa} f\left(\frac{y-\kappa\theta_1}{1-\kappa}\right) dy.$$

Let us make the change of variable

$$x := \frac{y-\kappa\theta_1}{1-\kappa} \quad \Rightarrow \quad y = \kappa\theta_1 + (1-\kappa)x, \quad dy = (1-\kappa)dx.$$

Then

$$\mathbb{P}(|Y - \theta_k| < \delta) = \int_{x\in A_\delta} f(x)\,dx,$$

where

$$A_\delta := \{x \in \mathbb{R} : |\kappa\theta_1 + (1-\kappa)x - \theta_k| < \delta\}.$$

Solving the inequality,

$$|\kappa\theta_1 + (1-\kappa)x - \theta_k| < \delta \quad \Leftrightarrow \quad x \in \left(\frac{\theta_k - \delta - \kappa\theta_1}{1-\kappa}, \frac{\theta_k + \delta - \kappa\theta_1}{1-\kappa}\right) =: I_\delta.$$

Thus,

$$\mathbb{P}(|Y - \theta_k| < \delta) = \int_{I_\delta} f(x)\,dx.$$

We now compare the intervals:

$$\mathbb{P}(|\theta_i - \theta_k| < \delta) = \int_{J_\delta} f(x)\,dx, \quad \text{where } J_\delta := (\theta_k - \delta, \theta_k + \delta).$$

Observe that unless $\theta_1 = \theta_k$, the center of I_δ is not equal to θ_k. Specifically,

$$\text{center of } I_\delta = \frac{\theta_k - \kappa\theta_1}{1-\kappa} \neq \theta_k.$$

Moreover, since θ_k is a strict local maximum of f, and f is continuous, there exists $\bar{\delta} \in (0, \varepsilon)$ such that for all $0 < \delta < \bar{\delta}$,

$$\sup_{x\in I_\delta \setminus J_\delta} f(x) < \inf_{x\in J_\delta} f(x).$$

Because I_δ is an interval of the same length as J_δ, but shifted away from the local maximum θ_k, we obtain

$$\int_{I_\delta} f(x)\,dx < \int_{J_\delta} f(x)\,dx.$$

Therefore,

$$\mathbb{P}(|Y - \theta_k| < \delta) = \int_{I_\delta} f(x)\,dx < \int_{J_\delta} f(x)\,dx = \mathbb{P}(|\theta_i - \theta_k| < \delta),$$

for all $0 < \delta < \bar{\delta}$.

□

Proposition 2.3

Statement. Denote relative identity shares with $s_k^{(t)} := \frac{S_k^{(t)}}{\sum_1^K S_k^{(t)}}$. Following Esteban and Ray (1994) and Bazzi and Gudgeon (2021), define polarization at time $t \in \{0, 1\}$ as

$$\mathcal{P}^{(t)} = \sum_{k=1}^{K} \left(s_k^{(t)}\right)^{\alpha}.$$

for $\kappa > 1$.
Assume that for each t, the vector $s^{(t)} = (s_1^{(t)}, \ldots, s_K^{(t)})$ satisfies the following:

(A1) $s_1^{(0)} > \max_{k \geq 2} \left\{ s_k^{(0)},\, s_k^{(1)} \right\}$.

(A2) $s_1^{(1)} < s_1^{(0)}$.

(A3) There exist *at least two* indices $k \in \{2, \ldots, K\}$ such that $s_k^{(1)} > s_k^{(0)}$; for all $k \geq 2$, $s_k^{(1)} \geq s_k^{(0)}$.

Also note that $s_k^{(t)} > 0$ for all k and t from the strict positivity of f.
We aim to show that under these assumptions:

$$\mathcal{P}^{(1)} > \mathcal{P}^{(0)}.$$

Proof. Consider the change in polarization:

$$P^{(1)} - P^{(0)} = \left(s_1^{(1)}\right)^{\alpha} - \left(s_1^{(0)}\right)^{\alpha} + \sum_{k=2}^{K} \left[\left(s_k^{(1)}\right)^{\alpha} - \left(s_k^{(0)}\right)^{\alpha} \right].$$

Define the mass shifted away from $k = 1$ as:

$$\varepsilon := S_1^{(0)} - S_1^{(1)} > 0,$$

which is redistributed among the components $k \geq 2$:

$$\sum_{k=2}^{K} \left(S_k^{(1)} - S_k^{(0)} \right) = \varepsilon.$$

Note that $f(x) = x^{\alpha}$ is strictly convex on $(0, 1)$ for $\alpha > 1$. Since $s_1^{(0)} > s_k^{(0)}$ for all $k \geq 2$ among at least two of the smaller S_k (with $k \geq 2$), Jensen's inequality implies an increases in the total sum of x^{α} terms:

$$\sum_{k=2}^{K} \left[\left(s_k^{(1)}\right)^{\alpha} - \left(s_k^{(0)}\right)^{\alpha} \right] > \left(s_1^{(0)}\right)^{\alpha} - \left(s_1^{(1)}\right)^{\alpha}.$$

Thus:

$$\mathcal{P}^{(1)} - \mathcal{P}^{(0)} > 0.$$

□

C.3 Persistence

Proposition 3.1

Statement. Consider $c : [0, 1] \to \mathbb{R}$ continuously differentiable such that

- $c''(\kappa) \geq 2\sigma^2$ for all $\kappa \in [0, 1]$,

- $c'(0) + 2\sigma^2 > 1$,
- $c(0) < \sigma^2 \leq c(1) + 1$.

We claim that Proposition 3 holds for any such $c(\kappa)$.

Proof. From utility maximization, $\mathrm{Var}(a_i) = (1-\kappa)^2 \cdot \sigma^2$ at any t.
Define
$$f(\kappa) := c(\kappa) - (1-\kappa)^2\sigma^2, \qquad g(\kappa) := f(\kappa) - \kappa = c(\kappa) - (1-\kappa)^2\sigma^2 - \kappa.$$
To address Proposition 3.1, we prove the following claims:

1. There exists a unique $\bar{\kappa} \in (0,1]$ such that $g(\bar{\kappa}) = 0$.
2. $f'(\kappa) > 1$ and hence $g'(\kappa) > 0$ for all $\kappa \in [0,1]$. In particular, $f'(\bar{\kappa}) > 1$, so $\bar{\kappa}$ is a repelling fixed point of f.
3. $g(\kappa) < 0$ for all $\kappa \in (0, \bar{\kappa})$.

