Political Competition and Economic Divergence:

Development Before and After the Black Death*

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Abstract

We study how political competition shaped a major divergence in development after the labor supply shock of the Black Death. We leverage the interaction between the timing of the exogenous labor supply shock and a boundary between the politically concentrated, low competition East and the politically fragmented, high competition West of Europe. We investigate disaggregated panel data 1200-1800 and find that after the shock, urban construction and the development of city institutions fell by one-third and remained depressed where political competition was low *ex ante*. This holds (1) comparing neighboring and otherwise similar cities on either side of the boundary, (2) comparing cities subject to the same ruler within states spanning the boundary, and (3) using dynastic shocks as an IV for local political concentration. We find this urban divergence shifted outside options in labor markets and predicts the subsequent institutionalization of serfdom and the spread of farms using labor coercion.

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I Introduction

The relationship between political competition and development is a central question in economics. On the one hand, concentrated political power may promote development by strengthening coordination and enforcement, and a large literature finds positive links between concentrated power and development (McGuire and Olson 1996; Tilly 1990; Michalopoulos and Papaioannou 2013). On the other hand, political competition may constrain extractive governments and foster growth by promoting property rights and innovation (North 1981; Acemoglu and Robinson 2012). For example, the rise of Europe is often attributed to its competitive, fragmented state system (Jones 2003; Scheidel 2019; Baechler 1971; Weber 1978; Landes 1998; Mokyr 2016; Fernández-Villaverde et al. 2023). This contrast suggests that the implications of political competition may vary and potentially reflect shifts in economic factors, including relative factor scarcities and prices.

We trace the relationship between political structure and development around an exogenous labor supply shock. We focus on the Black Death (c. 1348), which sharply increased wages and the demand for urban products, and depressed grain prices. The shock redistributed income from rulers and landowners to cities and labor, induced distributional conflict, and led to a divergence in European development. Leading arguments suggest that political structure shaped the response to the shock: in Western Europe, where political power was more fragmented, the shock contributed to structural change, urban growth, and the decline of feudal institutions. In Eastern Europe, where political competition was limited, the same shock depressed development: rulers limited city autonomy and institutionalized labor coercion (Acemoglu and Robinson 2012; 2019; North and Thomas 1973; Brenner 1976).

We study how the shock transformed the political economy of structural change through the development of a new sector. The new sector of the economy was a contestable base of urban taxable wealth, set against secure rents rulers derived from the traditional, agricultural sector. Before the Black Death, the urban sector had been built up by the Commercial Revolution (Lopez 1976; Cantoni and Yuchtman 2014; Angelucci, Meraglia, and Voigtländer 2022), and rulers across more and less politically competitive environments supported cities. The Black Death shock raised wages and, via Engel's law, the relative price of urban goods. This sharpened the ruler's trade-off between secure rents and contestable urban revenue,

and turned latent stakes into acute distributional conflict. Where competition among rulers was high, cities had credible outside options and rulers supported urban development; where competition was low, rulers restrained development and ultimately moved toward coercion.

The main contribution of this paper is to present new panel data describing political structure and economic development over centuries and to provide the first quantitative analysis of the divergence in urban growth and labor coercion in agriculture within Europe.

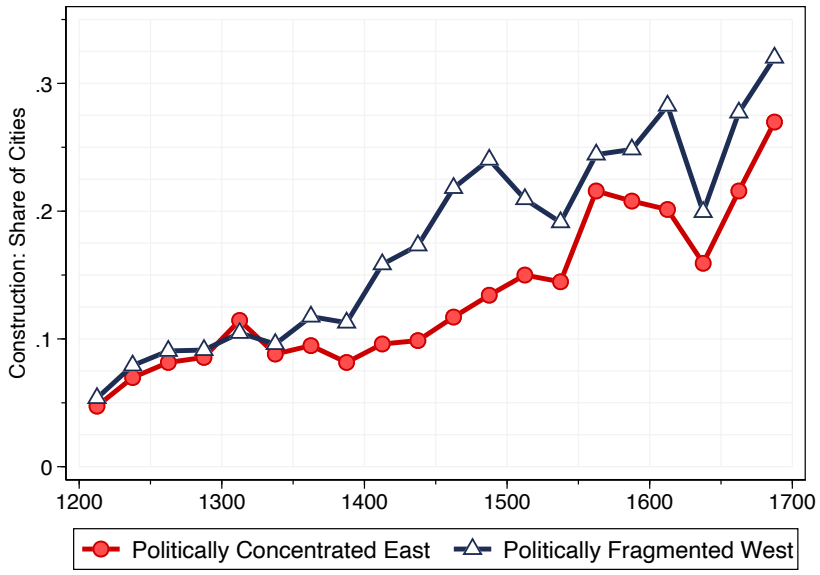
We gather disaggregated panel data on political and economic development spanning the urban and agricultural sectors and five centuries. We focus on evidence covering 2,000+ cities in German-speaking Europe between 1200 and 1700. First, we measure the structure of political competition with a novel proxy, local territorial fragmentation, which imposed constraints on rulers and raised cities' bargaining power. Second, to trace urban economic and political development, we gather data on (1) urban construction, which provides uniquely fine-grained evidence on urban growth,[1] and (2) the development of the "essential features" of the self-governing European city (Pirenne 1956; Weber 1978), recording: (a) the establishment of city councils, mayors, and charters; (b) the rules governing the selection of city governments; and (c) urban collective action, including the formation of city alliances, conflicts between cities and external overlords, and the passage of *autonomous* city laws that promoted economic activity and were legal acts of "anti-lordly revolution" (Ebel 1953, p. 11; Isenmann 2014, p. 437). Third, we assemble data on coercive agriculture (serfdom), including on laws restricting the mobility of labor and the establishment of over 4,600 agricultural estates using coercion between 1200 and 1800.

Our novel data reveal a pattern of economic divergence. Figure I illustrates the divergence in raw data on urban construction: the politically concentrated East and politically fragmented West were on the same path before the shock and diverge afterwards. We observe a similar pattern in cities' institutional development. We find this urban divergence precedes and predicts the spread of labor coercion in agriculture in Eastern Europe.

While the divergence we uncover in the raw data is suggestive, tracing the exact channel is empirically challenging. There were potentially important underlying political, economic, institutional, geographic, and cultural differences between Eastern and Western Europe

[1]Construction was a key, richly documented urban industry (Le Goff 1988, p. 56) and an indicator of city growth in Germany (Enders 2008, p. 95). Population and wage data are very sparse, especially before 1350.

Figure I: Urban Construction



This graph shows the share of German-speaking cities with major construction projects in 25-year periods. Data are from the *Deutsches Städtebuch*. Cities in the Concentrated East are East of the Elbe River or its tributary Saale ($n = 760$). Cities in the Fragmented West are West of the Elbe and the Saale ($n = 1{,}490$).

before the Black Death. Leading hypotheses emphasize regional variation in political competition, but alternative explanations focus on other factors such as urban density or agrarian institutions, which may have interacted with the demographic shock (Acemoglu and Robinson 2012; Acemoglu, Johnson, and Robinson 2005a; Brenner 1976). To study how political competition interacts with economic shocks thus requires disaggregated data to test channels, and variation in political competition unrelated to other development factors.

To investigate potential channels, we study development across a boundary that delivers variation in political competition, where geographic, economic, and cultural differences were limited. The Elbe River and its tributary the Saale famously traces a shift in political structure, divides the politically concentrated East and fragmented West of German-speaking Europe, and generates the "pivotal comparative case" to distinguish competing theories of long-run development (Brenner 1976, p. 56). According to historians, the Elbe-Saale line marked a shift in political structure, but not in technology or geography or culture, at the beginning of our study period (Postan 1973; Szűcs 1983; Bartlett 1995).[2] Empirically, we develop a novel measure of the structure of political competition among rulers using

[2]This boundary runs through the "northern European plain" and traced a shift in political structure where regional differences in geography, agricultural productivity, and external threats which otherwise tend to explain the size of states (Fernández-Villaverde et al. 2023) were attenuated. The Saale lies west of the Elbe before the two rivers join. It is thus the first geographic obstacle to movement from the West.

Herfindahl indices of local political concentration, following Stigler (1972) and North (1981).[3] We confirm political fragmentation was significantly lower (concentration was higher) in the East than in the West, and that this difference was stable before the Black Death.

This persistent and stable regional difference in political structure arose for reasons plausibly unrelated to later economic dynamics. The Elbe-Saale line traced a "political frontier" of the Carolingian Empire until c. 887 (Smith 1995, p. 177; Hardt 2001). After the Carolingian state collapsed, the territory West of the boundary fragmented among a large number of rulers.[4] Meanwhile a colonization process integrated Eastern territories into German-speaking Europe economically, institutionally, and culturally between the 900s and 1100s. There were fixed costs and increasing returns in organizing colonization, which left the East with a concentrated political structure (Kuhn 1956; Aubin 1966; Szűcs 1983; Barraclough 1957; Bartlett 1995). While historians indicate that there were no cultural shifts at the border (Bartlett 1995, p. 306) and that territories in the East were recognized as part of "Western Europe" by contemporaries before the Black Death (Szűcs 1983, p. 132), it is natural to wonder about other social differences at the border. We therefore gather finely grained data on local institutions, collective action, conflict, and culture; introduce a sequence of tests that explore the relationship between political structure and development controlling for other development factors; and interpret differences in political fragmentation as potentially reflective of an "institutional matrix" (North 1990).

We study the divergence in urban growth using difference-in-differences analyses. We first use disaggregated data on urban construction and compare development in the concentrated East, where competition among rulers was low, and the fragmented West. We find regional trends and levels of economic activity were indistinguishable (major finding 1) and fell by 1/3 where *ex ante* political competition was low when the shock hit (major finding 2). We observe no differential regional pre-trends in urban construction, important city institutions, city populations, market access, conflict, collective action, or political fragmentation. However, it is possible that other cross-sectional differences interacted with the Black Death shock to drive the regional divergence or, indeed, that this shock varied regionally.

To consider this possibility, we next use an empirical strategy that leverages cross-border

[3]Rulers offered cities protection in exchange for taxes and control, while competing with nearby rulers.
[4]This fragmentation reflected dynastic factors unrelated to the location of the border (see Section II).

variation in political competition and time variation from the exogenous shock to compare the trajectories of similar cities just inside the politically concentrated East to those just inside the politically fragmented West. Within 100 kilometers of the border, we observe 343 cities in the East and 342 in the West which were comparable in access to transport, geographic endowments, plague exposure, urban density, and culture. These border cities exhibit no differential pre-trends, despite being exposed to a different political structure, and subsequently diverge, mirroring the pattern across all cities. Our analysis identifies a persistent decline in urban growth in the concentrated East by comparing neighboring Eastern and Western border cities, including time-varying grid-cell fixed effects. Our results are robust to controlling for the time-varying implications of distance from the border, cultural factors, trade organization, agricultural productivity, and local plague exposure.

Our estimate holds under a research design that uses *within-ruler* variation in cities' exposure to local political competition. We compare cities in the concentrated East to cities in the fragmented West governed by the same ruler, absorbing common time-varying factors in states spanning the border. This analysis rules out unobserved differences in ruler-level institutions, policies, or leadership characteristics as confounders.

It is, however, plausible that there were underlying, layered regional differences in local politics and institutions beyond political fragmentation that interacted with the Black Death to drive the divergence. In our disaggregated data on city institutions and politics, we find Eastern and Western cities developed similarly before the Black Death and only afterwards do Western cities differentially: develop major institutions such as the council; secure charters; win the right to select their council; enter alliances; enter conflict with rulers; and pass autonomous laws. These changes supported property rights and growth (Isenmann 2014). The divergence in city politics holds across Germany, along the border, and within rulers. The fact that Eastern and Western cities developed similarly on these margins before 1350 makes it unlikely that *ex ante* differences in city institutions and politics drove the divergence.

It is also natural to wonder whether common social or cultural features of the East, besides political concentration, could explain the divergence. To test this hypothesis, we compare the development of more and less concentrated regions *within* the East with similar cultural histories. We find political concentration was associated with reduced post-shock development in areas exposed to the same colonization process and prior Slavic culture. This

suggests that common unobserved aspects of the East are unlikely to explain the divergence.

It is also plausible that other shocks contributed to the divergence. Our event-studies test the timing of the regional divergence and find a sharp structural break when the Black Death hit. It is unlikely that regionally varying shocks explain our results, as we observe the divergence across neighboring cities similar in prior economic development, plague outbreaks, and conflict exposure, and controlling for the time-varying effects of productivity in export crops, trade potential, and commercial organization. The Commercial Revolution, as argued above, was a necessary precondition for the divergence: it built the contestable urban sector, and the Black Death made the stakes acute. Consistent with this, urban construction, political institutions, populations, and market access followed smooth trends before the shock; our findings hold controlling for non-linear regional pre-trends—evidence against a prior regional acceleration in commercial development driving the results. Agricultural shocks are unlikely to explain the urban divergence, as they did not shift relative prices in a direction that threatened rulers' incomes and made political structure salient. The urban divergence opened up after the Black Death and before later shocks such as the Reformation (1517) and the Thirty Years' War (1618), consistent with historians' view that the Black Death was the "absolutely central event" in our period (Lütge 1950, p. 166).

While our analysis traces an urban divergence, the development of coercion in agrarian labor markets was also a fundamental and plausibly interrelated determinant of long-run growth. An influential hypothesis suggests that the decline of cities in the East was in fact caused by the imposition of coercive agriculture or serfdom in the region after the Black Death, which limited labor mobility and demand for urban products (Brenner 1976; Acemoglu, Johnson, and Robinson 2005a). Against this view, economic theory and history indicate cities provided outside options for agricultural labor, and that the urban decline in the concentrated East shifted bargaining in agriculture and was the prerequisite for the institutionalization of serfdom (Acemoglu and Wolitzky 2011; Anderson 1974; Carsten 1954).

We estimate event-studies to test whether shifts in urban development led to or followed the development of coercive agriculture and obtain our third major finding: urban development during the divergence predicts the development of coercive agriculture. We assemble novel panel data on coercive agricultural estates and laws limiting the mobility of agricultural labor. We find the relative decline in city growth in the concentrated East 1350-

1500 predicts the spatial pattern of coercive agriculture, which only develops after 1500. We further document that urban growth and outside options for agricultural labor lead to (and do not follow) local reductions in coercive agriculture after the Black Death.

To clarify potential mechanisms, we develop a two-sector model where markets and politics interact to shape structural change. The economy consists of an agricultural sector using fixed land and labor under diminishing returns, and an urban sector using labor under constant returns. Labor mobility equalizes wages across sectors. A ruler derives secure rents from agriculture and contestable revenue from cities, while facing political competition from other rulers over the urban sector. Rulers face a trade-off: supporting urban institutions raises urban productivity, but erodes secure rents via factor reallocation and increases the risk of losing contested revenue by strengthening cities' bargaining power. This trade-off depends on the interaction of factor prices and political competition. When labor is abundant, the cost of reallocating workers from agriculture is low and rulers broadly support development. After a negative labor supply shock, the trade-off sharpens. The marginal value of secure rents rises while labor scarcity raises the relative price of urban output, due to Engel's law, increasing both gains and risks of development. These countervailing forces generate scope for divergence: rulers now face a coordination problem in which they either (i) limit support for development and risk losing cities to rivals, or (ii) support development and accept greater internal risk. By providing cities with outside options, political competition sharpens this trade-off and can induce structural change when domestic incentives alone would not.[5]

We test this channel and the direct link between political structure and development using IV analysis. We confirm that political fragmentation measured continuously shaped development after the shock. This holds when instrumenting for political fragmentation with Eastern location or exogenous dynastic shocks before the Black Death. We use lineage extinctions, ruler deaths without direct heirs, as a source of idiosyncratic variation in political concentration (Schubert 1998, p. 200; Cantoni, Mohr, and Weigand 2024, p. 17) in which "biological chance played a decisive role" (Andermann and Weiß 2018, p. 219). Our analysis makes it unlikely that endogenous variation in political structure explains the divergence.

[5]Empirically, the model predicts that political competition promotes urban development after the shock, but has no systematic effect before. The mechanism is that competition increases outside options for cities, via the threat of factor mobility and defection to other rulers, when rulers do not uniformly support development. The model implies that, where competition sustains development, it raises urban bargaining power and the risk of collective action; absent competition, the risk of eroding land rents dominates.

Our investigation contributes new evidence on how political competition shapes growth. The role of political competition in shaping economic development is a longstanding question in economics. On the one hand, political competition may constrain extractive governments and foster economic growth by protecting property rights and promoting innovation (North 1981; Acemoglu and Robinson 2012), with the fragmentation of Europe a canonical example (Jones 2003; Scheidel 2019; Baechler 1971; Weber 1978; Landes 1998; Mokyr 2016). On the other, political concentration may solve coordination problems, and a large literature traces a positive link between state centralization and development (McGuire and Olson 1996; Bockstette, Chanda, and Putterman 2002; Tilly 1990; Michalopoulos and Papaioannou 2013). This suggests that the impact of political competition may vary over time and with relative prices. We provide novel evidence on when it matters: political competition drives development when a price shock raises the stakes attached to a rising sector, making a latent political structure decisive.[6] We demonstrate that underlying political arrangements do not persistently shape development but may emerge as drivers of economic change when shocks to relative prices raise the stakes of an emerging sector. More generally, rulers' stance toward a new economic order is shaped by the interaction of prices and political competition.