Differentiating,
$$g'(\kappa) = f'(\kappa) - 1 = c'(\kappa) + 2(1-\kappa)\sigma^2 - 1,$$
and
$$g''(\kappa) = c''(\kappa) - 2\sigma^2 \quad \text{for } \kappa \in [0,1].$$
Step 1. By the curvature condition $c''(\kappa) \geq 2\sigma^2$ on $[0,1]$,
$$g''(\kappa) = c''(\kappa) - 2\sigma^2 \;\geq\; 0 \quad \text{for all } \kappa \in [0,1].$$
Hence g' is nondecreasing on $[0,1]$. Evaluate at 0:
$$g'(0) = c'(0) + 2\sigma^2 - 1 = f'(0) - 1.$$
By the slope condition $c'(0) + 2\sigma^2 > 1$, we have $g'(0) > 0$. Since g' is nondecreasing, it follows that
$$g'(\kappa) \;\geq\; g'(0) \;>\; 0 \qquad \text{for all } \kappa \in [0,1].$$
Therefore g is strictly increasing on $[0,1]$, and
$$f'(\kappa) = 1 + g'(\kappa) > 1 \qquad \text{for all } \kappa \in [0,1].$$
Step 2. By the endpoint conditions,
$$g(0) = c(0) - \sigma^2 < 0, \qquad g(1) = c(1) - 1 \;\geq\; 0.$$
Continuity of g on $[0,1]$ and the intermediate value theorem imply the existence of at least one $\bar{\kappa} \in (0,1]$ with $g(\bar{\kappa}) = 0$. Since g is strictly increasing on $[0,1]$, this root is unique.
Step 3. From Step 1, for all $\kappa \in [0,1]$,
$$f'(\kappa) = 1 + g'(\kappa) > 1,$$
hence in particular $f'(\bar{\kappa}) > 1$. Because g is strictly increasing and $g(\bar{\kappa}) = 0$, it follows that
$$g(\kappa) < 0 \quad \text{for all } \kappa \in (0, \bar{\kappa}), \qquad g(\kappa) > 0 \quad \text{for all } \kappa \in (\bar{\kappa}, 1].$$
This establishes items (2) and (3).
Thus, for $\kappa^{(t)} < \bar{\kappa}$, the sequence $\kappa^{(t)}$ is strictly decreasing. Since it is bounded below by 0, we conclude:
$$\lim_{t\to\infty} \kappa^{(t)} = 0.$$

□

Proposition 3.2 As $\kappa^{(t)} \to 0$, each action converges:

$$a_i^{(t)} \to \theta_i \quad \text{almost surely.}$$

Therefore, for each $k \in \{1, \ldots, K\}$, the share of actions aligned with identity θ_k converges to:

$$\lim_{t\to\infty} S_k^{(t)} = \lim_{t\to\infty} \mathbb{P}(|a_i^{(t)} - \theta_k| < \delta) = \mathbb{P}(|\theta_i - \theta_k| < \delta).$$

□

D Name Data

D.1 Birth and Baptism Records

D.1.1 Data Origin

Our data are drawn from baptism records kept by Catholic and Protestant parishes. In these registers, local priests recorded the date of birth or baptism (which typically coincided), along with the child's full name and the names of both parents. 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 living in a given location (Jeserich et al., 1984). Original copies are usually preserved in the archives of the corresponding parish.

For genealogical research, The Church of Jesus Christ of Latter-Day Saints collected and digitized individual baptism records and made them available via Familysearch.org. Our study uses an anonymized version of these data—lacking last names and parental identifiers—obtained through a data-sharing agreement with FamilySearch.

These records do not constitute a representative sample of the German population. Geographic coverage varies depending on archival survival and accessibility: many churches and church records in the territory of the former German Democratic Republic were destroyed or abandoned, and were largely inaccessible to U.S. genealogists prior to 1990. Within covered locations, the data exclude Jewish and itinerant populations, as they were not recorded in church registers.

D.1.2 Name Processing

The raw dataset contains 42,812,304 individual records, spanning the time period 1000-1970 (with sparse coverage for many years). Each record includes two versions of the place name (the original archival string and a cleaned version), the full first name of the child, and the event date.

We drop observations meeting any of the following criteria:

- missing or unspecified place information,
- overly coarse place information (e.g. entered simply as "Germany"),
- contradictory place information (original and cleaned place names map to different states),
- missing event year, or
- missing or non-informative first name (empty field, marked as stillborn, or generic descriptions such as "a daughter").

Because births and baptisms are occasionally recorded as two separate events, we deduplicate the data by collapsing all observations with identical first name, place, and event date.

This yields a dataset of 25,381,143 births and 95,534 unique names.

We then correct name typos. We also standardize phonetic spelling, latinizations, spelling conventions ("th" and "t", "ph" and "f") and abbreviations. Applying this cleaning procedure to all names in multiple manual iterations, we arrive at 42,245 unique names.

We then use three datasets that map between gender and names. We use information from vorname.com and firstname-database to assign the most likely gender to a name.

For our main analysis, we retain the first name of an individual (but consider second names in Appendix Section E.)

D.1.3 Place Geolocation and Sample Restriction

We use precise location information for 200,000 villages in the former German Empire from https://www.meyersgaz.org/ to geolocate each name entry. There are 11,275 unique location names in the original data.

Then, we assign each location to its closest city (as defined by the set of cities covered in the *Deutsches Städtebuch*). We rely on the border polygons in Bogucka et al. (2019b) and omit all locations that are outside the area spanned by these polygons. Our sample coverage drops sharply after 1850, as civil registers were instituted in the second half of the 19th century. We thus focus on births in the years 1700–1850.

This sample comprises of 17,397,376 births in 111,588 city-years across 1,019 cities.

To reduce noise, we omit from our sample all observations that are associated with fewer than 100 births in a given city-year.The final name sample comprises of 14,855,249 births in 53,624 city-years across 690 cities.

D.1.4 Sample Representativeness: Across Cities

The spatial coverage of data is driven by the availability of records, as they were found and collected by genealogists. Coverage is most consistent for regions in the West of Germany, roughly corresponding to the present-day states of North Rhine-Westphalia, Hesse, Rhineland-Palatinate, and Baden-Württemberg. The spatial distribution of covered cities is shown in Appendix Figure D.1.

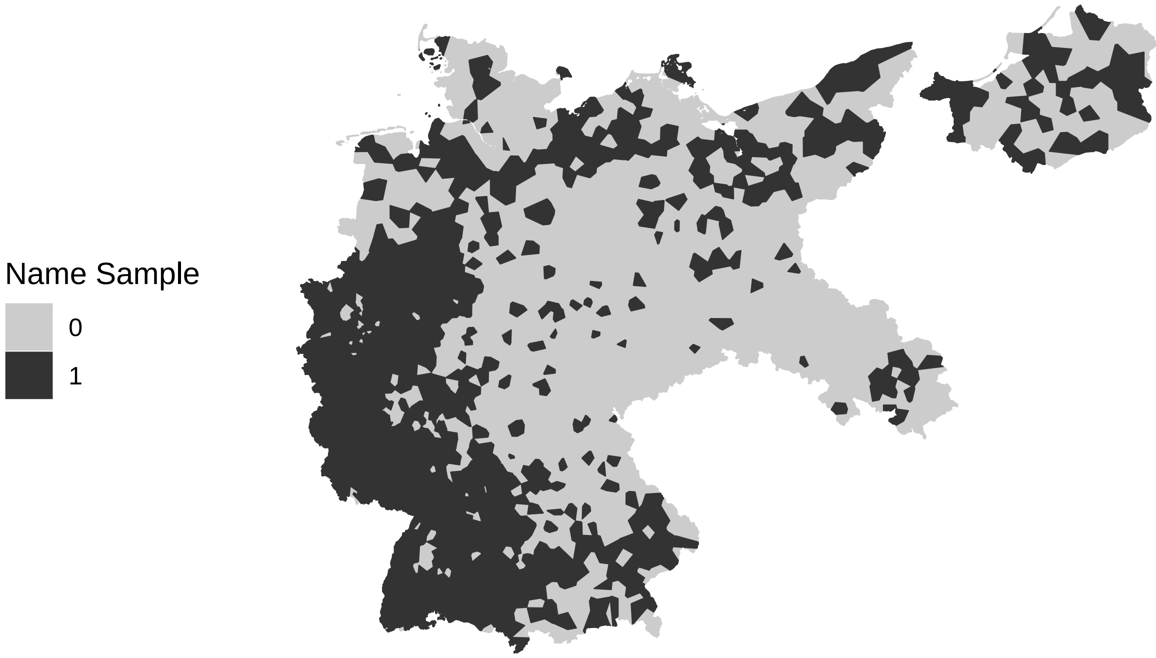
To assess the sample more systematically, we examine a dataset of all 2,125 cities in pre-1789 states with at least one city in our name sample. We regress an indicator of whether a given city is in our name sample on an indicator of whether the city is ever treated, and a full set of standardized city-level covariates as listed in Appendix Table A.1.

Appendix Figure D.2 shows results. Cities in the name sample are considerably more to the West, where area is more rugged. Additionally, the balance table reflects our choice to limit the data to city-years with more than 100 births: Cities have a larger area and have a higher stock of construction in 1789. Cities in the name sample are however not more likely to be ever treated than cities not in the name sample.

D.1.5 Sample Representativeness: Within Cities

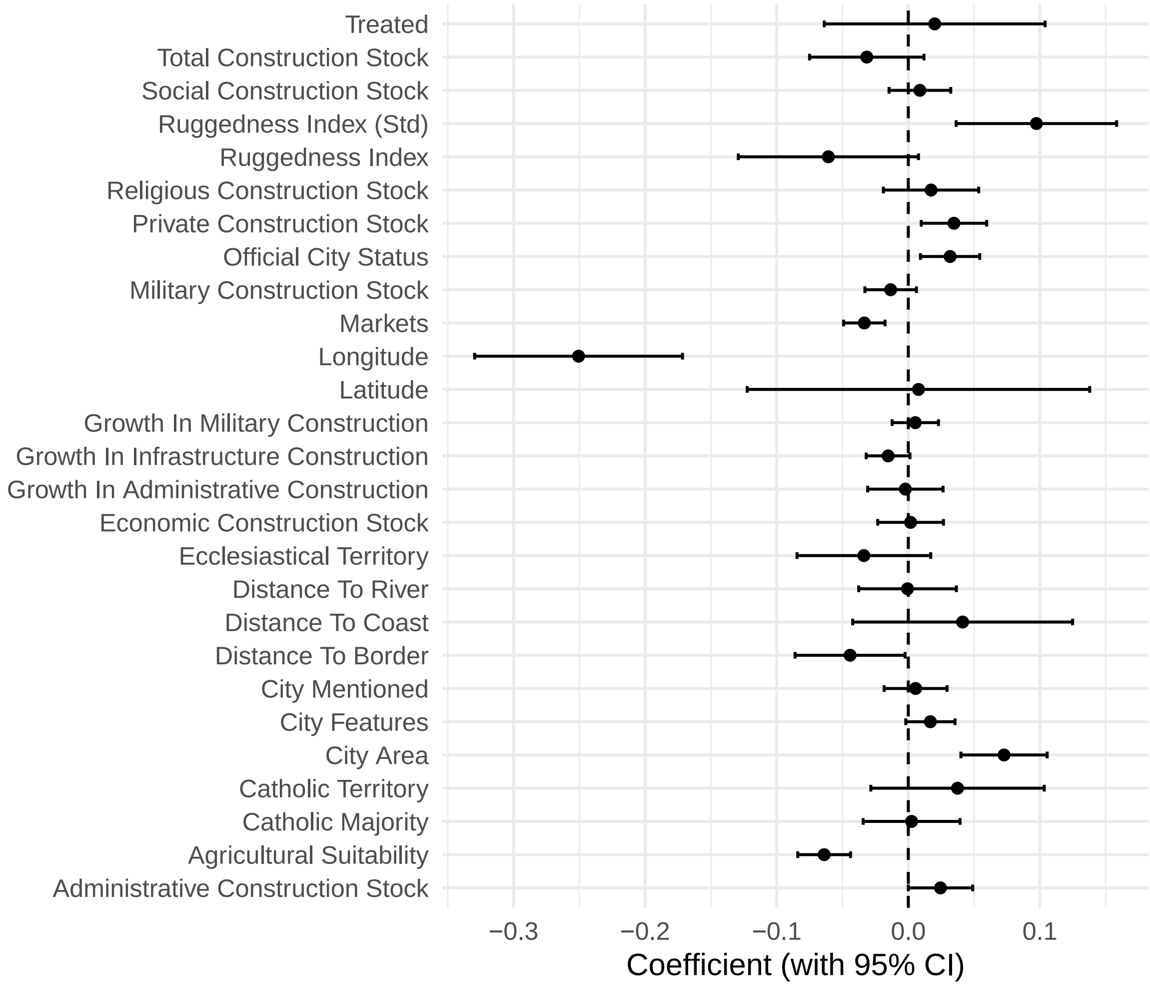
We also assess the representativeness of the name sample with respect to city dynamics. Absent systematic population records, we rely on construction activity from Cantoni (2020). We aggregate our data to the city-decade level and denote the average number of birth events and the average number of construction events, taking the inverse hyperbolic sine of both variables. We then regress average births on average construction in a city-decade. Appendix Figure D.3 shows results in a binned scatterplot: both variables track closely.

Figure D.1: Name Sample



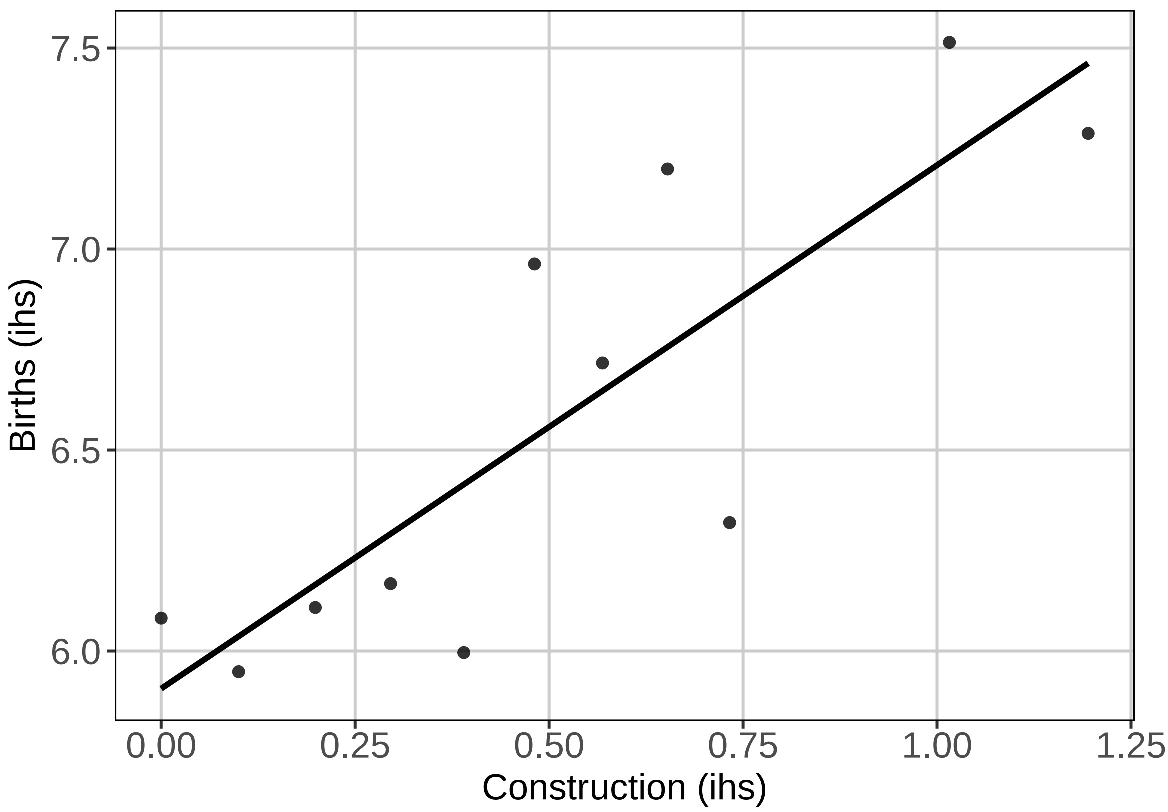
Note The plot shows cities included in the name sample.