We also contribute to the economics of institutional change. A large literature studies the impact of institutions on development using exogenous variation in institutions (Acemoglu, Johnson, and Robinson 2001; Dell 2010). However, "[u]ntil recently, empirical research in economics on the causes of institutional change has been limited" (Callen, Weigel, and Yuchtman 2024, p. 106), precisely because institutional change is typically endogenous. To trace and identify the drivers of institutional change generally requires exogenous variation in the demand for institutions. We develop panel data to document the process shaping institutional change across the urban and agricultural sectors around a major shock shifting relative prices.[7] We study two channels where theory indicates that outside options direct institutional change. First, a political channel – shaped by outside options in the political

[6] In this regard, our paper relates to a literature that studies institutional structure and factor endowments as drivers of growth. For example, Acemoglu, Johnson, and Robinson (2005b; 2002) study the direct and time-varying impact of economic institutions on development; and Sokoloff and Engerman (2000) trace how factor endowments led to the formation of persistent institutions shaping development. In contrast, we study how changes in relative factor scarcities animate political structure as a driver of development.

[7] Unlike Sánchez de la Sierra (2020), we study how a *common* price shock drives institutional divergence by activating the underlying structure of political competition.

market (North 1981). Second, an economic channel – shaped by outside options in the labor market (Acemoglu and Wolitzky 2011; Lewis 1954). We document how outside options in politics directed institutional change in the urban sector after the shock, and how resulting shifts in outside options in urban labor markets predict institutional change in agriculture. Our analysis traces a sequence of institutional changes directing structural change.

We uncover these general findings by investigating a critical juncture in development. After the Black Death, Western Europe embarked on a path to freedom and growth while Eastern Europe followed a trajectory of political subjection and economic stagnation (Acemoglu, Johnson, and Robinson 2005a; Acemoglu and Robinson 2012; 2019; North and Thomas 1973; Postan 1973). Prior arguments suggest the interaction between the shock and regional differences in agrarian class politics drove the divergence (Brenner 1976; Acemoglu, Johnson, and Robinson 2005a).[8] However, this argument generates a puzzle: the agrarian divergence emerged "after a lag of at least a century" (Brenner 1982, p. 267). Unlike prior work, we examine detailed quantitative evidence and identify key dynamics directly after the shock running through cities and reflecting underlying differences in political competition.[9] Classic arguments and empirical studies identify the self-governing city as a core institution that set Europe apart from Asia on a path to modern growth (Weber 1978; Marx 1965; DeLong and Shleifer 1993; Angelucci, Meraglia, and Voigtländer 2022; Voigtländer and Voth 2013),[10] and attribute the rise of the West to the political competition induced by state fragmentation (Scheidel 2019; Jones 2003; Baechler 1971). We provide the first quantitative analysis of how political competition explains a major, persistent divergence in development.

[8]Brenner's thesis is the leading explanation for the divergence in late medieval development (see Acemoglu and Robinson 2012), but rests on narrative evidence and is criticized for its narrow focus on the rural sector and its failure to account for the timing of the divergence (Heller 2011; Anderson 2005; Epstein 2000).

[9]Prior research studies cross-sectional evidence centuries after the shock (Ogilvie and Carus 2014). The shock also led to growth and lower inequality in the West (Jedwab, Johnson, and Koyama 2022; Alfani 2021).

[10]Related to our study, DeLong and Shleifer (1993); Cox and Figueroa (2021) find that pre-industrial cities grew faster where merchants were more powerful than princes, while Angelucci, Meraglia, and Voigtländer (2022; 2024) show how urban self-governance promoted national political institutions in England and was granted where returns to trade were high. We examine how the interaction between a major exogenous shock and underlying political competition shifted the growth of urban autonomy and led to development differences across *ex ante* similar cities. Unlike Voigtländer and Voth (2013), we document a divergence *within* Europe that reflects how the Black Death interacted with underlying differences in European political structure in settings without major differences in military conflict and exposure to epidemics.

II Historical Background

Our analysis studies the economic and institutional development in Europe before and after the Black Death, which hit c. 1348. In the period we study, cities in Europe were politically subject to external feudal rulers – princes and other hereditary lords – but were acquiring autonomous corporate rights: formal institutions that secured self-government, transformed the legal system, and supported economic activity (see Appendix C for details).

The self-governing city was one of the most important institutional innovations in the period we study and arguably all of economic history. Classic arguments suggest that the self-governing city was a distinctively European arrangement and played a key role in the divergence that saw Europe, and not China or the Islamic world, embark on an early path to capitalist modernity (Weber 1978). The self-governing city or *commune* was a legally recognized political corporation of urban citizens, acting jointly and in a relationship with an external ruler.[11] As a commune, a city acquired its own government and officeholders – typically a council and mayor – and its own law and enforcement processes (Weber 1978; Pirenne 1956). City law, as opposed to the law of a feudal lord, governed production and exchange: enforcement based on contract and evidence replaced the physical duel; standardized weights and measures for commerce were established, and dispute resolution was professionalized (Isenmann 2014; Weitzel 2009; Ebel 1953).

The institutions of urban self-government were endogenous. These institutions were adopted because the prior regime, "could no longer suffice for the needs of a merchant population" (Pirenne 1956, p. 201; Marx 1965). Weber (1978) emphasizes how urban autonomy was secured when city residents seized power from rulers through revolutionary action.[12] However, urban institutions were also established by rulers to promote development and generate revenue (Barraclough 1957; Weber 1978; Bartlett 1995).

A leading view is that Europe's distinctive political fragmentation promoted urban autonomy. Rulers offered cities protection in exchange for taxes and control, while competing with nearby rulers (North 1981). Political fragmentation thus provided outside options after

[11] The commune movement developed first in 10th-century Italy and began spreading in German-speaking Europe by the early 1100s, where the commune was known as the *Kommune* or *Stadtgemeinde*.

[12] Weber (1978; 1981, p. 324) stresses the "revolutionary" and "illegitimate" nature of this "usurpation," and that feudal lords were ousted by cities in our period "as the Russian bourgeoisie were by Lenin."

the fall of the Roman and Carolingian empires (Scheidel 2019; Jones 2003; Weber 1978; Landes 1998). Cities gained autonomy by taking "advantage of divisions among feudal lords" (Lachmann 2000, p. 53). In Europe, the "parcellization of sovereignty... alone permitted the political autonomy of the towns" (Anderson 1974, p. 193) (see Appendix B).

We focus our investigation around a major contrast in political structure: the West was politically fragmented, while the East was politically consolidated. This difference reflected a prior political process and followed the Elbe-Saale boundary (Barraclough 1957; Kuhn 1959; 1956). The Elbe-Saale line was the Eastern "political frontier" of the Carolingian Empire in the 800s (Smith 1995, p. 177; Hardt 2001, p. 230).[13] Between the 900s and 1100s, the collapse of the Carolingian Empire led to territorial fragmentation in Western Germany, while the colonization of Eastern territories generated more consolidated states East of the Elbe-Saale line. In the West, fragmentation was shaped by factors largely unrelated to the Elbe-Saale border. The Carolingian Empire was expanding when Viking incursions from the Northwest diverted resources away from the Elbe-Saale border (Barraclough 1957). Simultaneously, following the death of Charlemagne, the Carolingian Empire experienced dynastic succession crises that fractured central authority and accelerated fragmentation. By contrast, political concentration in the East was consolidated through the colonization of frontier lands between the 10th and 12th centuries (Barraclough 1957; Kuhn 1956; 1959; Bartlett 1995; Ebert and Kötzschke 1937). There were fixed costs and increasing returns to scale in organizing colonization, which resulted in larger, contiguous territories.[14] Rulers in these "frontier" lands could impose centralized administrative structures without the legacy of competing feudal claims that limited political concentration in the West (Kuhn 1959). The rulers who formed these less fragmented territories established hundreds of cities and villages with self-government institutions in planned development programs, and sent agents to West Germany and the Low Countries to recruit migrants (Kuhn 1956; Bartlett 1995). Migrants brought Western technology and culture to, and generated revenue for rulers in, the East in one of the largest processes of migration in medieval history. Postan (1973, p. 331) observes, "From their beginnings, the princely states of Eastern Europe differed

[13]The Elbe is a major European river and, prior to German colonization, crossing it was costly. In many stretches, it spans 200-300 m; construction of the first documented stone bridge across the Elbe (Dresden) began in 1169, was completed in 1222, and was among the largest medieval construction projects in Europe.

[14]Kuhn (1956, p. 77) observes that "prerequisites are necessary for such land planning" in particular "empty or little developed land, accessible to reshaping through colonization, in larger contiguous areas."

from their western prototypes, though the differences were not mainly economic or social in origin, but political and constitutional." As a result of this process, the Elbe became "the centre of German life," while still tracing a line between a "politically disjointed west" and a less fragmented East "organised on rational territorial principles" (Barraclough 1957, pp. 251, 279).[15] This difference in political structure was persistent and stable for centuries afterwards, as we document using detailed evidence on rulers' territories over time.[16]

Despite these differences, historians suggest regional economic trends were similar before the shock. Carsten (1947, p. 157; 1954, p. 88) indicates, "development in Western and Eastern Germany was running along parallel lines," and it, "only seemed a question of time until the east...would belong to the most developed parts of Europe." Isenmann (2014, p. 211) argues that absent the shock, cities in the East, "would have developed in a straight line."

Historical evidence indicates it was incentive compatible for rulers in more and less fragmented regions to support growth-enhancing urban institutions and self-government before the Black Death. Before the shock, rulers benefited from high and growing agricultural income. This reduced rulers' need to tax cities and aligned their interests with urban development, which provided key services to agriculture and demand for agricultural products, and which rulers thus supported, including in the more concentrated East (Bartlett 1995; Kuhn 1956; Aubin 1966).[17] We detail this incentive compatibility in Section VII.

The shock shifted payoffs. It increased labor incomes and shifted demand to urban products following Engel's law, leading to "the golden age of the craftsman" (Abel 1978, p. 53). It simultaneously led to a collapse in agricultural incomes, especially for landlords (Lütge 1950, p. 181), and a fiscal crisis for rulers (Kriedte 1981; Sablonier 1980; Blickle 1989;

[15] Historians note the River Elbe and its tributary the Saale formed "a line bisecting Germany" (Perkins 1986, p. 287) that constituted the "most important demarcation in German historical geography" (Ogilvie 1996, p. 122), and that "the Elbe and Saale...was the fateful 'seam' between the two areas" (Ebert and Kötzschke 1937, p. 14 – our translation). See Appendix C for details on the formation of Eastern territories.

[16] Globally, historical differences in political concentration also reflected variation in external threat environments (e.g., exposure to steppe incursions), that raised the fixed costs of defense.

[17] Rulers in the concentrated East offered cities the core institutions of urban self-governance, including city charters and councils, as well as valuable legal concessions conferring on cities the right to mill and export grain, to brew and sell beer, and to destroy castles in their neighborhoods (Kuhn 1956; Postan 1973; Enders 2008). Agrarian institutions were also favorable in the East before the Black Death: feudal rents were low (Schoer 1976, p. 35); agricultural settlers were personally free, had few or no labor obligations, and favorable hereditary land rights (Carsten 1954, p. 88; Aubin 1966, p. 468; Blickle 2003, p. 301; Melton 2015, p. 9; Thausing 1912, p. 487; Hagen 1985, pp. 83-84; Kaak 1991, pp. 374-75). That these institutions induced migration indicates migrants valued rights and freedom, as discussed in Appendices C.2 and D.2.3.

Graus 1969; Göttmann 1983; Rubner 1964; Hoffmann 1981; Störmer 1967; Lütge 1950; Abel 1978). The initial patterns were similar in Western and Eastern Germany (Sundhaussen 1990, pp. 53-4). However, the absence of systematic, disaggregated data on incomes or city populations in historic Germany motivates our analysis (Appendix C).

The political response to the shift in payoffs is subject to debate. In Western Europe, the demographic shock increased labor's bargaining power and led to pro-growth institutional change (North and Thomas 1973). Brenner (1976) argues that differences in the power of peasants and lords in agriculture East and West of the Elbe drove the divergence by promoting serfdom in the East, which stifled city growth (Acemoglu, Johnson, and Robinson 2005a). A key challenge for this view is that serfdom rose over 100 years after the shock: "The question is, why the delay? This difficult problem is not yet fully resolved" (Brenner 1982, p. 63). Anderson (1974, pp. 252-3) suggests, "it was precisely the objective 'interposition' of cities in the overall class structure that blocked any final intensification of servile bonds as a response to the crisis in the West...The noble class was well aware that it could not succeed in crushing the peasants until it had eliminated and subjugated the towns."[18]

The shock thus shifted the demand for urban institutions and induced conflict between rulers and cities. Cities were sources of revenue that rulers could extract and provided outside options that shaped the distribution of the surplus in agriculture (Carsten 1954; Blickle 1989). Cities specialized in economic activities that rulers could tax, whose relative prices rose after the Black Death.[19] Further, outside options may have "immense political importance" (Lewis 1954, p. 149) because employers in a given sector face labor costs that reflect labor's productivity in other sectors, which they may have an interest in suppressing.

Narrative evidence suggests that political competition shaped the outcome of distributional conflict and divergence across the Elbe-Saale line. In politically concentrated Brandenburg, after the Black Death the ruler crushed city autonomy, reneged on previously granted institutions supporting urban development, and built a castle in Berlin, 95 km East of the Elbe (Carsten 1954).[20] Just west of the Elbe, the cities of Lüneburg (15 km West) and Hannover capitalized on rival lords' competition in the 1370s, formed a coalition, won the

[18] Brenner's argument is controversial (Acemoglu, Johnson, and Robinson 2005a, p. 441). For criticisms emphasizing the role of cities, see Anderson (2005, p. 275), Enders (2008), Harman (1998), and Heller (2011).

[19] "Taxes" could involve rulers expropriating cities' rights to engage in marketing, milling, and brewing.

[20] Before the Black Death, cities in Brandenburg enjoyed self-government and the right to "break" castles, despite being in a politically concentrated area (Enders 2008; Keyser 1939-1974, Band 1, p. 622).

right to dismantle the lord's castle, and secured self-government rights. In the East, Bautzen fell under the concentrated authority of Wenceslas IV, who suspended free council elections in 1408 while in Görlitz, Duke Johann suppressed dissent, eliminated urban self-government, and took up residence in the city in 1390 (Jecht 1908). In the West, the city council in Frankfurt am Main leveraged political competition between the House of Luxembourg and the archbishop of Mainz to consolidate urban autonomy in the 1370s (Vigener 1908).

The layered history of economic, institutional, and cultural development naturally invites questions about other factors potentially shaping regional divergence after the Black Death. To address these questions, we gather novel evidence on local institutions and culture and focus components of our analysis on comparisons along the Elbe-Saale border, including across cities controlled by a common ruler, where prior economic and institutional development, endowments, access to transport, and urban density were similar in areas with different political fragmentation. Our analysis documents that the divergence was neither between a developed West and a backward East nor driven by ruler characteristics. To address questions about cultural confounders, we compare neighboring Western and Eastern cities along the Elbe border that were culturally Christianized and Germanized before the period we study.[21] By the 1100s, contemporaries viewed the German territories East of the Elbe as comprehensively part of "Western Europe" or *Europa Occidentalis* (Szűcs 1983, p. 132). Bartlett (1995, p. 306) observes that the towns and churches in the East "replicated the social framework" of the West: "The net result . . . [was] the spread. . . of the cultural and social forms found in the Latin Christian core. The new lands were closely integrated with the old. Travellers. . . would not be aware of crossing any decisive social or cultural frontier." In our quantitative analysis, we further control for the potential impact of differences in local exposure to Christian religion and pre-colonial culture using a broad set of indicators, and study the relationship between political competition and development within the East, across areas with similar cultural histories, subject to the same prior colonization process.

[21] Our analysis below documents divergence after the Black Death across cities within 100 km of the Elbe. German cultural dominance and Christianity were established in this area before our analysis begins. Thus, in 1174, the Bishop of Magdeburg wrote that in Jüterbog, over 100 km East of the Elbe, "the defence and protection of Christianity is firm and safe" and historical evidence indicates Germanization was "absolute" in the provinces of Brandenburg more than 100 km East of the border (Bartlett 1995, pp. 122, 299). Therefore the colonization-era settlement of this border zone was largely complete by c. 1200, well before the Black Death, so ongoing in-migration does not confound the border comparison; migration into more distant Eastern frontier regions continued later.

Our analysis focuses on the implications of the Black Death shock to labor supply. Lütge (1950, p. 166 – our translation) observes, "The absolutely central event... occurred around the middle of the 14th century, caused by the 'Black Death' of 1347/51 and the great epidemics that followed... The epidemic revived several times over the next few decades, around 1357/62, 1370/76 and 1380/83 in almost all of Germany with very similar results." The Black Death killed approximately 30% of Europeans; the second wave killed 10-20% in the early 1360s (Noymer 2007, p. 625; Gottfried 1983, p. 131). These repeated outbreaks prevented demographic recovery: "The effect of the subsequent epidemics was that [the original shock] was not overcome" (Kelter 1953, p. 164 – our translation) and thus, "Manpower shortages came to be widely felt... the socio-economic pyramid was altered" (McNeill 1976, pp. 149-50).[22] The historical evidence thus suggests that the relevant shock for our study was the overall decline in population after the Black Death.[23] This motivates our analysis of development before and after the Black Death. However, our quantitative analysis also accounts for and shows that our findings are not driven by local variation in plague.

III Data

Urban Construction. We study city-level construction data collected from the *Deutsches Städtebuch*, building on Cantoni, Dittmar, and Yuchtman (2018). The *Städtebuch* provides encyclopedic coverage of the historical development of over 2,000 places.[24] Construction involved a range of craft and manufacturing activities. Le Goff (1988, p. 56) observes, "Building sites were thus the centre of the earliest, and almost the only, medieval industry."

Urban Politics. We gather information on the "essential" political and institutional features that define the autonomous "Western city" (Weber 1978, p. 1226; Pirenne 1956) from the *Deutsches Städtebuch*.[25] We record the presence of major institutions, focusing on:

[22]Unlike the Black Death, the famines of 1315–22 did not produce a large or enduring check on labor supply (Campbell 2016, p. 16) and did not durably raise the relative price of urban output, as we discuss below.

[23]Further, cities not hit by the first wave of the Black Death were struck later, e.g. Würzburg, Nürnberg, Regensburg, and Munich were only hit in following years (Isenmann 2014, p. 77; Vasold 2003, pp. 295-7).

[24]Following Cantoni and Yuchtman (2014), we examine all cities except those in farthest East-Prussia.

[25]Our data expand on Wahl's (2019) evidence on elections and representation in 282 cities. Bosker, Buringh, and van Zanden (2013) provide data with a binary measure of participative city government, but these only cover large cities and code governance in East German cities as "participative" when participation was stifled, for example coding Berlin as "participative" after the ruler crushed city government militarily,

city councils (*Rat*); mayors (*Burgermeister*); and city charters. We construct information on the rules governing the selection of councils, recording whether the council: was elected; was oligarchic (i.e. empowered to select its members); or was appointed by the lord. We gather evidence on collective action, including: the formation of town alliances; conflicts between cities and lords; and autonomous laws. The *autonomous laws* passed by councils were indicators of revolutionary collective action through which cities "usurped" power and acquired "institutions adaptable to capitalism" (Weber 1978, p. 1250, 1325); these laws governed economic life, including commercial disputes, quality control in product markets, real estate transactions, servants' obligations, and migration (Weitzel 2009, p. 172; Isenmann 2014, p. 437; Weber 1978, p. 1325; Ebel 1953; and Appendix A).

Our institutional and political variables are observed and dated directly for every city in our panel. Our data on "major city institutions," such as charters, city council formation, and mayors record when each of these institutions was operative (typically dated by year, but sometimes by half-century), and the selection rules governing the appointment of city government, which conferred power either on cities or external rulers, and therefore index urban autonomy. Our data record how these institutions evolved at the city-by-time level, including their establishment as well as suspensions, eliminations, and re-establishments. We likewise observe conflict, alliances, and autonomous city laws at the annual level. Military conflicts are as recorded by Cantoni and Weigand (2021).

Political Fragmentation and Rulers. To measure local political fragmentation, we assemble comprehensive panel data on the rulers governing every city in our database from the *Deutsches Städtebuch* (Keyser 1939-1974) and a novel reconstruction of "territorial histories," following the methodology in Cantoni (2020) and extending the data from 1200 to 1450.[26] We use these data to document the stability of regional differences in political structure before the shock and to estimate shifts in development "within-ruler and time period" (with ruler-by-time fixed effects).

Coercive Agriculture. We construct data on the institutionalization of coercion in agriculture using comprehensive evidence on 85,000 territorial laws from the Max-Planck-Institut's *Policeyordnungen der Frühen Neuzeit* database (Härter and Stolleis 2023). We

built a new castle in Berlin, and eliminated any autonomous government (Carsten 1954).

[26]We use corroborating information on each city's type or "family" of charter from Cantoni (2020). We thank Davide Cantoni and Matthias Weigand for sharing data on rulers.

identify "coercive" laws from 1400-1800 that: deny peasant property rights (*Bauernlegen* and *Besitzverlust*), impose manorial serfdom (*Gutsherrschaft*), and require compulsory labor from tenant farmers (*Gesindezwang*). We assemble data on coercive production that record the construction of around 6,000 feudal agricultural estates across Germany from 1200 to 1800, from Hein (2024), *Die Burgendatenbank: Burgen, Schlösser, Adelssitze und Befestigungsanlagen* ("The castle database: Castles, palaces, noble residences and fortifications"). We specifically measure the construction of estate buildings (*Herrenhäuser*, *Gutshaus*, *Rittergut*), which are indicators of the rise of "the feudal noble estate economy" and "the transformation of the free peasantry into serfs" in the East (von Buttlar 1989, p. 9 – our translation). In our city-level analysis, we measure the number of coercive laws each city is exposed to and assign each agricultural estate construction event to the nearest city.[27]

Culture and Religion. We measure historic Slavic influence by identifying Slavic, Sorbic, and Old Polish roots in city names using an etymological place registry (Niemeyer 2012), the area of and distance to the historic Slavic settlement border (Wasserscheidt 2023), the historic exposure and distance to monasteries in 1350 (Niedersächsische Akademie der Wissenschaften 2023), and historic exposure to the church, measured as the sum of all periods that a city was within a bishopric before 1350 (Göttingen Academy of Sciences 2020).

Crop Yields, Trade Potential, and Market Access. We measure potential rye and wheat yields under rain-fed agriculture within 25 kilometers of each city using the FAO's *GAEZ* database. We measure trade potential with: "market access" calculated as trade cost weighted exposure to urban populations, following Donaldson and Hornbeck (2016); distance to trade routes Holterman et al. (2025), which reconstructs over 10,500 trade routes covering land and waterways in our study area; distance to navigable rivers; and Hanseatic League membership in 1348 as recorded in the *Deutsches Städtebuch*.[28] See Appendix A for details.

Plague. We measure local plague exposure in the Black Death (1348-51) with the number of city-level outbreaks recorded in the *Deutsches Städtebuch*, which varies locally, along the border, and within-ruler.[29] We examine supporting evidence on mortality rates

[27]The data include structures that no longer exist and structures that were converted to new uses, based on a systematic survey of the historical and archaeological literature.

[28]Note that large parts of Bavaria and Baden-Württemberg are excluded from the data in Holterman et al. (2025), but this does not affect cities at the border. All other variables cover all cities in our database.

[29]For example, the Bailiwick (*Vogtei*) of Quedlinburg straddled the Elbe. It ruled 3 Western cities, one of which had a major outbreak, and 2 Eastern cities, neither of which had an outbreak in the Black Death.

from Christakos et al. (2006, see also Jedwab, Johnson, and Koyama 2024) in Appendix D.2.

Population. We collect city-level information on population from Bairoch, Batou, and Chèvre (1988), and gather corroborating evidence on an extended set of cities from Holterman et al. (2025), and information recorded in the *Deutsches Städtebuch*.

IV Development Before the Shock

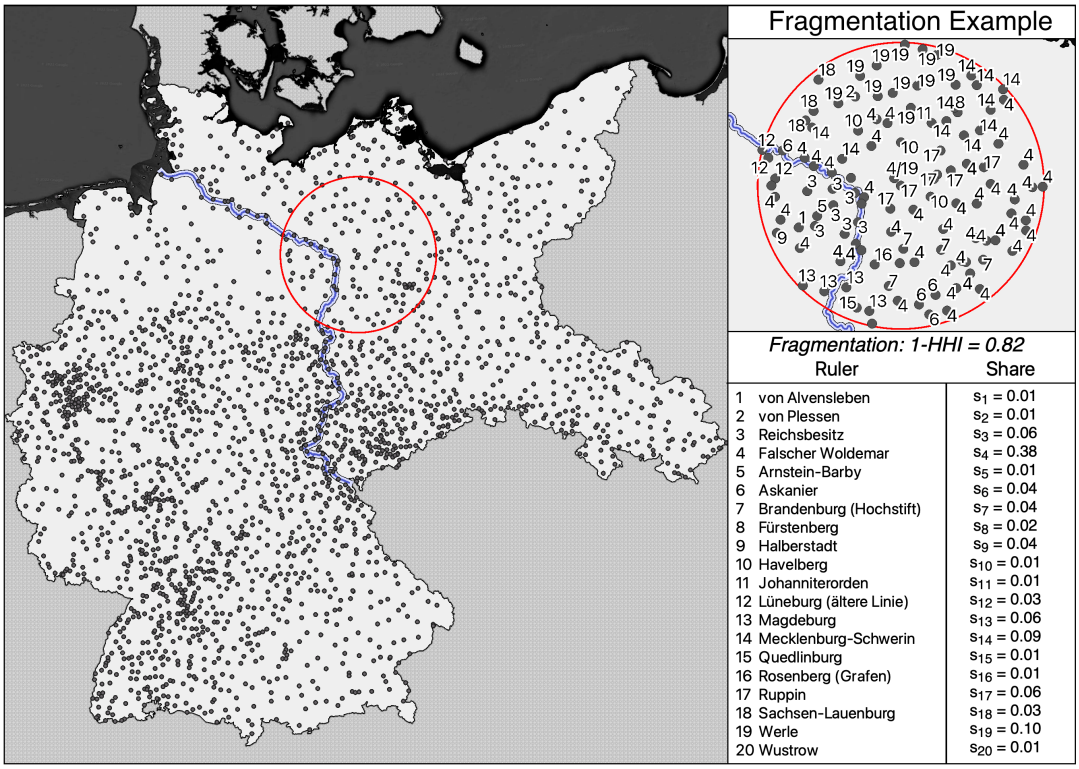
The first major finding that we document is that there were significant regional differences in the political structure shaping urban bargaining power before the labor market shock, but that core dimensions of urban development were similar across regions before the shock.

We use political fragmentation to measure the structure of political competition among rulers. We measure political fragmentation across space with Herfindahl indices following North (1981) and Stigler (1972),[30] using information on rulers' legal claims over cities in 1348, when 499 rulers held such claims. Figure II maps the cities we study, the Elbe-Saale boundary, and how we measure political fragmentation. For each city, we calculate a Herfindahl index (HHI) of local political concentration that reflects the shares of cities controlled by different rulers within 100 km. We define local "political fragmentation" as: $\kappa = 1 - HHI$. Figure II illustrates the variation in political rule for one city.

We observe a strong difference in exposure to political fragmentation between Eastern and Western cities. Figure III (Panel A) shows that Western cities were exposed to greater political fragmentation than cities in the East when the Black Death hit (c. 1348) and that there was minimal overlap in the distribution of political fragmentation across regions. We observe this difference despite measuring fragmentation including neighboring cities across regions near the border, which attenuates regional differences. In Appendix D.1, we further plot the underlying territorial data and the spatial distribution of political fragmentation before the shock. Panel B shows this regional difference in political structure was stable before the shock. We observe a relative decline in political fragmentation in the East after the shock, which is gradual along the border and more pronounced outside the border zone

[30] North (1981, p. 27) observes: "Where there are no close substitutes, the existing ruler characteristically is a despot. The closer the substitutes, the fewer degrees of freedom the ruler possesses," and "The alternative depends upon the structure of competitive political units. The more geographically proximate ones of course have an advantage." Stigler (1972, pp. 92, 97) notes, "strong [political] competition is positively correlated with (i) The number of rivals; (ii) Their similarity of size, and in particular the smaller the share possessed by the largest ruler, the more vigorous competition is likely to be," and proposes political Herfindahl indices.

Figure II: The Regional Distribution of Cities and Political Fragmentation



This figure maps the cities we study ($n = 2,250$) and the Elbe-Saale border. The local variation that enters our measure of political fragmentation in 1348 is illustrated for a representative city, circled at right, with the corresponding rulers and their share of cities in its 100 km neighborhood. Appendix A provides details.

in the "far East."[31] In heterogeneity analysis we find that Eastern cities exposed to more "Western" levels of political fragmentation followed more Western development trajectories after the pandemic shock (Section VII.B).

This pronounced regional difference in political structure motivates our comparison between the concentrated East and the fragmented West, and is consistent with historical research indicating the Elbe-Saale border was a political dividing line (Barraclough 1957).

To consider the potential role of political structure and other factors, we test for regional differences. We test for cross-sectional differences using regression models: $y_i = \alpha + \beta(T_i) + \epsilon_i$, where T_i indicates cities in the concentrated East. We test for differences in underlying trends in models: $y_{it} = \alpha(T_i \times t) + \beta(T_i \times Post_t) + \gamma(T_i \times Post_t \times t) + \theta_i + \delta_t + \epsilon_{it}$.[32]

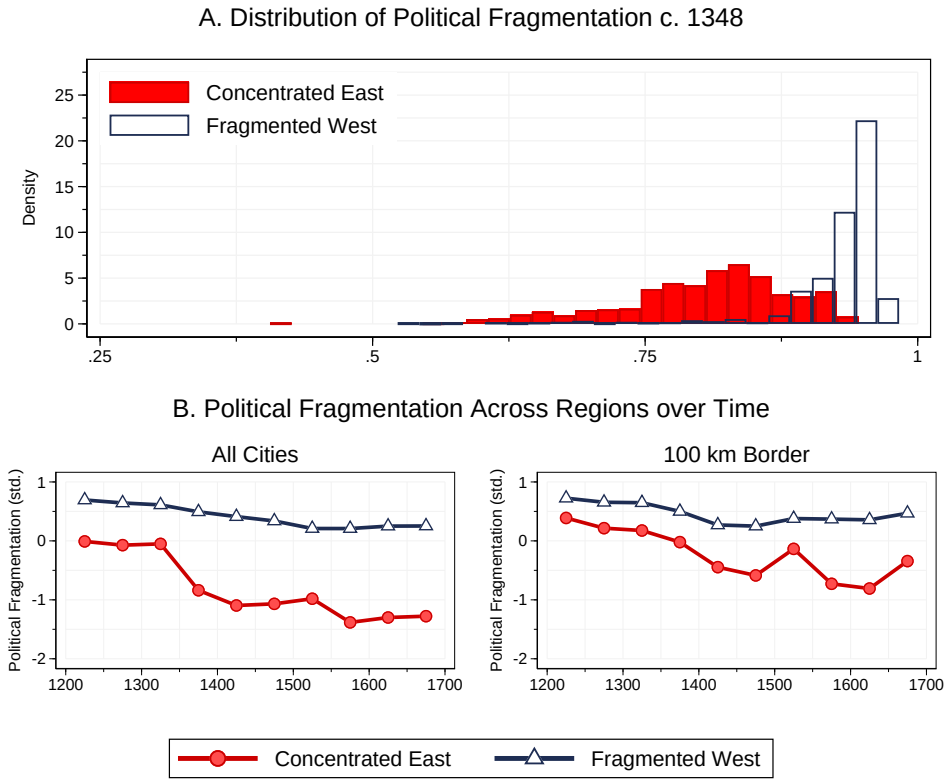
Figure IV Panel A examines cross-sectional differences. We find systematic regional differences in political fragmentation before the Black Death.[33] We find corroborating

[31] The decline away from the border is driven by greater political concentration in Silesia, which is outside the border zone. Our results are robust to dropping Silesia from our analysis.

[32] We further test for pre-trends in the main outcomes using event-studies in Figures VI and VIII below.

[33] We confirm the significant regional difference in political fragmentation accounting for the possibility

Figure III: Regional Differences in Political Fragmentation



Panel A plots the distribution of city-level political fragmentation in the concentrated East and fragmented West in 1348. Panel B plots mean political fragmentation by region for all cities and for cities along the 100 km border. City-level exposure to political fragmentation measured as described in the text.

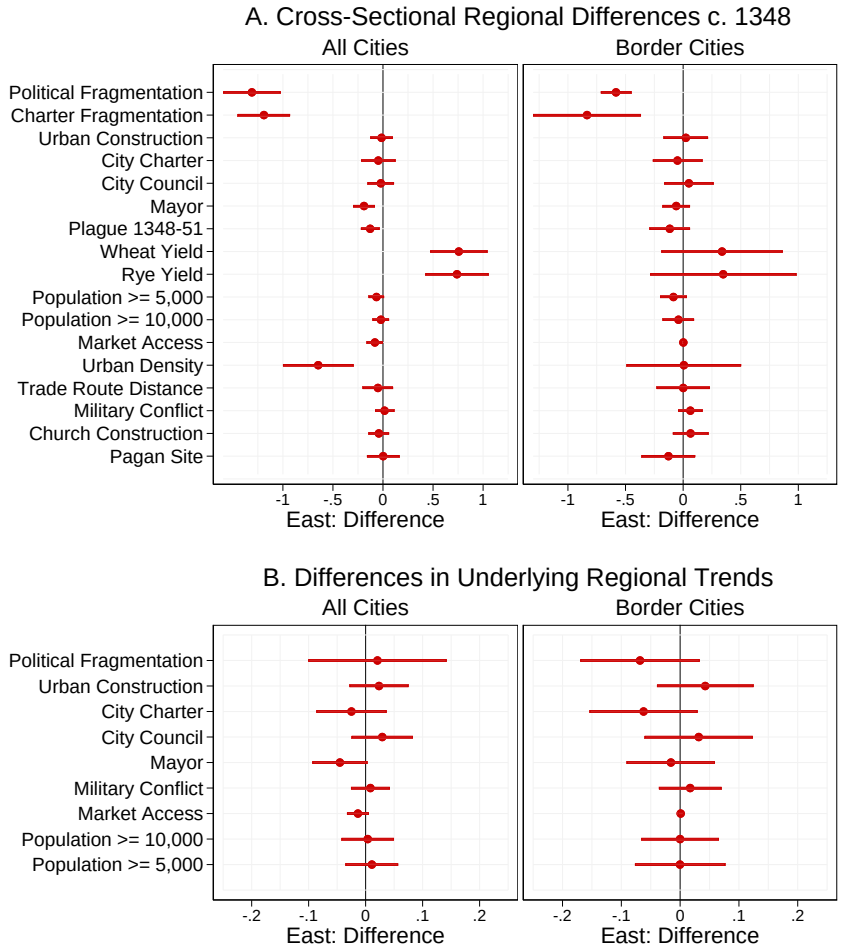
evidence that the fragmentation of city charter "families" was also lower in the East, reflecting the territorial concentration under which cities developed and indicating lordly power. These differences in political fragmentation indicate the lower level of potential political competition among rulers, and the lower bargaining power of cities, in the concentrated East.