Figure D.2: Comparison: Sample Cities vs. All Cities



Note The figure shows coefficients from regressing an indicator of whether a city is in the name sample on the covariates from Appendix Table A.1 and an indicator of whether a city was ever treated. The sample comprises of 2,125 cities.

Figure D.3: Comparison: Births vs. Construction Events



Note The figure shows a binned scatterplot from regressing the inverse hyperbolic sine of births in a city-decade on the inverse hyperbolic sine of construction events in a city-decade. The sample comprises of 4,673 city-decades.

D.2 Naming Distribution: Details

In place to our main measures of cultural traits introduced in Section 4.3 (main results in Table 1), we use the following alternative measures. Regression results based on these alternative measures are reported in section E.4 below, Table E.7.

(1) Turnover. We measure the information theory-based Theil (1967) index.[1] Intuitively, the name distribution is stable if we cannot infer which time period a randomly drawn name originates from. The total amount of births across both periods is $F_i = \sum_{a \in \mathcal{A}} (F_{ait_1} + F_{ait_2})$. Out of all births, the share of births with name a in city i is $f_{ai\bullet} = (F_{ait_1} + F_{ait_2}) / F_i$, the share of births that occurred in t and i is $f_{\bullet it} = \sum_{a \in \mathcal{A}} F_{ait} / F_i$, and the share of births with name a in city i and period t is $f_{ait} = F_{ait} / F_i$. The Theil index is defined as:

$$\mathcal{T}_i(t_1, t_2) = \frac{\sum_{a \in \mathcal{A}} \sum_{t \in \{t_1, t_2\}} f_{ait} \log \frac{f_{ait}}{f_{ai\bullet} f_{\bullet it}}}{- \sum_{t \in \{t_1, t_2\}} f_{\bullet it} \log f_{\bullet it}}$$

The numerator characterizes the mutual information contained in a name; the denominator normalizes the index so that it lies between 0 and 1. $\mathcal{T}$ equals zero if the naming distribution is exactly the same in t_1 and t_2. In that case, the information contained in the shares $f_{ai\bullet}$ and $f_{\bullet it}$ is fully sufficient to characterize the distribution in time period, $f_{ait} = f_{ai\bullet} f_{\bullet it}$. In contrast, if the naming distribution is maximally different across the two time periods, then marginal probabilities are not informative to learn about the distributions in each group, and $\mathcal{T} = 1$.

(2) Dispersion. We measure the unique name count as a fraction of all names in a given city and period,

$$\mathcal{D}_{it} = \frac{\sum_{a \in \mathcal{A}} \mathbb{1}(F_{ait} > 0)}{\sum_{a \in \mathcal{S}} F_{ait}}.$$

This measure is equal to 1 if all children are given a different name, and decreases when fewer names are used.

(3) Novelty. We calculate the "global" novelty of a name following Voth and Yanagizawa-Drott (2024): as opposed to the main measure introduced in Section 4.3, here the degree of novelty is measured in the entire sample of cities, and not within a given city. Across all cities i, we thus classify the leftmost 1% of the distribution of cumulative name counts as follows:

$$\mathcal{N}_{at} = \begin{cases} 1 & \text{if } \sum_{\tau=t_0}^{t} \sum_i F_{ai\tau} \leq Q_1 \left(\left\{ \sum_{\tau=t_0}^{t} \sum_i F_{a'i\tau} \mid a' \in \mathcal{A} \right\} \right) \\ 0 & \text{otherwise,} \end{cases}$$

where Q_1 indicates the cut-off value at 1%, ranking cumulative name shares from lowest to highest. We then calculate the share of these 'tail' names in city i and period t:

$$\mathcal{N}_{it} = \frac{\sum_{a \in \mathcal{A}} \mathcal{N}_{at} F_{ait}}{F_{it}}$$

[1] See also Shorrocks (1980), Mora and Ruiz-Castillo (2011), and Elbers (2023).

D.3 Name Identity: Details

D.3.1 Alternative Measures

To avoid relying on a single classification of names, and to show the robustness of our findings to alternative approaches to categorization, we propose a number of alternative measures to depict the loyalist, religious, and nationalist identity content in naming. Regression results based on these alternative measures are reported in section E.5 below, Tables E.8–E.11.

Alternative 1 We use other, alternative name lists from the contemporary era.

(1) Loyalism. We widen the definition of "dynasty names" to include all dynasties of the Holy Roman Empire, not just the German Confederation.

(2) Religiosity. We use the *Neu-erfundene doch alt-gewohnte deutlich-Teutsche Tauff-Namen* (Danck, 1708), which lists religious baptism names.

(3) Nationalism. For nationalist names, we use *Die Namen der alten Teutschen* (Viehbeck, 1818), published two years after our main source, with the same aim of providing a set of nationalist names to choose from.

(4) Polarization. We then calculate polarization relying on (1–3).

Alternative 2 We use alternative name lists, focusing on those that are applicable to male names.

(1) Loyalism. We restrict "dynasty names" to just include male names.

(2) Religiosity. We use a list of all church names in Germany from Open Street Maps.

(3) Nationalism. We use all male names that are listed as having a 'Germanic' etymology on vorname.com.

(4) Polarization. We then calculate polarization relying on (1–3).

Alternative 3 To move away from list-based measures, we follow Fryer and Levitt (2004) and infer the ideological content from revealed choices of individuals in the respective social group. In a dataset of reference births, we measure the distinctiveness of a name for an identity group as:

$$\mathcal{I}^{\mathrm{a,\,k}} = \frac{\mathbb{P}(\mathrm{a} \mid \mathrm{k})}{\sum_{k'=1}^{K} \mathbb{P}(\mathrm{a} \mid \mathrm{k}')},$$

where a is a particular first name and $k \in \{\text{nationalist, religious, loyalist}\}$. The index ranges from 0 to 1. If $k =$ nationalist, and a name is exclusively given to children of nationalists, then $\mathcal{I}^{\mathrm{name,\,k}} = 1$. In contrast, if a name is only given to children of religious figures or loyalists, $\mathcal{I}^{\mathrm{name,\,k}} = 0$. Note the measure $\mathcal{I}^{\mathrm{name,\,k}}$ is defined for each first name and for each of the three identities.