These patterns reflect a shift in the spatial structure of political fragmentation at the Elbe-Saale line and motivate our comparison of cities on either side of the border. Importantly, we find regional differences in political fragmentation despite the fact that our measure is constructed conservatively to vary relatively smoothly in space.[34] Small, fragmented territories predominate in the West, while larger more contiguous territories

of spurious inference due to strong spatial dependence, implementing the low-frequency spatial unit root diagnostics and the LBM-GLS correction of Müller and Watson (2024), using the `spur` commands provided by Becker, Boll, and Voth (2025) in Appendix D.3.

[34]Because the index aggregates rulers within a 100-kilometer radius, cities on opposite sides of the river share a large part of the area over which it is calculated. Our baseline measure therefore cannot exhibit a discrete jump at the river by construction. The regional difference is a difference in means. Our design instead leverages the interaction between the spatial structural shift across regions and the timing of the shock; it is not a regression discontinuity design.

Figure IV: Regional Differences and Trends



Panel A presents regression estimates examining differences between concentrated Eastern and fragmented Western cities in the mid-1300s from models: $y_i = \alpha + \beta T_i + \epsilon_i$, where T_i indicates cities in the concentrated East for "All Cities" ($n = 2,250$) and "Border Cities" within 100 kilometers of the Elbe-Saale boundary ($n = 685$). All variables are normalized. "Political Fragmentation" and "City Charter Fragmentation" are described in the text. "Urban Construction" indicates construction 1200-1349. "Charter," "Council," and "Mayor" are indicators. "Plague 1348-1351" is the number of major outbreaks during the Black Death. "Rye Yield" and "Wheat Yield" are the logarithm of potential yields within 25 km of a city. "Population" variables are indicators. "Market Access" measures access to urban populations following the methodology of Donaldson and Hornbeck (2016). "Urban Density" is the number of neighboring cities within 100 kilometers. "Distance to Trade Route" is measured in kilometers. "Conflict" indicates conflict measured by Cantoni and Weigand (2021). "Church Construction" measures religious construction. "Pagan Site" as in text. Panel B tests for underlying regional trends (α): $y_{it} = \alpha(T_i \times t) + \beta(T_i \times Post_t) + \gamma(T_i \times Post_t \times t) + \theta_i + \delta_t + \epsilon_{it}$, where t denotes time trends, $Post_t$ indicates post-1350, and θ_i and δ_t are city and time fixed effects. The Panel B specification corresponds to column 2 of Tables I and II; the covariates are examined without conditioning, as several are themselves controls in those tables. Standard errors estimated allowing for arbitrary spatial correlation within 50 kilometers following Conley (1999).

dominate in the East. As a result, while κ varies smoothly across space, the rate of change is maximized at the border, where a marginal shift in location causes the greatest possible change in the composition of political structure. This holds within grid-cells and within

jurisdictions spanning the border, and using alternative measures of political fragmentation, including fragmentation calculated within grid cells and across a city's ten or twenty-five closest neighbors (Appendix D.1). We further find discrete differences at the border in the raw data when we construct political fragmentation to only include neighbors on each side of the border. Our framework below models how differences in κ translate into discrete policy responses under labor scarcity (Section VII and Appendix B, Proposition 2).

In contrast, we observe no differences in major city-level institutions such as city charters and councils. While Eastern cities had a slightly lower likelihood of having developed a mayor office by 1348, these differences vanish and become statistically insignificant when we focus on cities along the border. Below we further find city council selection and collective action were also similar across regions, and that while Eastern cities were "younger" and somewhat more likely to be founded top-down by a ruler, these factors do not shift significantly at the border and do not explain the divergence associated with political competition.

We next consider differences in the Black Death shock. We observe fewer plague outbreaks in Eastern cities during the Black Death. While this difference is statistically insignificant along the border, our analysis below finds that local plague differences do not drive the post-pandemic divergence, shows there are no observable differences in mortality rates across regions, and addresses questions about potential measurement error in detail (Section V).

We also observe limited if any economic differences across regions before 1350. We find no cross-sectional regional differences in construction, urban density (measured as the number of neighboring cities within 100 kilometers), distance to trade routes, market access, or population.[35] We find Eastern cities were located in higher yield (higher productivity) locations for rye and wheat, the key export crops in the period we study. This difference, however, is smaller and statistically insignificant along the Elbe-Saale border. We account for the potentially time-varying consequences of differences in agricultural productivity in our analysis below. In Appendix D.1 we find there were no regional differences in proxies for culture, such as monastery and church construction, which we nonetheless account for.[36]

[35] Our analysis uses Bairoch, Batou, and Chèvre's (1988) data on city populations. We extend the analysis considering two additional datasets and the distribution of populations exceeding 10,000 in Appendix D.1.4. While the limited nature of the surviving data prevents us from conclusively ruling out prior population differences, the absence of significant differences across all three datasets suggests any differences were limited.

[36] A further question concerns potential implications of regional differences in prior Slavic culture. While historical evidence suggests culture did not vary at the border in our period (Bartlett 1995, p. 306;

Figure IV Panel B tests for differences in underlying regional trends. We find no evidence that regional trends differed, suggesting regions were on similar development trajectories.

V Urban Divergence

V.A Economic Development

Construction activity provides us with a summary statistic for "increasing prosperity" and the presence of related industries given the required financial, human, and physical capital inputs (Lütge 1966, p. 208 – our translation; Henning 2020, p. 256; Enders 2008, p. 95).[37]

Our raw data uncover a new stylized fact: that construction was increasing in a similar manner in Eastern and Western cities before the Black Death and diverged afterwards, stagnating in Eastern cities and generating a persistent regional divergence (Figure I above).

To investigate the shifts in construction we leverage the sharp arrival of the Black Death in difference-in-differences analyses. We first test whether there were regional shifts in construction after the shock, and whether there were underlying differences in regional trends. We estimate the time-varying effects of being in the concentrated East (T_i) in models:

$$\begin{aligned} y_{it} = \beta_1(T_i \times post_t) + \beta_2(T_i \times trend_t) + \beta_3(T_i \times post_t \times trend_t) + \\ \beta_4(x_i \times post_t) + \beta_5(x_i \times trend_t) + \beta_6(x_i \times post_t \times trend_t) + \alpha_i + \delta_t + \epsilon_{it} \end{aligned} \tag{1}$$

The outcome measures whether major construction projects are observed in a city-period.[38] The parameter β_1 estimates the relative shift in construction in the concentrated East after 1350. We test for regional pre-trends with β_2 and for shifts in regional trends after the Black

Section II above), we address this concern quantitatively by studying variation in political fragmentation and development *within* the colonial East, across regions with similar prior Slavic settlement. We also control for a rich set of time-varying measures of exposure to Slavic settlement in all our analyses below.

[37] Buringh et al. (2020) note, "Construction work was normally sustained over periods of years and decades and hence was a manifestation of confidence in the future based on an assessment of the income streams required... They required enterprise, planning and organisation of a high order, substantial inputs of capital and labour (both skilled and unskilled)... Each major project was an intrinsically economic undertaking with significant multiplier effects." It is natural to presume construction fell after the Black Death (Jedwab, Johnson, and Koyama 2022, pp. 8-9). But historical evidence indicates construction may have increased in economically dynamic areas. Lütge (1966, p. 258 – our translation) observes that many major projects were initiated after 1348 and "The construction industry was of particular importance during this period," while the price of building materials rose relative to wages and grain after 1348 (Abel 1978, p. 52).

[38] This binary outcome captures the vast majority of the variation in construction overall and almost all the variation along the Elbe boundary.

Death with β_3, measured such that a unit change in time trends corresponds to 100 years. The interaction terms involving x_i account for other factors that differed across cities and may have had time-varying implications, such as geographic endowments, distance from the Elbe-Saale border, local exposure to plague outbreaks in the Black Death, trade potential, and cultural factors. The α_i and δ_t are city and time fixed effects. We focus on the comparison between concentrated East and fragmented West. We show the direct link between political fragmentation measured continuously and development after 1350 when we analyze all the variation in the data or instrument for fragmentation in Section VII.B.

Table I reports our estimates.[39] Our baseline finding is that the likelihood of observing a major construction project in a given half-century fell by around 30 percent in Eastern cities after 1350 relative to the mean (column 1).[40] We find this estimate is robust and that there are no significant differences in underlying regional trends (column 2). Our estimate strengthens controlling for factors that vary smoothly at the border, including the time-varying implications of distance from the Elbe-Saale border measured as a running variable, which absorbs unobserved factors that vary with distance. We control for the time-varying effects of geographic, agricultural, and trade potential with distance to navigable rivers, membership in the leading commercial organization (Hansa), market access, city population in 1300, and agricultural productivity in rye and wheat, the leading export crops (column 3). Our estimate holds controlling for local variation in plague outbreaks during the Black Death and culture (column 4).[41]

We control for the time-varying effects of culture with historic Church exposure, measured

[39] We estimate standard errors allowing for arbitrary spatial correlation (Conley 1999). We obtain similar estimates allowing for correlation over different distances or clustering standard errors (Appendix D.3).

[40] The divergence in city growth that we uncover distinguishes our study from prior research. For example, Cantoni, Dittmar, and Yuchtman (2018) show the shock to religious competition in the Reformation shifted construction from religious to secular uses but did not affect overall urban growth.

[41] It is unlikely that measurement error in local plague exposure explains our results. "False positives" and therefore classical measurement error are unlikely, as our data count the number of directly recorded city-level outbreaks in the *Städtebuch*. Non-classical error due to missed outbreaks is unlikely to explain our results for two separate reasons. The first involves the relationship between city-level outbreaks and development. City-level variation in (observed) outbreaks is a significant negative predictor of post-1350 development trends. The parameter estimate on the control variable "Post × Outbreaks × Trend" is negative and statistically significant, while the estimate on "Post × Outbreaks" is close to zero and insignificant, in Tables I and II. Thus, for "missing" outbreaks in the West to explain our findings, their impact would have to have the opposite sign and be more immediate than the impact of observed outbreaks, which is improbable. See Appendix D.1 for details, which also tests for and finds no regional mortality differences. Second, for non-classical error to explain our findings, there would have to be regional differences in "missing" outbreaks across neighboring border cities subject to the same ruler, which we argue is unlikely.

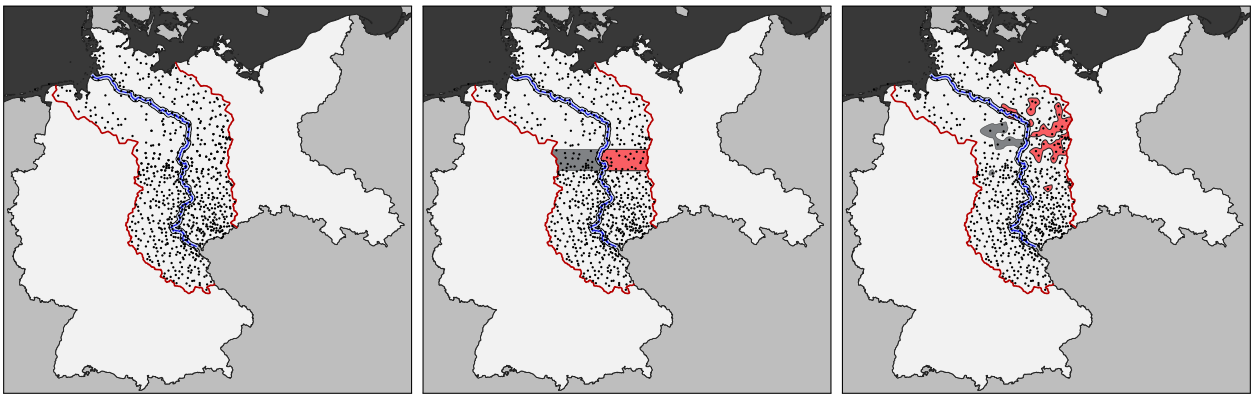
Table I: Shifts in Urban Construction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcome: Indicator for Construction Activity						
	All Cities				100 km Border		
Concentrated East × Post	-0.08***	-0.10***	-0.16***	-0.18***	-0.22***	-0.22***	-0.23**
	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
Concentrated East × Trend		0.01	0.01	0.02	0.04	0.04	0.06
		(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Concentrated East × Post × Trend		-0.01	-0.02	-0.01	-0.01	-0.01	-0.05
		(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Observations	22500	22500	22500	22500	6850	6850	6850
Mean Outcome	0.27	0.27	0.27	0.27	0.24	0.24	0.24
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Agriculture Controls	No	No	Yes	Yes	Yes	Yes	Yes
Trade & Population Controls	No	No	Yes	Yes	Yes	Yes	Yes
Local Shock Controls	No	No	No	Yes	Yes	Yes	Yes
Cultural Controls	No	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes
Western Cities	1490	1490	1490	1490	342	342	342
Eastern Cities	760	760	760	760	343	343	343

This table presents regression estimates examining urban construction (equation (1)). The outcome is a binary variable that takes the value of 1 if a major urban construction project is recorded in the *Deutsches Städtebuch* (Keyser 1939-1974) in a city-period. The unit of analysis is the city-half-century from 1200 through 1699. Columns 1-4 examine 2,250 German-speaking cities. Columns 5-7 examine 685 cities within 100 kilometers of the border between "East" and "West." "Concentrated East × Post" interacts an indicator for Eastern cities, defined as cities located East of the Elbe or Saale Rivers, and an indicator for time periods from 1350 forwards. "Concentrated East × Trend" interacts an indicator for Eastern cities with a time trend measured in centuries, such that a 1-unit change is 100 years. "Geography & Agriculture Controls" control for the time varying effects of the linear distance to the Elbe-Saale border and to navigable rivers, potential rye and wheat yields within 25 kilometers of a city, while "Trade & Population Controls" control for Hansa membership, market access, and population in 1300 (indicators for 5k+ and 10k+), all with post period, trend, and post-trend interactions. "Local Shock Controls" control for the time-varying impact of the number of plague outbreaks in a city 1348-1351, while "Cultural Controls" address the time-varying effect of having a historic Slavic settlement name, being within the historic Slavic settlement area, the distance to the Slavic settlement border, the distance to monasteries, the year of the founding of the closest monastery, and the sum of all periods that a city was within a bishopric before 1350, all incorporating similar post-period, trend, and post-trend interactions. "Latitude Cell × Time FE" interact indicators for time periods and indicators for 1/2 degree (55 kilometer) latitude bands. "Ruler × Time FE" interact indicators for time periods and ruler jurisdictions. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following Conley (1999).

by the periods a city was within a bishopric before 1350, distance to monasteries, and the founding year of the closest monastery, and ethnolinguistic legacies, measured by settlements having a Slavic name, being in the historic Slavic settlement area, and distance to the Slavic settlement border.

Figure V: Mapping the Counterfactuals



(a) Cities Along Border (b) Neighbors Along Border (c) Neighbors with Common Ruler

Panels (a), (b), and (c) correspond to Table I columns 5, 6, and 7, respectively. Panel (c) highlights cities on both sides of the Elbe-Saale border belonging to a single illustrative ruler.

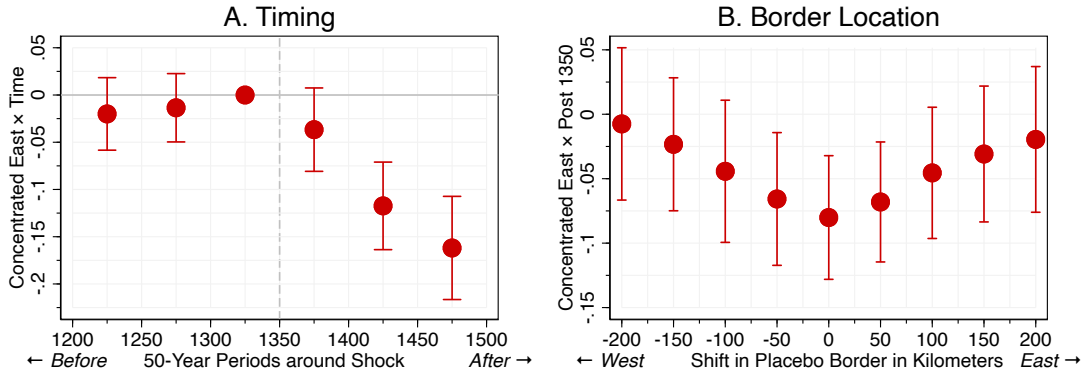
To address remaining questions about potential unobserved omitted variables, we focus our analysis on Eastern and Western cities within 100 km of the Elbe border, where there are no prior differences in economic development, agricultural productivity, plague exposure, core city institutions, urban density, or access to river transport (Figure IV). Our results are unchanged when we examine these border cities (column 5). Our estimates hold when we compare neighboring border cities in the East and West and control for all common factors that vary at the gridcell-by-time level (column 6), with 1/2 degree latitude cells (55 km).

A natural question is whether regional differences in rulers or ruler-level institutions could explain our results. However, our results remain robust when using a research design that compares the development of adjacent Eastern and Western cities subject to the same ruler, controlling for common time-varying factors in a jurisdiction with ruler-by-time fixed effects (column 7), using the fact that 21 rulers had cities East and West of the border in 1348, accounting for 216 Eastern and 143 Western border cities.[42] This approach is analogous to, but more demanding than designs that use borders within territories, as it also leverages variation over time. To clarify these counterfactuals, Figure V maps the comparison (a) along the border, (b) across neighboring border cities, and (c) within-ruler.

We test the timing of the economic shifts using event-study analysis (equation (2) below) and the salience of the Elbe border with placebo borders. Figure VI presents our estimates. Our event-study estimates reveal that the relative decline in the concentrated East appears

[42]We confirm significant within-ruler regional differences in local political fragmentation in Appendix D.1.

Figure VI: Tests of the Timing and of the Border Location



Panel A presents estimates of the event-study specification (2), for the three periods before and after the shock, conditional on city and period fixed effects and without time-varying controls; Figures D6 and D7 report versions under each control set of Tables I and II. Panel B shows "Concentrated East × Post" estimates as one shifts the border dividing Eastern and Western cities. The estimate at 0 uses the Elbe-Saale border and corresponds to the "Concentrated East × Post" estimate in Table I, column 1. Estimates shifting the border j kilometers East reclassify as "Western" all Eastern cities within j kilometers of the Elbe-Saale border. Estimates shifting the border j kilometers West reclassify as "Eastern" all Western cities within j kilometers of the Elbe-Saale border. 95% confidence intervals estimated with Conley (1999) standard errors as in Table I.

directly after the Black Death shock (Panel A).[43] The event-study coefficients grow more negative between 1350 and 1500. This is consistent with the small "Concentrated East × Post × Trend" coefficients in Table I: the trend terms average over the full 1200–1699 panel, in which the divergence stabilizes after 1500 (Figure IX Panel A), whereas the event-study window in Figure VI Panel A ends in 1500. Our placebo border test shows that the "Concentrated East × Post" estimate is largest when the Elbe-Saale line is the border and decays as we shift the border East or West (Panel B). This sharp timing and spatial pattern support our interpretation and are not consistent with leading alternative explanations that are slow-moving, do not vary discretely at the border, or do not involve the Black Death.[44]

We study construction as a whole, including both religious and secular construction in our main outcome. In our study period, church-building reflected commercial development (Buringh et al. 2020), and city councils themselves controlled the financing of church-building (Reitemeier 2005). We find similar patterns when we disaggregate secular and religious construction: both types of construction exhibit large and statistically significant declines in

[43] Figure IX presents longer event-studies for construction and coercive agriculture and the border.

[44] To further test whether our result is driven by the specific political economy of the Elbe-Saale line rather than by rivers as geographic features, we conduct a placebo exercise using sixteen other major navigable rivers as borders and find no systematic post-1350 shifts in our outcomes at these rivers, and political fragmentation itself breaks at the Elbe-Saale specifically, not at rivers in general or placebo lines (see Appendix D.3).

the East relative to the West after the shock. The Eastern decline in secular construction is somewhat more immediate, and the decline in religious construction is larger in 1400–99. Appendix D.2.1.4 details this evidence.

Our analysis indicates the salience of political structure. Since political structure was not randomly assigned, this association does not necessarily imply causation. However, while we cannot conclusively rule out a role for all potential unobservables related to geography, culture, or prior development, the pattern we uncover is robust to a host of alternative explanations. First, we find the correlation between political structure and development after the Black Death is not driven by observable differences in geography and agricultural productivity. Second, we find no differential pre-trends in construction activity, political autonomy, population growth, or market access. Third, our findings place limits on the extent to which the divergence can be attributed to cultural factors tied to religion and ethnicity.[45] Fourth, underlying differences in ruler "types" or institutions cannot explain our results, as they hold when we compare cities subject to the same ruler in the fragmented West and concentrated East. Fifth, regionally-varying shocks are also unlikely to explain our findings, as we document the divergence along the border where the Black Death shock was similar across regions and controlling for local shock exposure.[46]

The historical literature suggests two further factors that could shape the divergence. First, a prior divergence in agriculture could explain our results (Brenner 1976). This motivates our analysis below, where we document the timing of shifts in agrarian and urban development and find that agrarian development followed and responded to the urban divergence (Sections VI and VII.C). Second, earlier global shocks, prior to the Black Death, may have interacted with political structure to explain the divergence. The most important candidate is the Commercial Revolution.[47] It expanded the urban sector and thereby raised

[45] While historians argue that there was no ethno-religious frontier at the border (Section II), our results control for time-varying implications of Catholic and historic Slavic culture. Our result is also not explained by regional differences in other aspects of cultural geography such as distance to pre-Christian pagan sites, the age or top-down foundation of cities, or inheritance norms; and we also find that church construction was developing similarly across regions before 1350 and then diverged (see Appendix D.2). Finally, in Table IV (below) we find political fragmentation explains post-shock development within the concentrated East, comparing areas subject to the same colonial process and with similar patterns of prior Slavic settlement.

[46] Other candidate shocks, such as military conflict and famine do not vary at the border, and cannot account for the timing and patterns we observe, as we detail below and in Appendix D.2.

[47] While we cannot rule out that earlier agricultural shocks created background conditions that shaped the effects of the Black Death, the fact that the other major demographic shock of the 1300s, the famine of 1315–17, led to no divergence in development before the Black Death is consistent with our analysis.

the fiscal and political stakes of urban–ruler bargaining. The Black Death then shifted relative prices in ways that threatened rulers' revenues, turning these latent stakes into acute distributional conflict (Section VII.A). The Commercial Revolution is therefore a necessary background condition for this mechanism. The distinct empirical question is whether it had already made political structure salient before 1350, or whether the Black Death activated those stakes. The data are consistent with the latter timing. Economic and institutional development followed smooth trends before 1350 (Figures I and VII), while our event-studies exhibit a sharp break in urban development coinciding with the Black Death. We also find no pre-1350 shift in market rights, urban or total population, trade fairs, or trade tolls (Appendix D.2). We cannot rule out an unobserved prior acceleration, so we flexibly control for non-linear regional pre-trends.[48] Further, a one-off demographic shock suggests a level shift in the divergence, whereas an accumulating commercial expansion implies a progressively widening divergence as urban productivity continues to grow. The estimates in Table I show a large and stable post-1350 level effect and no significant post-1350 trend. Finally, the divergence opened after the Black Death and before later shocks such as the Protestant Reformation (1517) and Thirty Years' War (1618).[49]

Our results point to how the shock interacted with differences in political competition, but raise two important questions on the mechanism. The first is why political competition did not drive development before the shock and became a factor in development after the shock. The second is whether variation in political fragmentation is directly linked to outcomes, including within the East. We address these questions in Section VII.B. We present a

First, the Black Death was far larger and "achieved what even the Great European Famine of 1315–22 had been unable to bring about, namely a big and enduring positive check to human populations" (Campbell 2016, p. 14). Second, the Black Death and famine moved prices and politics in different directions: the Black Death was unique in raising the relative price of urban output and posing a long-run threat to rulers' revenue. See Appendix D.2.1. The famines did not, however, produce the relative-price shift at the center of our mechanism. In England, where the record is best, manorial accounts show that agricultural prices spiked during the harvest failures and the Great Bovine Pestilence of 1319–20 killed most draft and dairy animals, and with them the manure and traction that supported arable production, so survivors inherited more land per person but less capital and no income windfall (Campbell 2016; Slavin 2012).

[48] Appendix Table D13 additionally interacts the East–Post term with pre-1350 Hansa membership. The interaction is negative and statistically significant for both outcomes in the full sample, and imprecisely estimated in the border sample. Because the framework does not imply an unambiguous sign for a globally linear interaction, we interpret these coefficients as descriptive local slopes. It remains possible that the Commercial Revolution crossed an unobserved threshold just as the Black Death arrived.

[49] The urban divergence is not explained by either (i) local variation in the Reformation, Peasants' War, or Thirty Years' War or (ii) interactions between these shocks and regional political structure; see Appendix D.2.

model that clarifies why political competition does not affect urban development when, under labor abundance, urban development is generically in rulers' interests, and becomes salient when the shock shifts relative prices and threatens rulers' revenue. We study differences in fragmentation across all cities in our data and within the East using OLS and IV strategies.[50]

V.B Political and Institutional Development

It is plausible that there were underlying differences in local politics and institutions beyond regional political fragmentation that may have interacted with the Black Death to drive the divergence. We therefore test for pre-trends and post-shock shifts in city-level politics and institutions. We focus on the development of major institutions supporting urban self-government; rules governing the selection of city governments; and urban collective action.

Figure VII documents the dynamics of urban political and institutional change in the raw data, focusing on the cities along the Elbe border. We observe a consistent pattern. Eastern and Western cities evolve similarly before the Black Death. Afterward, we see a differential shift toward the development of urban institutions and municipal autonomy in the West.[51]

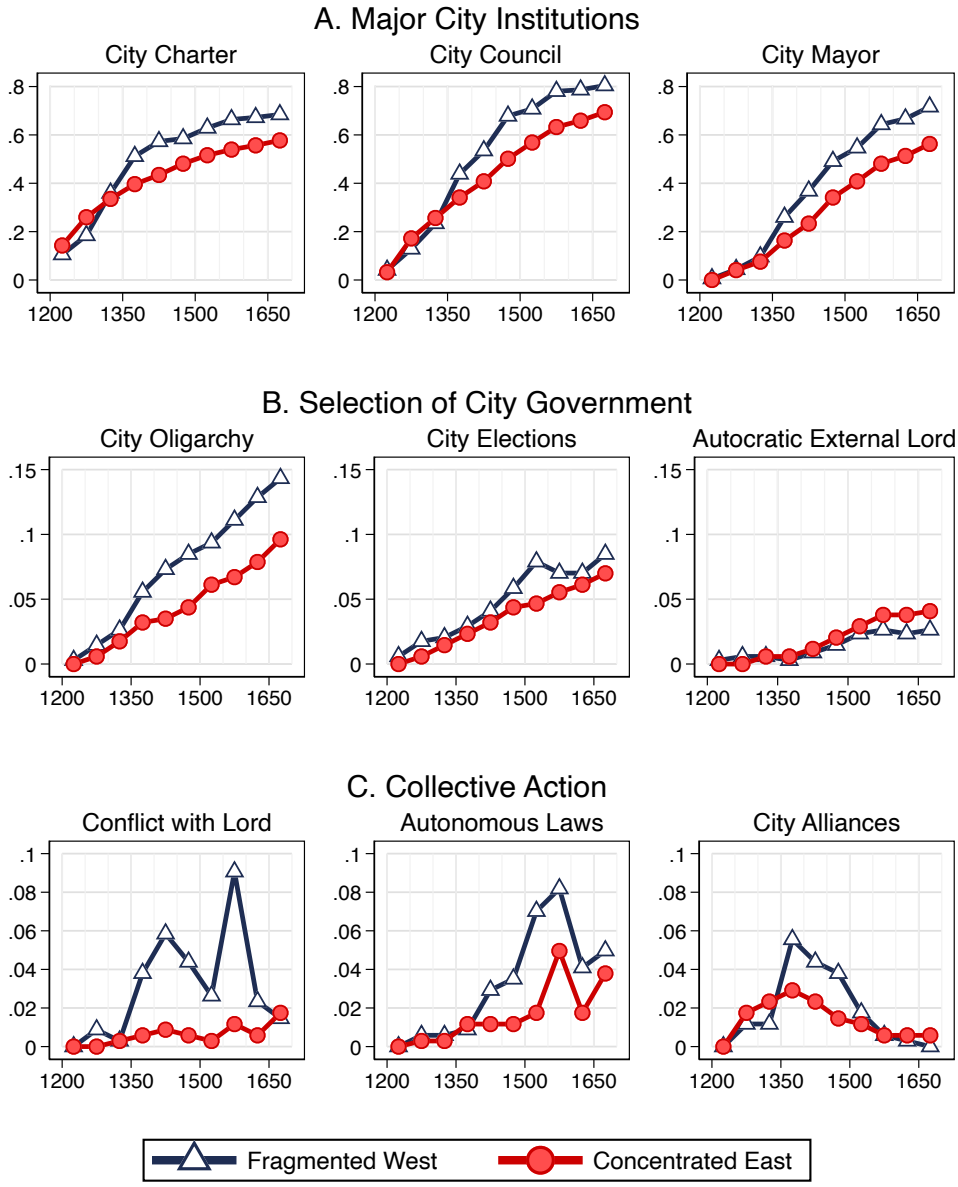
Major Institutions. In Panel A, Figure VII shows that the appearance of city councils and mayors, and the acquisition of charters, followed similar paths in Eastern and Western cities before the pandemic. Afterwards we observe greater institutional development in Western cities. Charters institutionalized important rights, including the right to hold permanent markets, impose taxes, and build fortifications (Hirschmann 2016). A council was the "identifying mark" of city autonomy (Weber 1978, pp. 1249-50). Its powers included the construction of buildings, supervision of markets, regulation of trade, manufacturing, and coinage (Engel 1993, p. 87; Isenmann 2014, p. 366; Weber 1978, p. 1328-9). The rise of the mayor in the West is also significant: mayors assumed functions previously performed by officials appointed by rulers such as the *Schultheiss* or bailiff (Isenmann 2014, p. 227).

Selection of City Government. Cities in the fragmented West secured institutionalized power over urban governance by shifting council selection rules. Where control of city council appointments passed to cities from lords this largely reflected the power of city oligarchies (Isenmann 2014; Weber 1978). We also see some differential increase

[50] While cross-border migration may have been an important mechanism supporting the new equilibrium, we find no evidence of differential sorting at the border in individual-level data on elites (Appendix D.2).

[51] We observe the same patterns when we compare all Western and Eastern cities.

Figure VII: City Politics Along the Border



This figure presents evidence on changes in city politics. The figure compares cities within 100 kilometers of the Elbe-Saale border, of which 343 are Eastern and 342 are Western. Panel A shows the share of cities with major city institutions: city charters; active city councils (*Rat*); and mayors (*Buergermeister*). Panel B shows the share of cities with: "City Oligarchy," i.e. city councils able to self-appoint members; "City Elections," defined as elected city councils; and "Autocratic External Lord," which we define as councils appointed by lords. Panel C shows the share of towns observed in open conflict with an external lord; the share of towns passing autonomous laws; and the share of cities entering into alliances with other cities.

elections in the West and that lords' power to appoint councils only increased in the East.[52]

Collective Action. In the data, we find an increase in Western cities engaging in

[52]Our evidence relates to research by Becker et al. (2025), who focus on the period after 1400 and study how wars between nobles precipitated by dynastic shocks led to changes in the size of city councils and thus participation. We focus our analysis on the presence of the core institutions of the self-governing city and a different political process.

conflict with lords, passing autonomous laws, and forming alliances (Panel C). Differences in conflict tend to reflect cities' bargaining position, in addition to information asymmetries. Autonomous town laws also indicate collective action, as these laws were legal acts of "anti-lordly revolution" (Ebel 1958, p. 11; Weitzel 2009) and *economic institutions* that improved the business environment (Section III). City alliances secured urban power and protected trade and city rights from predatory rulers (Marx 1965, p. 131; Engel 1993, pp. 284-5; Isenmann 2014, p. 315). These measures proxy for bargaining processes but capture a subset of collective action; political change often occurred without observable conflict.

Interpretation. First, institutions supporting urban autonomy and commerce were developing along similar trends in Eastern and Western cities before the Black Death. Second, after the Black Death Western cities shifted closer to the model of the autonomous city which Weber (1978, p. 1226), Pirenne (1956, p. 204), and Marx (1965, p. 131) identify as a key factor in historic development.[53] Third, while recent research has found limited evidence of growth effects of "participative" institutions (Stasavage 2014; Wahl 2019), core institutional changes were *non-democratic* and supported the interests of urban oligarchies, as suggested by Weber (1978) and the Marxist literature (Anderson 1974). Fourth, our findings do not simply reflect greater urbanization on the extensive margin in the West; we see similar shifts if we restrict the analysis to cities chartered before 1350.

Estimation. We examine how politics shifted across regions after the Black Death in an analysis that parallels our study of construction. We construct and study a unified city-level *political autonomy* index that reflects the dimensions of politics and institutions summarized in Figure VII, using generalized principal components analysis (see Appendix A).

Table II documents the large, relative decline in the political autonomy of cities in the concentrated East. This decline is observed across all cities (columns 1-4), along the border (columns 5-7), and controlling for potential time-varying implications of geography, trade, local shocks, cultural factors, grid-cell, and ruler fixed effects. We observe no differential pre-trends, making it unlikely that *ex ante* differences in city-level politics drove the divergence.

Our empirical strategy relies on a parallel trends assumption. To assess its plausibility, we present event-study estimates in Figure VIII and do not detect any differential pre-trends

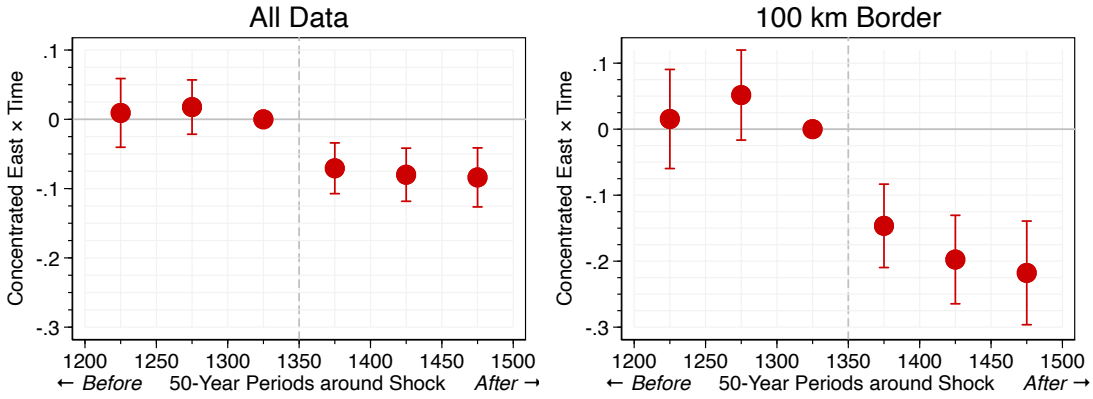
[53] Our analysis uncovers local variation flagged by Weber (1978, p. 1254), which emphasizes that autonomy had multiple dimensions and notes "cases where the usurpation of civic sovereignty was not completely effective."