For each city and time period, we can then construct the average distinctiveness of birth events for each group, $\mathcal{I}^{k}_{it} = \frac{1}{F_{it}} \sum_{a \in \mathcal{A}} F_{ait} \mathcal{I}^{\mathrm{a,\,k}}_{it}$.

Constructing this measure requires a set of reference births for each identity group to construct the conditional probabilities. We access the most comprehensive lists of available biographies of individuals that formed part of one of the three groups, and record the names of their children.

(1) Loyalism. For loyalism, we use the dataset of all children born to the German rulers between 1600–1850 from Marek (2018).

(2) Religiosity. For religiosity, we rely on a list of 458 German theologians in the 19th century with at least one known child.

(3) Nationalism. For nationalism, we consider all 1,746 individuals who either were part of the first nationalist fraternities (*Burschenschaften*) or the national assembly of 1848 and who had at least one child.[2]

(4) Polarization. To calculate polarization, we binarize measures (1–3) by whether for a given $\mathcal{I}^{\mathrm{a,\,k}}$ it holds that $\mathcal{I}^{\mathrm{a,\,k}} > \mathcal{I}^{\mathrm{a,\,k'}}\ \forall\, k' \neq k$.

Alternative 4 We use additional information embedded in names.

(1) Loyalism. Using Fryer and Levitt (2004), we compute the distinctiveness of each local dynasty name relative to the names of all other dynasties in the German Confederation. This isolates rejection of local ruler names over and above a rejection of noble naming conventions more broadly.

(2) Religiosity. For religiosity, we match exact baptism dates to the calendar of saint days from Schwenger (1753) and compute the share of births named in the week surrounding a corresponding feast day.

(3) Nationalism. For nationalism, we consider the names for which Beneken (1816) recommends an alternative 'authentic' Germanic spelling. Undoing our standardization of spelling, we compute the share of names that use the nationalist spelling variant out of all names with a suggested spelling.

(4) Polarization. Since (1–3) do not allow for measuring polarization, we instead use this measure to assess the parametrization of polarization. We use the main name lists from Section 4.3, but instead set $\alpha = 3$.

D.3.2 Deduplication

Name lists of loyalist, religious, and nationalist names overlap partly. For example, Johann(es) had religious connotations (John the Baptist and John the Apostle), but in some states — for example in Saxe-Weimar — it was also an entrenched dynastic name.

We address this issue in three ways.

1. When using list-based measures, as in Table 5 and Appendix Tables E.8 and E.9, we deduplicate lists in a two-step procedure: First, to account for the saliency of local dynasties, we assign each overlapping name that not only appears across all dynasties, but specifically in the local dynasty, as loyalist. For remaining names, we assign the name to the identity group with the highest distinctiveness $\mathcal{I}^{\mathrm{name,\,k}}$, resolving ties at random.
2. We also calculate identity shares by removing all overlapping names altogether.
3. Two of our alternative name measures do not rely on resolving overlap: The methodology from Fryer and Levitt (2004) assigns continuous scores to each name; and so do our measures of within-loyalist distinctiveness, saint day shares, and correct spelling shares.

[2]For nationalism, we use entries linked in the following Wikipedia categories: Liste der Mitglieder der Frankfurter Nationalversammlung, Mitglied der Urburschenschaft, Burschenschafter (19. Jahrhundert). For religiosity, we use the following categories: Lutherischer Theologe (19. Jahrhundert), Römisch-katholischer Theologe (19. Jahrhundert), Evangelischer Theologe (19. Jahrhundert), Baptistischer Theologe (19. Jahrhundert), Evangelikaler Theologe (19. Jahrhundert), Mennonitischer Theologe (19. Jahrhundert), Methodistischer Theologe (19. Jahrhundert), Reformierter Theologe (19. Jahrhundert).

D.3.3 Normalization

To account for potential differences in the coverage of our name lists across treated and control cities, we redefine identity shares as fractions of total births rather than as fractions of list-classified births.[3]

[3] Because the polarization index $\mathcal{P}_{it}$ requires group shares that sum to one, we include an additional 'unclassified' group when calculating polarization.

E Robustness Checks

E.1 Comparable Control Groups

Controls Appendix Table E.1 shows results when estimating equation (1), flexibly controlling for the city-level covariates listed in Appendix Table A.1.

Fixed Effects Appendix Table E.2 shows results when estimating equation (1), including city-year linear trends.

Table E.1: Territory Change and Naming Practices (Controls)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.3354***	0.2109***	0.3736***
	(0.0440)	(0.0549)	(0.0599)
Observations	53,624	53,624	53,624
R^2	0.66	0.71	0.65
Number of Units	690	690	690
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City
Controls	✓	✓	✓

Note Table presents results of estimating equation (1), including the city-level characteristics from Appendix Table A.1 interacted with $Post1789$ as controls. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.2: Territory Change and Naming Practices (Fixed Effects)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.2540***	0.1919***	0.2508***
	(0.0408)	(0.0476)	(0.0497)
Observations	53,624	53,624	53,624
R^2	0.72	0.79	0.75
Number of Units	690	690	690
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City
Linear Trends	✓	✓	✓

Note Table presents results of estimating equation (1), including the city-year linear trends in the estimation. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