Table II: The Political Autonomy of Cities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcome: Political Autonomy Index						
	All Cities				100 km Border		
Concentrated East × Post	-0.07***	-0.09***	-0.23***	-0.27***	-0.24**	-0.24***	-0.19**
	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.09)	(0.09)
Concentrated East × Trend		-0.00	-0.00	-0.01	0.01	0.01	0.01
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Concentrated East × Post × Trend		0.02	0.00	0.01	-0.01	-0.00	-0.02
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Observations	22500	22500	22500	22500	6850	6850	6850
Mean Outcome	0.62	0.62	0.62	0.62	0.59	0.59	0.59
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Agriculture Controls	No	No	Yes	Yes	Yes	Yes	Yes
Trade & Population	No	No	Yes	Yes	Yes	Yes	Yes
Local Shock Controls	No	No	No	Yes	Yes	Yes	Yes
Cultural Controls	No	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes
Western Cities	1490	1490	1490	1490	342	342	342
Eastern Cities	760	760	760	760	343	343	343

This table presents regression estimates in which the outcome is the political autonomy index, constructed with principal components analysis and reflecting all variables in Figure VII (see Appendix A). All specifications estimate equation (1), as in Table I. Conley (1999) standard errors allow for spatial correlation within 50 kilometers.

Figure VIII: Political Autonomy event-study



This figure presents estimates of the event-study specification (2) studying our "political autonomy" index, without time-varying controls; Figure D7 reports the controlled version. 95% confidence intervals estimated with Conley (1999) standard errors as in Table I.

in political autonomy, both in the full sample of cities and in the border sample.

VI Agricultural Divergence

The development of the agricultural sector is both a potential confounder in our analysis of the urban divergence and a potential outcome shaped by the urban divergence. To assess these possibilities, we study the timing of economic change and document our third major finding: the urban divergence precedes and predicts a major divergence in agriculture.

The Agrarian Hypothesis. An influential hypothesis suggests that the adoption of coercion in agriculture and expansion of feudal estates in the East drove regional differences in urban growth after the Black Death, by suppressing demand for urban output and restricting the mobility of labor (Brenner 1976).[54] The agrarian hypothesis predicts that the expansion of feudal estates and the institutionalization of coercion in agriculture in the East should precede or coincide with, not substantially lag, the shift in urban growth that we document. The opposite is predicted by theory which highlights the role of urban outside options in labor coercion (Acemoglu and Wolitzky 2011; Anderson 1974).

Novel Data. To test the agrarian hypothesis, we gather and investigate novel panel data on the expansion of feudal agriculture and coercive agrarian institutions. To study economic development, we assemble disaggregated data on the construction of nobles' agricultural estates, which used coercion.[55] Our data cover all of Germany from 1200 onwards and 4,600 estates. To study the adoption of coercive institutions, we compile comprehensive data on laws institutionalizing "serfdom" in agriculture. Using information on 85,000 territorial laws 1400-1800, we identify laws institutionalizing the loss of peasant property rights (*Bauernlegen* and *Besitzverlust*), serfdom (*Gutsherrschaft*), and compulsory labor (*Gesindezwang*).[56]

[54] Brenner (1976, p. 60) argues that the extension of serfdom in territories East of the Elbe had "momentous consequences": "the lord's increasing surplus extraction from the peasantry continually limited the emergence of a home market for industrial goods," and "controls over peasant mobility meant the constriction of the industrial labour force, resulting in the suffocation of industry and the decline of the towns."

[55] Our data identify the construction of "noble estate" residences of a manorial lordship (*Gutsherrschaft*). Importantly, the noble estate, "is primarily not an architectural term, but one defined by law, linked to the feudal noble estate economy," so that in Eastern Germany, "the creation of estate complexes is tied to the rise of the…nobility…and the consequences were the transformation of the free peasantry into serfs and the rapid expansion of estates" (von Buttlar 1989, p. 9 – our translation). The estates we study enjoyed, "lordship rights such as jurisdiction, services from village residents," and served as centers for managing agricultural operations (Andreae and Geiseler 2001, p. 11 – our translation). Our measure predicts the share of estate land and serf emancipation rates in 1860 from Ashraf et al. (2024). We note that while informal coercion may have existed earlier, the construction of estates represents a significant capital investment in a coercive production model, and the laws represent its formalization, making these suitable markers for a structural shift.

[56] The term "serfdom" is widely used in English. As Ogilvie (2014, p. 33) observes, "The German term

Our analysis provides the first panel data investigation of the timing of the agrarian divergence, to the best of our knowledge. Prior quantitative research on serfdom has exclusively studied cross-sectional variation in agrarian development observed hundreds of years after the Black Death shock, so far as we are aware.[57]

Testing the Agrarian Hypothesis. We test the agrarian hypothesis and document the timing of shifts in agrarian and urban development with event-study regressions. We estimate the time-varying effects of being in the concentrated East (T_i) in models:

$$y_{it} = \alpha_i + \delta_t + \sum \beta_s (T_i \times time_s) + \epsilon_{it} \tag{2}$$

We study three city-level outcomes: (i) the number of feudal agricultural estates constructed near a city, (ii) the number of territorial laws institutionalizing coercion in agriculture that a city is exposed to, and (iii) urban construction activity. We assign each noble estate to its nearest city and count the number of territorial laws each city is exposed to. We focus our estimates $\hat{\beta}_s$ on four high-level periods: the period before the labor market shock (1200-1349) and three post-shock periods: 1350-1499, 1500-1649, and 1650-1799. We estimate (2) at the city-time level, with city and period fixed effects, and standard errors estimated allowing for arbitrary spatial correlation or clustering by territory.[58]

Figure IX presents our estimates. Panel A shows that urban construction in Eastern cities fell sharply and significantly in the 1350-1499 period and remained depressed. In contrast, Panel B documents that there were limited regional differences in estate agriculture before 1500; estate construction in the East rose modestly in 1500–1649 and expanded sharply after 1650. Panel C shows that there were no significant regional differences in the institutionalization of coercion in agriculture before 1500 and that coercive agricultural laws expanded significantly in the East as early as 1500–1649. These patterns hold across all of Germany and along the 100 km border.

'*Gutsherrschaft*' (sometimes translated as 'demesne lordship') refers to a manorial regime in which the lord derived revenue mainly from exploiting demesne lands using compulsory labor services of unfree tenants."

[57] For example, Cinnirella and Hornung (2016) and Ashraf et al. (2024) study cross-sectional variation in the concentration of land ownership and serfdom within Germany in the 1800s; Ogilvie (2014) synthesizes evidence on the regional allocation of land to noble estates focusing on the 1700s, while providing three exceptional early observations from Mecklenberg in the 1600s and Pomerania in the mid-1500s; Cerman (2012) records ten territorial laws restricting labor mobility in Eastern regions starting in the late 1400s.

[58] We provide more finely-grained event-studies on urban construction in Figure VI, on political autonomy in Figure VIII, and on the development of coercive agricultural estates in Appendix E.

Figure IX: The Timing of Shifts in Agricultural and Urban Development

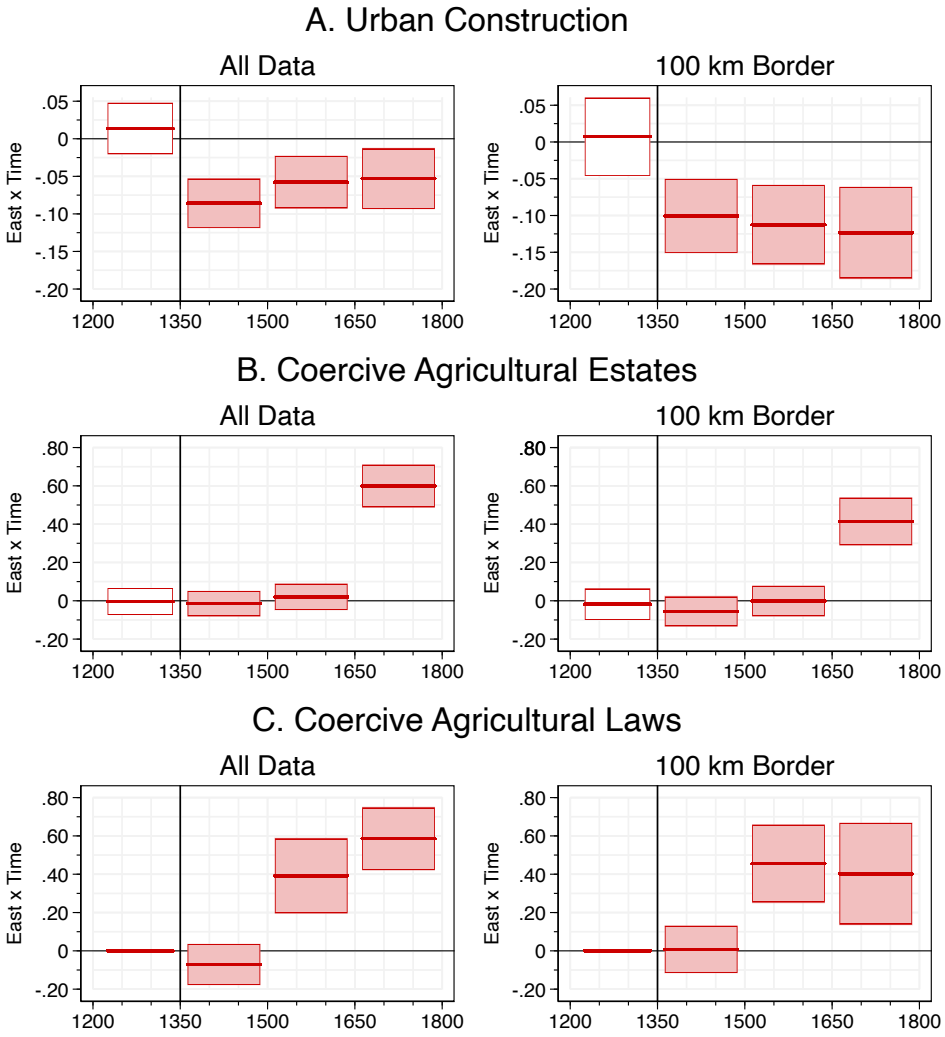


Figure IX plots event-study estimates of the "$T_i \times$ time" interactions from equation (2). Panel A studies urban construction events, as in our main analyses. Panel B studies the construction of feudal agricultural estates, with individual estate construction events assigned to the nearest city. Panel C studies the institutionalization of coercion in agriculture, measured by the number of territory-level laws a given city is exposed to in a city-period. All estimates are relative to the 1200-1249 reference period and include city and period fixed effects. Estimates exclude time-varying controls, so that the figure shows the raw timing of the variation. The graph shows 95% confidence intervals estimated with standard errors allowing for arbitrary spatial correlation within 50 kilometers, following Conley (1999), in Panels A and B, and are clustered by territory in Panel C. Data on coercive agricultural estates and laws are described in Section III.

We find urban growth in the East declines before the major shifts in agriculture. Several observations are important in interpreting our findings. The data are consistent with history pointing to the priority and cross-sector significance of changes in the urban sector (Anderson 1974; Carsten 1954). The rise in estate construction in the East after 1500 reflects an increase in resources allocated to coercive agriculture, not the fragmentation of a fixed amount of

land into smaller estates. Narrative evidence indicates land in estate agriculture grew after 1500 (von Buttlar 1989; Carsten 1947; Ogilvie 2014). We confirm this quantitatively in unique administrative data, where we find the amount of land devoted to estates was stable in the 1300s and 1400s and rose in the late 1500s (Appendix E). Historical research also documents that the number of days tenant farmers (serfs) were required to work on noble estates increased East of the Elbe in the 1500s and, before the 1500s, tenant farmers were free to move (Ogilvie 2014; Cerman 2012; Carsten 1954). Similarly, the literature shows there were few peasant revolts in Germany before the 1500s and virtually all of these were located far from the Elbe border (Appendix E). These findings suggest that cities helped resolve a collective-action problem that rural areas alone could not overcome.[59]

VII Mechanisms

To clarify potential mechanisms, we present a framework where markets and politics interact to shape structural change. We focus on the mechanism and empirical implications of our model below and provide details on the derivation and assumptions in Appendix B.

VII.A Framework

We develop a two-sector general equilibrium model in which economic incentives interact with political competition to shape support for structural change. The economy consists of a traditional and a modern sector, the agricultural and urban sectors in our context. The traditional agricultural sector uses fixed land and labor under diminishing returns. The modern urban sector uses labor under constant returns to produce manufactures and services. Labor mobility equalizes wages across sectors. A ruler derives secure rents from the traditional sector and contestable revenue from the modern sector. The ruler can support the

[59] We do not claim that the urban divergence alone caused the agricultural divergence, and the lag between the urban and agrarian shifts is informative about the mechanism. The sequence in Figure IX points to later shocks interacting with the prior divergence: coercive laws expanded from the 1500s, when Western demand for Eastern grain rose (Postan 1973), and estate construction accelerated after the Thirty Years' War. In our interpretation, these shocks raised the returns to coercive agriculture, and the prior political and urban divergence determined where coercion could be imposed. Legal restrictions on mobility emerged East of the border, across areas with similar endowments and similar development before 1350, and not in the West, where autonomous towns provided outside options. The timing of the legal shift also limits the role of the Thirty Years' War as an independent explanation: the legal expansion began in the 1500s, well before the war (Ogilvie 2014; Cerman 2012), and our urban estimates are robust to controlling for the time-varying implications of local exposure to the war (Appendix Table D12).

modern sector by setting up institutions that raise its productivity. However, the decision to support modern development reflects trade-offs imposed by political competition:

Rulers' support for the modern sector reflects a trade-off between external competition and internal control. External competition among rulers strengthens incentives to support modern development. Internally, this support can erode secure land rents and empower the modern sector, which may lead to a loss of revenue for the ruler. Rulers thus face a trade-off between revenue from secure (traditional) and contested (modern) assets.

This trade-off is shaped by factor prices and political competition. When the mobile factor is abundant, the marginal value of retaining this factor in the traditional sector is low, the secure-rent loss from factor reallocation grows less than proportionally, and the risk-adjusted tax base scales with the modern sector.[60] As a result, rulers support the modern sector regardless of political competition. When the mobile factor is scarce, countervailing forces operate: the marginal value of the mobile factor in the traditional sector is high, and redirecting it sharply reduces secure rents, lowering the incentive to support the modern sector. However, scarcity affects relative prices in equilibrium: an exogenous negative labor supply shock raises wages; and under non-homothetic preferences this lowers the share of income allocated to traditional agricultural goods and raises the relative price of modern output, following Engel's Law (Matsuyama 1992; 2019; Voigtländer and Voth 2013). This price effect can dominate the direct negative impact of labor scarcity; shift the balance of power toward cities; and activate political competition as a driver of development.

These countervailing forces generate scope for divergence as rulers now face a coordination problem with two equilibria: rulers can either limit support for development, risking the loss of urban revenue to competitors, or accommodate change and accept greater internal risk. By providing cities with credible outside options, competition among rulers facilitates the high-support equilibrium. Through this channel, political competition can induce support for structural change when domestic incentives alone do not.[61]

[60] The secure-rent loss grows sub-linearly in labor as agricultural production is Cobb–Douglas with a fixed land factor, whereas urban output is linear in labor. Appendix B discusses the underlying assumptions.

[61] Two limitations of our framework are important. First, the probabilities of external defection and internal contestation are reduced-form. However, the comparative statics require only that a stronger urban sector raises contestation risk at a non-decreasing rate; microfoundations based on effort, bargaining, or contests deliver the same predictions. Second, regionally correlated expectations could select the same allocation for reasons outside the model. However, our reading of the history suggests expectations were largely a function of the interaction between political structure and prices, and that before the Black Death shock

The framework generates several testable predictions concerning the interaction of political competition and shocks to relative factor scarcity. Below, we examine both quantitative and historical evidence to assess the model's empirical predictions.

First, when labor is sufficiently abundant, our framework suggests that rulers support urban development irrespective of political competition. Empirically, this implies no significant variation in urban autonomy or growth trends across regions with differing levels of political competition prior to the labor supply shock. Before the shock, labor was abundant and support for urban development did not threaten rulers' agricultural rents. Abundant labor enhanced their capacity to risk losses induced by an endogenous labor reallocation to the urban sector and incentivized them to offer a "good deal" to cities (Bartlett 1995, p. 136; Higounet 1986, pp. 88, 255; Barraclough 1957, pp. 254, 274). Consistent with our framework, we find no significant differences in trends or levels of urban autonomy and growth across high- and low-competition regions before 1350 (Tables I and II, and Figures I, IV, and VII).

Second, our framework indicates that the shock creates a strategic coordination problem for rulers, where both supporting and repressing cities become viable equilibrium outcomes. The level of external political competition now shapes which equilibrium is likely to be chosen. High competition makes coordination on urban support more likely, while low competition favors the repressive equilibrium. The model predicts that the shock and political fragmentation interact to produce institutional divergence. The Black Death provides a natural experiment for this prediction. The shock increased labor incomes and shifted demand toward urban products (via Engel's law), enhancing cities' economic importance (Abel 1978; Jedwab, Johnson, and Koyama 2022). Simultaneously, agricultural revenues collapsed, precipitating fiscal crises over secure rents for rulers (Kriedte 1981; Sablonier 1980; Blickle 1989; Graus 1969; Göttmann 1983; Hoffmann 1981; Störmer 1967; Lütge 1950). Cities became increasingly important as sources of revenue, but they also posed direct political risks and indirect economic risks through the outside options they provided to rural workers (Blickle 1989; Anderson 1974). The increase in these risks led to provisions banning city alliances and restricting migration into cities (e.g. the Golden Bull of 1356). However, the structure of external political competition shaped the political response to

relative freedom was expected in the East. We discuss these implications and limitations of our framework in Appendix B.

the shock. Just west of the Elbe River, the cities of Lüneburg and Hannover capitalized on rulers' competition in the 1370s, formed an alliance, gained the right to dismantle castles, and secured self-governance rights. East of the Elbe, where political competition was low, rulers blocked urban development: in the 1400s the margrave of Brandenburg attacked and built a castle in Berlin, reflecting "the bridle on ancient liberties" (Carsten 1954). Empirically, we document a sharp divergence in post-1350 urban autonomy and growth across high and low political competition areas (Tables I and II, and Figures I and VII for the regional divergence; Table III for the time-varying implications of political fragmentation in general).

Third, our model suggests two important channels through which these risks operate. The political risk channel involves a higher likelihood of internal contestation due to a stronger urban sector. We therefore expect more frequent urban collective action—such as city leagues, revolts, or autonomous lawmaking—against rulers where political competition supported the urban sector. After the shock, Western cities formed alliances and engaged in large-scale conflict with rulers, such as the War of the Cities (1387). The economic risk channel involves the loss of secure rents from agriculture. In low-competition environments, a ruler withholds support for the city to retain labor in farming and preserve secure rents (Lewis 1954). In high-competition environments, a ruler who supports the city comes to rely increasingly on urban revenue. In Western regions, cities gained autonomy and drew in mobile labor, limiting coercion in the countryside. Political competition arising from territorial fragmentation famously enabled southwestern German and Swiss cities to break free from feudal rulers; this increased villagers' outside options and limited the adoption of coercion in agriculture (Blickle 1989), consistent with theory (Acemoglu and Wolitzky 2011). In Eastern regions, by contrast, rulers restricted mobility and developed coercive agricultural estates. Historical research even suggests that there was regional divergence *within* territories such as Brandenburg that spanned the border (Carsten 1954; Enders 2008; Harnisch 2015; Cerman 2012). We next examine these risk channels quantitatively.

VII.B Quantitative Evidence: Urban Channel

Our framework predicts a direct and increasing link between political competition and development. While our main analysis focuses on the regional divergence induced by a major shift in political structure at a previous border, we would expect that the shock led

to an increased role for variation in political competition in general.

We test and confirm that political fragmentation becomes a predictor of urban development after the Black Death using multiple sources of variation. First, we examine all the variation in political fragmentation in 1350 using OLS. Second, we study variation in fragmentation induced by Eastern location as an instrumental variable ("IV East"). Third, we study political fragmentation instrumented by dynastic shocks, deaths of rulers without direct heirs, in the 50 years before 1350 that exogenously reduced fragmentation for neighboring cities ("IV Death"). Deaths of rulers without direct heirs constituted "the most common impediment to territorial survival" (Cantoni, Mohr, and Weigand 2024, p. 17) and reflected exogenous fertility and mortality events so that "biological chance played a decisive role in the formation of a territory" (Andermann and Weiß 2018, p. 219 – our translation). We estimate the shift in the predictive power of political fragmentation with regressions that parallel our baseline analysis (equation (13), Appendix D.3.3), measuring political fragmentation as of 1350.

Table III: Political Fragmentation and Urban Development

	Construction			Political Autonomy		
	OLS	IV East	IV Death	OLS	IV East	IV Death
Political Fragmentation × Post	0.21**	0.50***	0.60**	0.25***	0.47***	0.60***
	(0.09)	(0.15)	(0.24)	(0.08)	(0.16)	(0.22)
F-Statistic		49.82	89.85		49.82	89.85
Observations	22500	22500	22500	22500	22500	22500
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Regional Trend Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-Varying Controls	Yes	Yes	Yes	Yes	Yes	Yes

This table presents estimates of equation (13) in Appendix D.3.3, examining the effect of political fragmentation on construction and political autonomy. "Political Fragmentation × Post" interacts political fragmentation c. 1348 and an indicator for post-1350. The unit of analysis is the city-half-century from 1200 through 1699. "OLS" indicates ordinary least squares. "IV East" indicates the IV for "Political Fragmentation × Post" is "Concentrated East × Post." "IV Death" indicates the IV is the standardized share of cities exposed to rulers dying without direct heirs in a city's neighborhood over the period 1300-1349 interacted with the post period. Estimates include the interactions "Fragmentation × Trend" and "Fragmentation × Post × Trend," and similar interactions for distance to navigable rivers, Hansa membership, and plague shocks. Standard errors in parentheses allow for arbitrary spatial correlation within 50 kilometers, following Conley (1999).

Table III documents that political fragmentation became associated with development after 1350. Compared to the OLS estimate studying all the variation, the IV estimate

increases in magnitude when we examine differences in fragmentation induced by cities' locations in the concentrated East, consistent with the local treatment effect of this variation being particularly consequential. We also find variation in fragmentation induced by dynastic shocks is a strong predictor of development. We provide evidence on the robustness of these results and the identifying assumptions in Appendix D.3.3. We show that lineage extinctions and fragmentation are uncorrelated with development before the Black Death, consistent with the exogeneity of the instrument; that off-channel effects of the extinctions are small where we can isolate them; and that our results are robust both to controlling for military conflict and to plausible violations of the exclusion restriction. More generally, a basic underlying result supports our interpretation: we find no significant relation between local variation in political fragmentation and urban development before the Black Death; afterwards political fragmentation strongly predicts development (Appendix D.3.3).

To further assess the salience of political fragmentation, we study variation in political fragmentation within the concentrated East, comparing areas subject to the same colonial process and similar patterns of prior Slavic settlement. We compare a "more fragmented" zone (Saxony and Thuringia) with a "more concentrated" zone (Pomerania, Mecklenburg, Schleswig-Holstein, Brandenburg, and Silesia) within the East.[62]

We expect to find urban development was more "Western" in the "More Fragmented East" after the pandemic. To test this hypothesis, we extend our analysis to differentiate shifts in urban construction and politics in the low and high fragmentation zones within the East. To rule out other confounders, we focus the test on the period before 1500, before urban growth could be influenced by the subsequent development of mining activities in the more fragmented zone and shifts in demand for grain, the key agricultural product.

Table IV presents our estimates and shows that negative economic and political shifts after 1350 were significantly muted in the high fragmentation East. These findings make it unlikely that underlying cultural differences explain the developments we study, as exposure to pre-colonial Slavic settlement was similar across these zones.

Importantly, this within-East variation reflects time-varying resource endowments

[62]Our political fragmentation index averages 0.68 in the "more concentrated East," 0.83 in the "more fragmented East," and 0.92 in the West (see Appendix D.3.3). Carsten (1954, p. 193) observes: "The territories of the house of Wettin [Saxony] were 'colonial' lands like those of the margraves of Brandenburg." Similarly, Bartlett (1995, p. 42) notes that "German expansion... produced new political units, Brandenburg, for example, or the Wettin lands later to coalesce as Saxony."

Table IV: Heterogeneity Within the Politically Concentrated East

	Construction	Political Autonomy
More Concentrated within East × Post	-0.16***	-0.24***
	(0.05)	(0.05)
More Fragmented within East × Post	-0.09**	-0.13***
	(0.05)	(0.04)
p-value of Difference	0.09	0.00
Observations	13500	13500
City and Time FE, Time-Varying Controls	Yes	Yes

This table presents regression estimates examining city construction and political autonomy as defined in Tables I and II. All specifications estimate equation (1), replacing the single "Concentrated East" indicator with separate indicators for the two Eastern zones, each with post, trend, and post-trend interactions. The unit of analysis is the city-half-century 1200 through 1499 for 2,250 German-speaking cities. "More Concentrated within East × Post" interacts an indicator for the more concentrated East (East outside Saxony and Thuringia) and an indicator for periods from 1350 forwards. "More Fragmented within East × Post" interacts an indicator for Eastern cities in Saxony and Thuringia and an indicator for periods from 1350 forwards. Time-Varying controls include: subregional trends and post-1350 trends and a complete set of distance, rye and wheat yield interactions as in Table I. Standard errors in parentheses allow for arbitrary spatial correlation within 50 kilometers following Conley (1999).

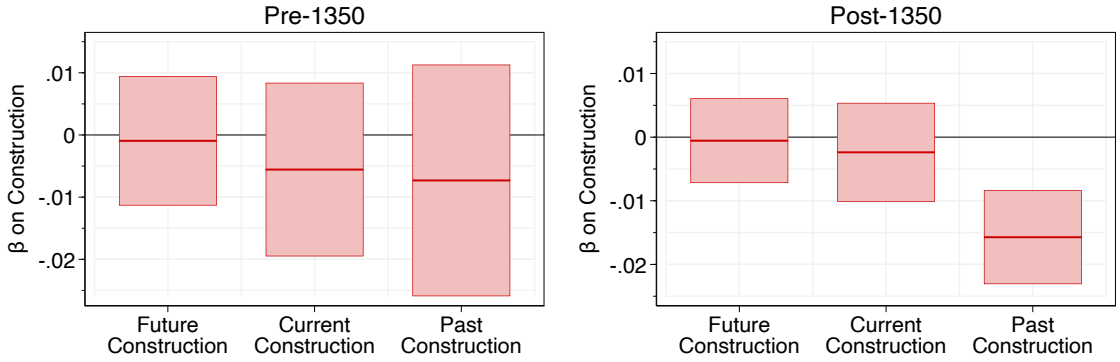
through two channels. The political fragmentation of Saxony initially reflected the discovery of surface silver deposits in the 1100s. However, these deposits were soon exhausted and ceased to directly shape economic development in the period we study. Surface deposits were exhausted and deeper mines unprofitable by the late 1200s; former mining areas were deserted by the 1300s (Henning 2020, p. 239; Schwabenicky 2016; Hemker and Schubert 2018, p. 13). New mineral discoveries and new pump technologies brought mining back at the end of the 1400s. When the Black Death hit, Saxony-Thuringia thus had a political structure that reflected historic but exhausted resource endowments. We focus our test on the period before 1500 to limit the possibility that the direct effects of silver endowments or renewed mining account for the results.

VII.C Quantitative Evidence: Agricultural Channel

We next test an economic mechanism linking the urban divergence and the divergence in agriculture. Economic theory predicts that outside options reduce labor coercion (Acemoglu and Wolitzky 2011).[63] We examine the local relationship between the establishment of coercive agricultural estates and urban development before and after the shock.

[63]This theory is motivated by narrative evidence indicating that the development of urban markets was a core determinant of tenant farmers' ability to resist coercion (Marx 1965; Carsten 1954; Anderson 1974), and that increases in the price of labor can otherwise encourage the adoption of coercion.

Figure X: Urban Construction and Coercive Agriculture



This figure plots estimates of the local response of agricultural coercion, measured by the number of feudal estates built by city-time, to urban construction from equation (3). The "Pre-1350" graph plots the β_τ, for $\tau = t$-1, t, t+1 (time in 50-year periods). The "Post-1350" graph plots total post-1350 effect ($\beta_\tau + \theta_\tau$).

We test the timing of the local relationship between coercive agricultural estates and current, past, and future construction. We estimate the model:

$$y_{it} = \theta_1(post_t \times x_{it+1}) + \theta_2(post_t \times x_{it}) + \theta_3(post_t \times x_{it-1}) + \beta_1 x_{it+1} + \beta_2 x_{it} + \beta_3 x_{it-1} + \alpha_i + \delta_t + u_{it} \tag{3}$$

Here y_{it} is the number of coercive agricultural estates built near city i in a period t (50 years), x_{it} is the number of urban construction events, $post_t$ indicates post-1350, and α_i and δ_t are city and half-century fixed effects, respectively. If urban construction had a negative impact on coercive agriculture after the shock, we would predict $\beta_3 + \theta_3 < 0$. If coercive agriculture depressed urban development after 1350, we would expect $\beta_1 + \theta_1 < 0$.

We find that urban construction leads to reductions in coercive agriculture after 1350, as shown in Figure X. The fact that we estimate $\beta_3 + \theta_3 < 0$ is consistent with outside options in the urban sector having a negative impact on the development of coercion in agriculture. We find no evidence that coercive agriculture led to declines in construction post-1350, and no significant relationship between construction and coercive agriculture before 1350.

We also test the relationship between coercion and the establishment of urban textile industries and urban agricultural markets, which provided key outside options for the rural labor market and product market, respectively. We find that cross-sectional, post-shock variation in the establishment of textile industries and agricultural markets (1350-1499) became negative predictors of coerced agriculture after 1500, when coercion itself increased

(see Appendix E).

VIII Conclusion

Economic shocks induce distributional conflicts whose outcomes shape the path of development. The Black Death pandemic generated one of the most pivotal examples of this general phenomenon. The exogenous shock led to a major divergence in development that reflected prior differences in the structure of political competition within Europe.

Differences in political competition became core determinants of economic change after the shock shifted relative prices and induced political conflict over rents. Cities in the politically competitive West increasingly secured urban institutions that promoted economic activity. In the concentrated East, rulers restricted city autonomy and urban activity was depressed for centuries. The resulting urban divergence shaped bargaining power in the agrarian sector and foreshadowed the institutionalization of coercion in Eastern Europe.

The mechanism by which political competition became a growth factor reflects a general economic process shaping the role of states in development. States develop new sectors to promote growth, but in so doing risk political change. While states may promote growth absent political competition, shocks can shift this fundamental trade-off and induce distributional conflict which activates political competition as a driver of development.

While the historic pivot we study led to enduring differences in development, we simultaneously document how historical features of societies do not always persistently shape economic activity, but may return to drive economic change when supply and demand shift.

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A Data

This appendix details the data sources and variable definitions used in our analysis. Table A1 presents summary statistics on our data. Columns 1 and 2 show summary statistics for all cities, columns 3 and 4 focus on cities within 100km distance to the Elbe-Saale border.

Table A1: Summary Statistics

	All Cities			Within 100 km Border		
	(1) Mean	(2) SD	(3) N	(4) Mean	(5) SD	(6) N
City Council	0.45	0.50	22500	0.47	0.50	6850
City Mayor	0.34	0.47	22500	0.33	0.47	6850
City Charter	0.54	0.50	22500	0.46	0.50	6850
City Elections	0.06	0.24	22500	0.04	0.20	6850
City Oligarchy	0.05	0.22	22500	0.06	0.23	6850
Autocratic External Lord	0.02	0.15	22500	0.02	0.13	6850
City Alliances	0.03	0.17	22500	0.02	0.13	6850
Autonomous Laws	0.01	0.12	22500	0.02	0.14	6850
Political Autonomy	0.62	0.59	22500	0.59	0.59	6850
Military Conflict	0.20	0.85	22500	0.14	0.68	6850
Plague 1348-51	0.10	0.30	22500	0.09	0.30	6850
Construction	0.27	0.44	22500	0.24	0.43	6850
Political Fragmentation (100km)	0.81	0.19	22500	0.84	0.11	6850
Legal Fragmentation (100km)	0.79	0.17	22354	0.78	0.17	6843
Church Construction	0.21	0.56	22500	0.17	0.49	6850
Distance to Elbe-Saale (km)	-0.77	1.95	22500	0.01	0.54	6850
Urban Density (100km Neighbors)	0.55	0.23	22500	0.62	0.24	6850
Population ($\geq$ 5,000)	0.01	0.11	22500	0.01	0.11	6850
Population ($\geq$ 10,000)	0.01	0.07	22500	0.01	0.07	6850
Rye Yields (Log)	8.35	0.12	22500	8.37	0.13	6850
Wheat Yields (Log)	8.78	0.08	22500	8.79	0.08	6850
Distance to Navigable Rivers	19.23	17.53	22500	23.84	18.78	6850
Hansa Membership	0.02	0.15	22500	0.03	0.17	6850
Slavic Settlement Name	0.20	0.40	22500	0.29	0.46	6850
Slavic Settlement Area	0.40	0.49	22500	0.70	0.46	6850
Distance to Slavic Settlement Area (km)	155.57	101.20	22500	59.23	41.53	6850
Distance to Monastery c. 1350 (km)	11.30	9.01	22500	11.27	8.37	6850
Monastery Foundation (in Years)	83.87	201.14	22500	86.53	167.45	6850
Bishopric Exposure	12.84	6.15	22500	10.09	4.95	6850
Pagan Site	0.27	0.44	20010	0.28	0.45	6850
Market Access	0.96	15.89	11250	0.21	1.00	3425
Distance to Trade Route	0.02	0.07	12750	0.02	0.07	5940
Agriculture						
Coercive Estates	0.17	0.63	24024	0.25	0.74	8220
Coercive Laws	0.38	0.91	9859	0.59	1.17	2012

This table presents summary statistics on city-level and regional-level variables. Columns 1-3 provide summary statistics for all cities. Columns 4-6 present summary statistics for cities within 100 kilometers distance to the Elbe-Saale border. Data on urban development cover the ten 50-year periods between 1200 and 1699. Note that we compute "City Charter Fragmentation" for 2,249 cities, due to missing data for the island of Borkum. Data on coercive agriculture spans the twelve 50-year periods from 1200 to 1799. Data on "Coercive Estates" do not cover a subset of cities in the far East, outside the 100 km border, located in contemporary Poland.