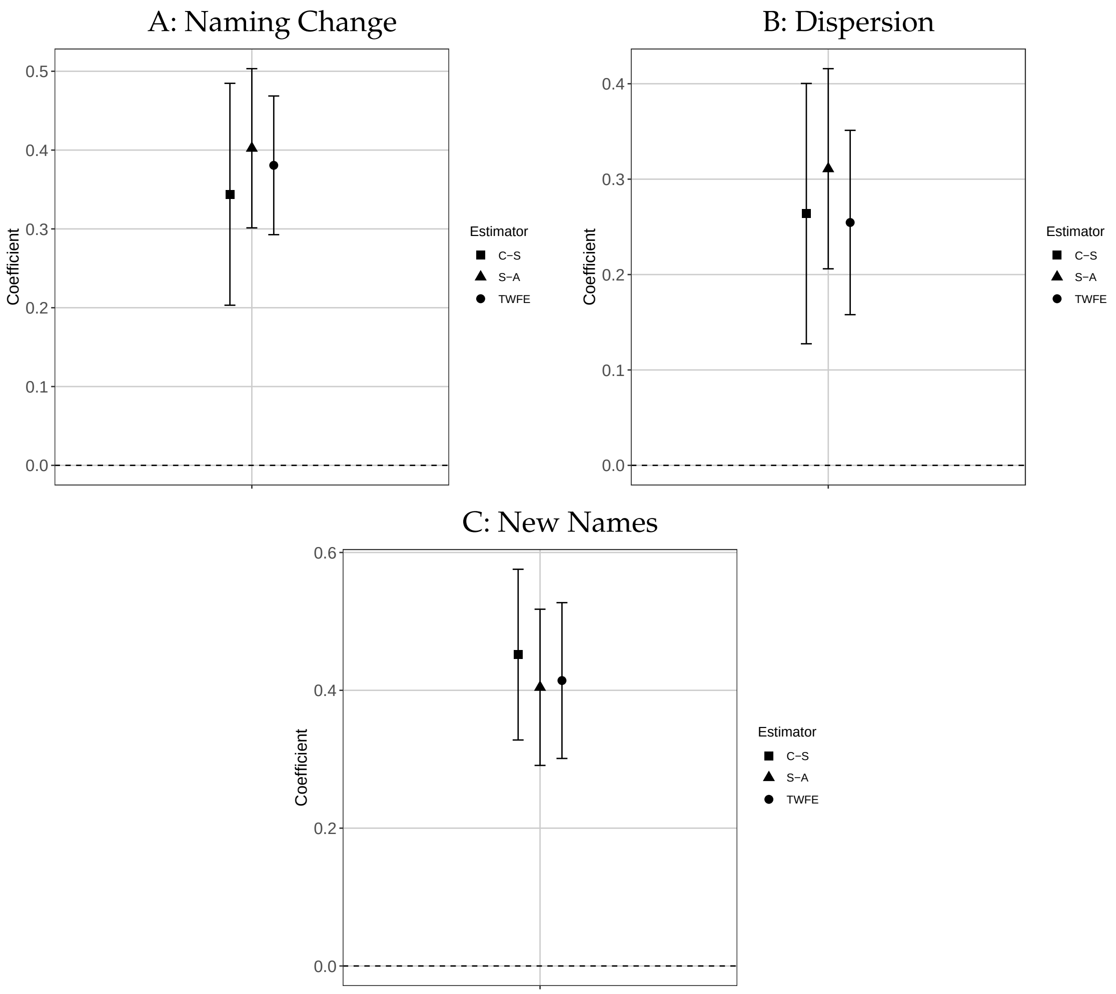
E.2 Heterogeneous Effects

Alternative Estimators Appendix Figure E.1 shows two-way fixed-effects estimates side-by-side with results from estimating the analogue of equation (1) using instead the methodology in Callaway and Sant'Anna (2021) and Sun and Abraham (2021), respectively.

Outliers Appendix Figure E.2 shows results of estimating equation (1), leaving out one German Confederation state at a time.

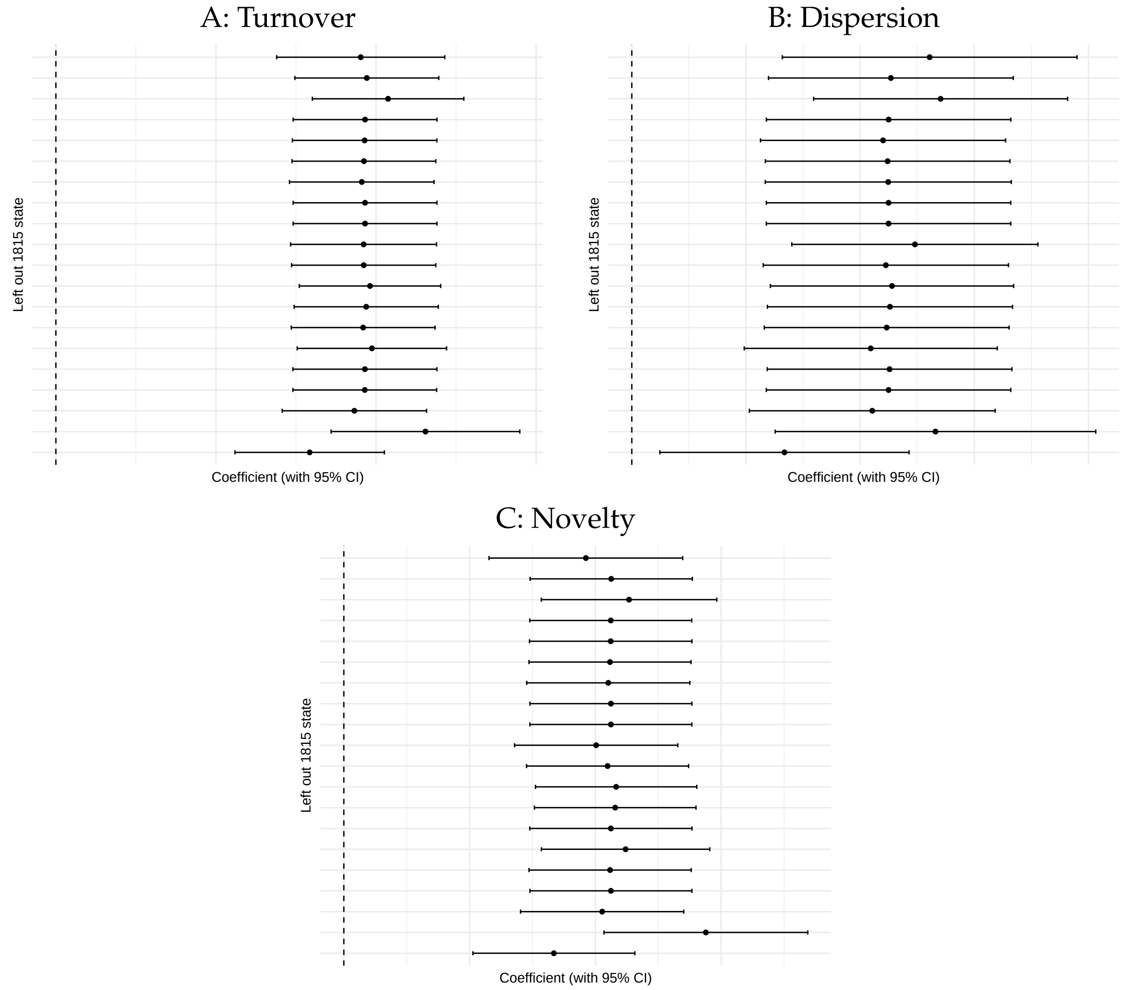
Sample Definition Appendix Tables E.3 and E.4 report results from estimating equation (1) in separate samples of female and male births. Additionally, we construct a sample that considers second names instead of first names of individuals where applicable. Appendix Table E.5 shows the results.

Figure E.1: Territory Change and Naming Practices (Heterogeneous Treatment Effects)



Note The plot shows results of estimating the various robust estimators in equation (2), with 95 percent confidence intervals. Observations are at the city-year level. The sample comprises 150 years. The dependent variables are standardized values of (A) turnover $\mathcal{T}_{it}$, (B) dispersion $\mathcal{D}_{it}$, and (C) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level.

Figure E.2: Territory Change and Naming Practices (Leave-Out Plots, German Confederation States)



Note The plot shows results of estimating equation (1), leaving out one German Confederation state at a time, with 95 percent confidence intervals. Observations are at the city-year level. The sample comprises 150 years. The dependent variables are standardized values of (A) turnover $\mathcal{T}_{it}$, (B) dispersion $\mathcal{D}_{it}$, and (C) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level.

Table E.3: Territory Change and Naming Practices (Female Names)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.3473***	0.2121***	0.4613***
	(0.0438)	(0.0529)	(0.0664)
Observations	53,466	53,466	53,466
R^2	0.56	0.51	0.57
Number of Units	710	710	710
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1), in a sample of female names. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.4: Territory Change and Naming Practices (Male Names)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.3370***	0.1890***	0.3595***
	(0.0436)	(0.0505)	(0.0629)
Observations	53,293	53,293	53,293
R^2	0.61	0.66	0.49
Number of Units	703	703	703
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1), in a sample of female names. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.5: Territory Change and Naming Practices (Second Names)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.3603^{***}	0.2471^{***}	0.3261^{***}
	(0.0456)	(0.0466)	(0.0677)
Observations	53,824	53,824	53,824
R^2	0.66	0.66	0.62
Number of Units	690	690	690
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1), in a sample that uses second names instead of first names where applicable. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

E.3 Treatment Timing

We next address the relevance of pre-trends in the context of the staggered nature of our treatment. On the one hand, there might have been anticipation of the treatment — as treaty negotiations were underway, "mediatization rumors" (Burgdorf, 2009, p. 192) spread; on the other hand, the narrow time window within which most territorial changes occurred (see section B.1 above; Figure A.1) limits the scope for concerns introduced by staggered treatment timing.

First, we note that across all estimates of equation (2) in Figures 3 and 4, no post-treatment confidence intervals overlap with a linear extrapolation of pre-treatment coefficients (Rambachan and Roth, 2023).

Second, we address potential treatment anticipation by noting that the initial outbreak of the War of the First Coalition was not anticipated (Wilson, 2016). Thus, we re-estimate equation (1) with treatment defined as $Treated_i \times Post1789_t$, where $Treated_i$ indicates whether a city changed rulers between 1789 and 1815, while $Post1789_t$ is a dummy for the time period after 1789. Appendix Table E.6 shows results, with Appendix Figure E.3 showing the corresponding event studies.

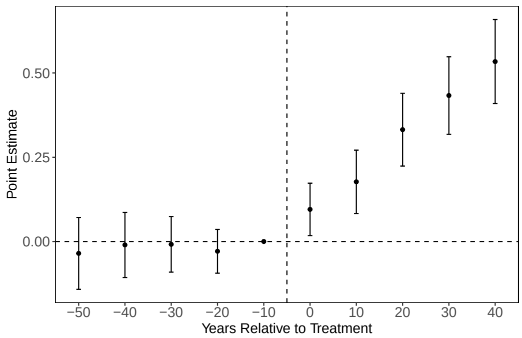
Table E.6: Territory Change and Naming Practices (Simultaneous Adoption)

	Turnover (1)	Dispersion (2)	Novelty (3)
Ever Treated × Post-1789	0.3606***	0.1824***	0.4046***
	(0.0491)	(0.0575)	(0.0693)
Observations	53,624	53,624	53,624
R^2	0.65	0.70	0.64
Number of Units	690	690	690
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

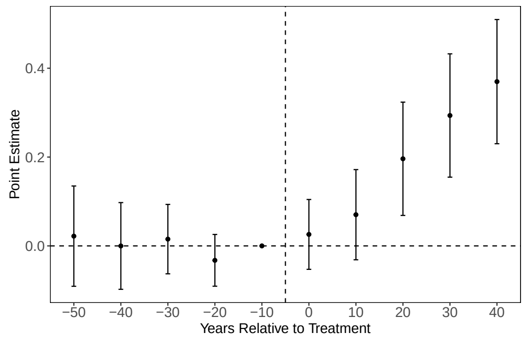
Note Table presents results of estimating equation (1), using an indicator of whether $t > 1789$ interacted with an indicator of whether a city changed ruler between 1789–1815 as simultaneous treatment. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Figure E.3: Territory Change and Naming Practices (Event Studies, Simultaneous Adoption)

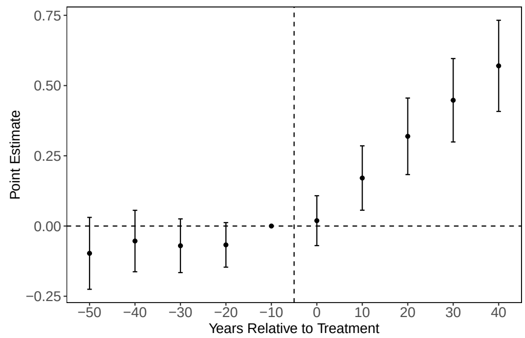
A: Turnover



B: Dispersion



C: Novelty



Note The plot shows results of estimating the event study regression in equation (2), using an indicator of whether $t > 1789$ interacted with an indicator of whether a city changed ruler between 1789–1815 as simultaneous treatment, with 95 percent confidence intervals. Observations are at the city-decade level. The sample comprises 15 decades. The dependent variables are standardized values of (A) turnover $\mathcal{T}_{it}$, (B) dispersion $\mathcal{D}_{it}$, and (C) novelty $\mathcal{N}_{it}$, as described in Section 4.3. Standard errors are clustered at the city level.

E.4 Alternative Measures (Robustness): Naming Distribution

Appendix Table E.7 shows results when using alternative outcome for turnover $\mathcal{T}_{it}$, dispersion $\mathcal{D}_{it}$, and novelty $\mathcal{N}_{it}$ as introduced in Section D.2.

Table E.7: Territory Change and Naming Practices (Alternative Outcome Measures)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.4034***	0.3361***	0.1021***
	(0.0471)	(0.0561)	(0.0347)
Observations	53,624	53,624	53,624
R^2	0.70	0.73	0.14
Number of Units	690	690	690
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1) using alternative outcome measures. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Appendix Section D.2. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

E.5 Alternative Measures (Robustness): Name Identity

Identity Measures We show results of estimating equation (1) using alternative measures of s_{it}^{loyalist}, $s_{it}^{\text{religious}}$, $s_{it}^{\text{nationalist}}$, and $\mathcal{P}_{it}$. Appendix Tables E.8, E.9, E.10 and E.11 use measures 1, 2, 3 and 4 described in Appendix Section D.3, respectively.

Deduplication and Normalization Appendix Table E.12 shows the main identity measures from Section 4.3, omitting all names that overlap across lists. Appendix Table E.13 shows the main identity measures from Section 4.3, normalizing S_{it}^{k} by F_{it} instead of $\sum_{k'=1}^{K} S_{it}^{k'}$ for each k.

Table E.8: Territory Change and Identities (Alternative Outcome Measures 1)

	Loyalist (1)	Religious (2)	Nationalist (3)	Polarization (4)
Treated	-0.3632***	0.2638***	0.1931***	0.2787***
	(0.0678)	(0.0711)	(0.0457)	(0.0635)
Observations	53,624	53,624	53,624	53,624
R^2	0.57	0.49	0.70	0.62
Number of Units	690	690	690	690
City FEs	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓
Cluster	City	City	City	City

Note Table presents results of estimating equation (1) using alternative outcome measures. Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) s_{it}^{loyalist}, (2) $s_{it}^{\text{religious}}$, (3) $s_{it}^{\text{nationalist}}$, and (4) $\mathcal{P}_{it}$ as described in Appendix Section D.3 (1). Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.9: Territory Change and Identities (Alternative Outcome Measures 2)

	Loyalist (1)	Religious (2)	Nationalist (3)	Polarization (4)
Treated	-0.5639***	0.1935***	0.4026***	0.2034***
	(0.0734)	(0.0603)	(0.0508)	(0.0641)
Observations	53,624	53,624	53,624	53,624
R^2	0.66	0.68	0.68	0.59
Number of Units	690	690	690	690
City FEs	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓
Cluster	City	City	City	City

Note Table presents results of estimating equation (1) using alternative outcome measures. Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) s_{it}^{loyalist}, (2) $s_{it}^{\text{religious}}$, (3) $s_{it}^{\text{nationalist}}$, and (4) $\mathcal{P}_{it}$ as described in Appendix Section D.3 (2). Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.10: Territory Change and Identities (Alternative Outcome Measures 3)

	Loyalist (1)	Religious (2)	Nationalist (3)	Polarization (4)
Treated	-0.4097***	0.2133***	0.2269***	0.2758***
	(0.0734)	(0.0665)	(0.0443)	(0.0652)
Observations	53,624	53,624	53,624	53,624
R^2	0.48	0.51	0.75	0.62
Number of Units	690	690	690	690
City FEs	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓
Cluster	City	City	City	City

Note Table presents results of estimating equation (1) using alternative outcome measures. Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) s_{it}^{loyalist}, (2) $s_{it}^{\text{religious}}$, (3) $s_{it}^{\text{nationalist}}$, and (4) $\mathcal{P}_{it}$ as described in Appendix Section D.3 (3). Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.11: Territory Change and Identities (Alternative Outcome Measures 4)

	Loyalist (1)	Religious (2)	Nationalist (3)	Polarization (4)
Treated	-0.1232**	0.1387**	0.1852**	0.1155**
	(0.0557)	(0.0698)	(0.0777)	(0.0547)
Observations	53,624	53,624	19,036	53,624
R^2	0.81	0.55	0.33	0.81
Number of Units	690	690	509	690
City FEs	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓
Cluster	City	City	City	City

Note Table presents results of estimating equation (1) using alternative outcome measures. Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) s_{it}^{loyalist}, (2) $s_{it}^{\text{religious}}$, (3) $s_{it}^{\text{nationalist}}$, and (4) $\mathcal{P}_{it}$ as described in Appendix Section D.3 (4). Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.12: Territory Change and Identities (Omitting Duplicate List Entries)

	Loyalist (1)	Religious (2)	Nationalist (3)	Polarization (4)
Treated	-0.2674***	0.2477***	0.0485	0.1936***
	(0.0453)	(0.0436)	(0.0405)	(0.0583)
Observations	52,958	52,958	52,958	52,958
R^2	0.66	0.67	0.28	0.43
Number of Units	690	690	690	690
City FEs	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓
Cluster	City	City	City	City

Note Table presents results of estimating equation (1). Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) s_{it}^{loyalist}, (2) $s_{it}^{\text{religious}}$, (3) $s_{it}^{\text{nationalist}}$, and (4) $\mathcal{P}_{it}$ as described in Section 4.3, omitting names that are duplicated across lists. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.13: Territory Change and Identities (Normalizing By All Names)

	Loyalist (1)	Religious (2)	Nationalist (3)	Polarization (4)
Treated	-0.2789***	0.0774*	0.2961***	0.2825***
	(0.0488)	(0.0418)	(0.0425)	(0.0585)
Observations	53,624	53,624	53,624	53,624
R^2	0.83	0.85	0.71	0.79
Number of Units	690	690	690	690
City FEs	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓
Cluster	City	City	City	City

Note Table presents results of estimating equation (1). Observations are at the city-year level, with the number of cities indicated in the table. The sample comprises 150 years. The dependent variables are standardized values of (1) s_{it}^{loyalist}, (2) $s_{it}^{\text{religious}}$, (3) $s_{it}^{\text{nationalist}}$, and (4) $\mathcal{P}_{it}$ as described in Section 4.3, normalizing instead by F_{it}. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

E.6 Mechanical Biases

Finite Sample Bias We also consider the role of finite sample bias in driving our results. Our main sample omits observations related to fewer than 100 births in a given city-year. Instead, Appendix Table E.14 shows results when not using any cutoff, whereas Appendix Table E.15 doubles the cutoff to 200 births.

Spatial Correlation Appendix Tables E.16, E.17, and E.18 show robustness of each outcome to using restrictive standard errors, respectively. Appendix Table E.19 shows results from Table 3, clustering standard errors at the level of 1789 territories.

Table E.14: Territory Change and Naming Practices (No Sample Cutoff)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.2831***	0.1433***	0.3407***
	(0.0366)	(0.0359)	(0.0451)
Observations	109,282	109,282	109,282
R^2	0.63	0.48	0.56
Number of Units	1,011	1,011	1,011
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1), not omitting any city-year observations. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.15: Territory Change and Naming Practices (Higher Sample Cutoff)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.3447***	0.1825***	0.4382***
	(0.0567)	(0.0692)	(0.0827)
Observations	26,477	26,477	26,477
R^2	0.69	0.75	0.70
Number of Units	493	493	493
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	City	City	City

Note Table presents results of estimating equation (1), omitting city-year observations with fewer than 200 associated birth events. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the city level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.16: Territory Change and Name Change (Standard Errors)

	Turnover				
	(1)	(2)	(3)	(4)	(5)
Treated	0.3863***	0.3863***	0.3863***	0.3863***	0.3863***
	(0.0457)	(0.0887)	(0.0759)	(0.0788)	(0.0913)
Standard-Errors	City	Territory (1789)	50km	100km	200km
Observations	53,624	53,624	53,624	53,624	53,624
R^2	0.65	0.65	0.65	0.65	0.65
City FEs	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓

Note Table presents results of estimating equation (1), using alternative standard errors. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variable is the standardized value of turnover $\mathcal{T}_{it}$. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.17: Territory Change and Name Dispersion (Standard Errors)

	Dispersion				
	(1)	(2)	(3)	(4)	(5)
Treated	0.2249***	0.2249*	0.2249***	0.2249***	0.2249***
	(0.0545)	(0.1230)	(0.0706)	(0.0640)	(0.0571)
Standard-Errors	City	Territory (1789)	50km	100km	200km
Observations	53,624	53,624	53,624	53,624	53,624
R^2	0.70	0.70	0.70	0.70	0.70
City FEs	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓

Note Table presents results of estimating equation (1), using alternative standard errors. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variable is the standardized value of dispersion $\mathcal{D}_{it}$. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.18: Territory Change and Name Novelty (Standard Errors)

	Novelty				
	(1)	(2)	(3)	(4)	(5)
Treated	0.4247***	0.4247***	0.4247***	0.4247***	0.4247***
	(0.0656)	(0.1165)	(0.1364)	(0.1335)	(0.1378)
Standard-Errors	City	Territory (1789)	50km	100km	200km
Observations	53,624	53,624	53,624	53,624	53,624
R^2	0.64	0.64	0.64	0.64	0.64
City FEs	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓

Note Table presents results of estimating equation (1), using alternative standard errors. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variable is the standardized value of novelty $\mathcal{N}_{it}$. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

Table E.19: Territory Change and Naming Practices (Instrumental Variables, Clustered)

	Turnover (1)	Dispersion (2)	Novelty (3)
Treated	0.8598***	1.071***	0.9332***
	(0.1660)	(0.2935)	(0.1555)
Observations	36,169	36,169	36,169
R^2	0.66	0.69	0.62
IV	✓	✓	✓
Number of Units	471	471	471
City FEs	✓	✓	✓
Time FEs	✓	✓	✓
Cluster	Territory (1789)	Territory (1789)	Territory (1789)

Note Table presents results of estimating equation (1), in the sample of cities belonging to a secular territory, using an instrumental variable based on the dynastic marriage network. Observations are at the city-year level, with the number of cities indicated each panel the table. The sample comprises 150 years. The dependent variables are standardized values of (1) turnover $\mathcal{T}_{it}$, (2) dispersion $\mathcal{D}_{it}$, and (3) novelty $\mathcal{N}_{it}$ as described in Section 4.3. Standard errors are clustered at the territory (1789) level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively.

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