Our primary data source is the *Deutsches Städtebuch*, the standard reference of urban history in German-speaking Europe and a unique source for economic history. Compiled over decades by hundreds of local historians, this multi-volume work systematically documents the history of over 2,250 cities. Its key strength is a uniform coding scheme for each city entry, covering topics such as urban origins, economy, local institutional development, rulership, and law (see Figure A1 for an example entry). This standardized structure, cross-validated by historical experts, provides a unique basis for tracing development across cities over centuries.

We construct our main panel dataset covering the 2,250+ cities listed in the *Deutsches Städtebuch* from 1200 to 1700. Our unit of analysis is the city-time period of fifty years in length. We assign any event or change happening in a time period to that period. For example, an event happening in 1395 is recorded in the "1350-1399" time period. Following Cantoni and Yuchtman (2014), we examine all cities in the *Städtebuch* except those in Ostpreußen (East Prussia, in today's Poland).

The data structure derived from the *Deutsches Städtebuch* allows us to address concerns relating to potential selection bias, measurement error, and panel balance. First, we address selection bias, which could arise if, for example, better-resourced historians were concentrated in certain regions or archival survival varied systematically across regions. The inclusion of city fixed effects in our balanced panel analyses controls for any such time-invariant unobservables, while gridcell-by-time and ruler-by-time fixed effects control for time-varying factors shared by "neighboring" cities on either side of the Elbe-Saale border. Consequently, for selection to bias our estimates, it would need to vary differentially by region (across the Elbe-Saale line) at the time of the Black Death, including across neighboring cities. Second, our analysis addresses concerns about potential measurement error. Our core economic and political outcomes, urban construction and city-level institutions, are directly observed and measured with clear dating for all cities, as we describe in Section III, and we construct comprehensive data identifying the rulers of each city period-by-period, as described below. While measurement error is a potential concern for some variables, including local exposure to plague outbreaks, we show in Appendix D.2 that (1) our measure of local plague outbreaks is the most comprehensive in the literature and predicts variation in our key outcomes, including "within-ruler", and (2) measurement error in local plagues is unlikely to explain our findings. In Section III, we clarify that local plague outbreaks are measured directly and vary locally, including within ruler. Third, to address potential concerns regarding panel imbalance, we present analyses that control for the year in which each settlement was first recorded and find our results hold (see Appendix D.2).

We start by describing the construction of novel measures of politics and institutions relying principally on sections 9 and 10 of each city's entry in the *Deutsches Städtebuch*, which contain information on the: structure of city institutions; the rules governing the selection of the city council; and urban collective action, including whether cities were engaged in an open conflict with an external lord, whether they formed alliances with other cities, and whether they passed autonomous city laws. Some additional information, for example on conflicts, is gathered from section 11.[64] Additionally, we use data on territorial rulers, city

[64]While our measures of the three "major city institutions" are relatively unambiguous, we acknowledge that some other political variables may contain measurement error. For example, our coding of the presence of a "conflict" between a city and its lord is based on historians' narrative descriptions, which may involve some degree of interpretation. Similarly, our data on the selection of city governments are

Figure A1: Example Entry Deutsches Städtebuch

Burkheim am Kaiserstuhl, Kr. Freiburg

1 Purhaim (Libri confraternitatis St. Galli), Burcheim (762), Purcheim (972), Burgheim(984), Burckheimb (1479), Burckheym (1554).

2 10 km nördl. Breisach, ehedem am Rhein, seit der Tullaschen Rheinkorrektion 1 km östl. am Hang eines nach W vorspringenden Sporns des Kaiserstuhls. H. 190–210 m. Auf Essexitfelsen gebaut. Südlage.

3 a castrum 1231, burg und stat 1316, opidum 1377.

3 b Vermutl. an röm. Kastell angelehnte Siedlung, anfangs Dorf mit Burg an Rheinübergang. Schutz- und Zollstätte.

4 a Stadtgründer vermutl. die Herren von Üsenberg (13. Jh.).

4 b Stadtrecht um 1300, bestätigt 1348, 1521, 1562, 1667. Marktrecht 1479 (Wochen- und 2 Jahrmärkte).

4 d Hinrichtungsstätte der sog. Henkenberg.

5 a Burg auf steil abfallendem Fels, östl. daran anschließend, ehem. durch Graben und Wall getrennt, die Stadt. Ellipsenform. Gerade Hauptstr. mit rechteckigem großem Marktplatz. Nur auf der Bergseite 2 Parallelstr. Stadtmauer mit 5 Türmen, davon 2 mit Toren (das nordöstl. renoviert erhalten). Entfernung der Tore an der Hauptstr. (NO–SW) 500 m. Unterhalb der Altstadt schmale Vorstadt. 1600–1800 geschlossene Erweiterungen, nach 1800 lockere Bauweise.

5 b Burg vor 1000, mittelalterl. Burg im Bauernkrieg zerstört. Neubau 1572–74 durch Lazarus von Schwendi. Zerstörung 1672 durch die Franzosen, seither Ruine. Altes Rathaus (Fachwerk) mit eisernem Wappenschild (5 Türme). Hexenturm vermutl. 1551 (jetzt Wohnung). Spital 1574 durch Lazarus von Schwendi erbaut, jetzt Armenhaus (kirchl. Fonds). Kirche, 10./11. Jh. als basilica s. Petri erwähnt, gotischer Chor, Neubau 1727 gotisch, 1742 barockisiert, neuer Patron Pancratius. Turm vor 1772, Anbau 1877. Hl.-Kreuz-Kapelle, 1493 erwähnt, 1806 zum Spital umgebaut, heute Gasthaus Kreuz-Post.

5 c Vor der Rheinkorrektion wiederholte Überschwemmungen durch den Rhein bis zum Spital. Vgl. 10b.

5 d Zerstörungen durch Artilleriebeschuß. 3 Brücken gesprengt, Bevölkerung zweimal evakuiert. Rebberge verwildert.

6 a 1475: 34 Herdstätten. Zu seßhafter Bevölkerung kam starker Zuzug infolge von Kriegen und Durchzügen fremder Heere. Zuwanderung vor allem aus Vorarlberg, der Schweiz und Frankreich.

6 b Pest 1628–30.

6 c Kb. seit 1600. Protokollbücher der Zünfte und Bürgerrodel (beides unvollständig).

6 d Lazarus von Schwendi, kaiserl. Feldoberst, 1560–84 in B. ansässig. Jörg Wickram, Stadtschreiber von B., Begründer des dt. Romans, um 1550 in B. ansässig.

6 e 1813: 533 E., 1855: 178 Fam., 757 E. (361 m., unter 14: 119 m., 130 w., über 14: 242 m., 266 w.), 1861: 828 E., 1880: 179 Haushalte, 749 E., 1895: 665 E., 1905: 709, 1910: 736, 1925: 696, 1933: 702, 1946: 176 Haushalte, 706 E., 1950: 778 E.

6 f 160 E./qkm.

7 Die Mundart ist niederalem., spricht Kind 'Kind', Hus 'Haus', mähe '(sie) mähen', seï 'sei' (Imp.).

8 Marktrecht und Handwerkerpriv. 1472. Alte Zünfte der Fischer, Handwerker und Bauern. Älteste Urk. der Fischerzunft 1442. Rheinfähre unter Lazarus von Schwendi eingerichtet. Wochen- und Jahrmärkte heute bedeutungslos; jetzt vorwiegend Anbau von Qualitätswein. Weingut Bercher seit 1457. Winzergenossenschaft 1924 gegr.

9 Bgm. und Rat zuerst um 1450 erwähnt. Seit 1600 Zunftmeister im Rat vertreten. 1300 bis 1800 Verwaltungssitz des sog. Talgangs, seit etwa 1472 Herrschaft B. gen. Gerichtsbarkeit durch österreichische Pfandherrn ausgeübt. Errichtung eines Gefängnisses für die Herrschaft in B. 1551 (Hexenturm aus dieser Zeit?).

10 a 973 wurde B. vom Bf. Heddo von Straßburg an Kloster Ettenheim verschenkt. Besitzungen der Klöster Lorsch 778 und Einsiedeln 952 in B., örtl. Adel (Ministerialen?) seit 1113 erwähnt. Herrschaft der Üsenberger wohl auf Vogtei von Einsiedeln zurückzuführen. B. 1316 im Besitz des Sohnes Burchards von Üsenberg und des Markgrf. Heinrich von Hachberg. 1330 Verkauf an Hz. Otto von Österreich. Bis 1797 blieb B. bei Österreich, jedoch meist verpfändet. 1366 an Eppe von Hadstatt, 1382 an Martin Malterer, 1442 an Berthold von Staufen, Hans von Ratsamhausen, von Triberg und Lüttemann von Ratsamhausen, 1454 an die Stadt Breisach, 1457 an Turing von Hallwil, 1472 an die Grf. Conrat und Jerg von Tübingen, 1548 an Christoph von Sternsee, kaiserl. Hauptmann „uber die teutschen gwarda", 1560 an Lazarus von Schwendi, 1680 an Grf. Franz Karl zu Fürstenberg und Freiherr Ignaz Wilh. Casimir von Leyen als Schwendische Descendenten ex filia. 1715 im Besitz des Carl Heinr. Hornuß von Berncastel, 1737 vererbt an seinen Schwiegersohn Franz Ferd. Mayer von Fahnenberg, Landeshoheit 1797 an den Hz. von Modena, 1805 an Baden. Grundherrschaft, 1856 allodifiziert, bis 1878 Fahnenbergisch.

10 b Zerstörung der Stadt 1525 durch Hans Ziler von Amoltern, 1634 Zerstörung durch die Schweden bis auf 25 Häuser, sogar das Straßenpflaster aufgerissen. Danach 10 Jahre lang entvölkert. Zerstörung des Schlosses 1672 durch die Franzosen.

11 Wehrhoheit im Besitz des Landes- bzw. des

This figure provides an example entry of the Deutsches Städtebuch for the city of Burkheim am Kaiserstuhl.

remarkably detailed – indicating when selection was by city-wide elections, co-optation by a city oligarchy, or appointment by an external lord – but this granular evidence does not survive for all cities. To address such measurement error and to summarize the multiple facets of urban governance, we construct a unified index of "Political Autonomy" using principal components analysis. This method aggregates information

charters, and construction from Cantoni (2020).

City Council is an indicator for city-time-periods with an active city council (*Rat*). The variable takes on the value 1 in all periods after an active council was mentioned and the value 0 if/when the council was removed. The city of Bad Gandersheim in Lower Saxony in 1329 provides an example of an observation recording the presence of a council. The *Deutsches Städtebuch* indicates: "Der Rat erscheint erstmalig 1329" (Keyser 1939-1974, Band 3 Teil 1, p. 139). In our translation: "The council appears in 1329 for the first time."

City Mayor is an indicator for city-time-periods with an active mayor (*Bürgermeister*). The variable takes on the value 1 in all periods after an active mayor was mentioned and the value 0 if/when the mayor was removed. The city of Auerbach in Saxony in 1407 provides an example of an observation recording the simultaneous presence of a council and a mayor. The *Deutsches Städtebuch* indicates: "erstmalig 1407 durch das Vorkommen von BGM [Bürgermeister] u. 6 Ratsgeschworenen bezeugt" (Keyser 1939-1974, Band 2 Teil 1, p. 19). In our translation: "documented for the first time in 1407 by the presence of a BGM and 6 councilmen."

City Charter measures the presence of a city charter, as recorded by Cantoni (2020). The variable takes on the value 1 in all periods after a charter was acquired and takes on value 0 if it was revoked.

City Election Selects Council is an indicator for city-time-periods with city council elections. The variable takes on value 1 in all periods after an election of the council was mentioned and takes on value 0 when the council was removed or a different selection procedure was specified. An example of an initially elected and later 'co-opted' oligarchic council is Grimma in Saxony in the first half of the 16th century. The *Deutsches Städtebuch* indicates: "Wahl von Ratsmitgliedern durch die Bürgerschaft nur bis 1520, seitdem ergänzt er sich wieder durch Zuwahl bis 1833" (Keyser 1939-1974, Band 2 Teil 1, p. 92). In our translation: "Election of council members by the citizenry only until 1520, since then it co-opts itself again by election until 1833."

City Oligarchy Selects Council is a binary indicator for cities where oligarchic "co-optation" was used to appoint council members, i.e. the council itself votes on its membership. The variable takes on the value 1 in all periods after a co-optation of the council was mentioned and takes on the value 0 when the council was removed or a different selection procedure was specified. An example of a co-opted council is Speyer in Rhineland-Palatinate in 1349. The *Deutsches Städtebuch* indicates: "Nach erst langsamem Zurückdrängen gelang es 1349 den Zünftigen durch Gewalt endgültig... Der Rat nunmehr dreigeteilt, wechselte im 3jährigen Turnus und ergänzte sich nach Vorschlag der Zünfte durch Kooptation" (Keyser 1939-1974, Band 4 Teil 1, p. 397). In our translation: "In 1349, after a slow push back, the guilds finally succeeded in ousting the patricians by force... The council, now divided into three parts, changed every three years and was selected by co-optation according to the proposal of the guilds."

Autocratic External Lord Selects Council is a binary indicator for cities where the local ruler appoints council members. The variable takes on the value 1 in all periods after an external appointment of the council was mentioned and takes on the value 0 when the council was removed or a different selection procedure was specified. An example of a lord appointed council is Bautzen in Saxony from 1408 to 1412. The *Deutsches Städtebuch* indicates: "1408

from nine independently observed institutional variables, reducing the influence of noise in any single measure and capturing the underlying institutional matrix of the self-governing city.

beseitigte König Wenzel den neuen Rat, ließ 13 Mitglieder des Handwerkerrates hinrichten, setzte einen neuen Rat ein und nahm der Stadt (bis 1412) das Recht der freien Ratskür" (Keyser 1939-1974, Band 2 Teil 1, p. 23). In our translation: "In 1408, King Wenzel disbanded the new council, had 13 members of the craftsmen's council executed, installed a new council, and deprived the city of the right to freely elect its council members until 1412."

Conflict with Lord measures whether cities engaged in conflict with a lord. An example of a conflict between a city and a lord is the conflict in 1439 in Hettstedt in Saxony-Anhalt. The *Deutsches Städtebuch* indicates: "[M]ißglückte Erhebung der Stadt gegen die Grafen von Mansfeld... 1439" (Keyser 1939-1974, Band 2 Teil 3, p. 548). In our translation: "Unsuccessful uprising of the town against the Counts of Mansfeld... 1439."

City Alliances is a dummy equal to one if a city entered into alliance with other cities. An example of an alliance is found involving Nürnberg in Franken. The *Deutsches Städtebuch* indicates: "1344 schließt N[ürnberg] einen Bund mit den Städten Würzburg, Weißenburg und Windsheim." (Keyser 1939-1974, Band 5 Teil 1, p. 401) In our translation: "1344 Nuremberg enters into an alliance with the cities of Würzburg, Weißenburg and Windsheim."

Autonomous Laws records whether cities passed what historians describe as autonomous laws. We code the following legal documents as autonomous laws: *Willküren, Stadtsatzungen, Stadtstatuten, Stadt(ver)ordnungen, Beliebungen, Rezesse, and Ratsordnungen.*[65] An example of autonomous town law is in 1319 in Erfurt in Saxony-Anhalt. The *Deutsches Städtebuch* indicates: "Pfahlbürgertum in der Ratswillkür von 1319 erlaubt" (Keyser 1939-1974, Band 2 Teil 3, p. 483). In our translation: "Burghers living outside city walls were permitted in the council ordinance of 1319." To clarify, the "Pfahl" was a palisade that enclosed districts outside city walls. *Pfahlbürger* were "burgesses of the palisades," who typically moved to these areas to escape the authority of lords and to obtain rights and protections from cities. Table A2 provides further details on types of autonomous laws.

Political Autonomy is a unified index of urban political autonomy constructed using principal components analysis, accommodating binary data, and using all city-level political variables shown in Figure VII and described above, namely: "City Council", "City Mayor", "City Charter", "City Election Selects Council", "City Oligarchy Selects Council", "Autocratic External Lord Selects Council", "Conflict with Lord", "City Alliances", and "Autonomous Laws".

Ruler is a variable that records, for each city, its respective territorial lord or ruler in each period. We rely on data from Cantoni (2020) for the period 1450-1700. We construct further data to cover the period 1200-1450, using the *Deutsches Städtebuch*, data kindly shared by Davide Cantoni and Matthias Weigand, and our reconstruction of territorial histories following the methodology of Cantoni (2020). These uniquely fine-grained data allow us to compare development across cities that were subject to the same ruler over time (we focus on the comparison across cities subject to the same ruler in 1348, when the Black Death hit). Further, the extended temporal coverage of these data allows us to characterize the evolution

[65] Isenmann (2014, p. 181) notes: "Das autonome Stadtrecht ist rationales Willkürrecht (Kore), Einungsrecht (Einung, conventio), Statutarrecht (statutum), rechtsgeschäftlich begründete Satzung (Satzung, Gesetz). Auch der Ausdruck >Ordnung< (ordinatio) ist dafür gebräuchlich. [...] Weitere Ausdrücke sind iustitium, mandatum, arbitrium, decretum." For further reference see Ebel (1953), Bader and Dilcher (1999, p. 386), and Weitzel (2009, p. 171).

of political structure across centuries before and after the Black Death shock (see Figure III and below). We observe territorial affiliation for all cities from the 1300s onward. Rulers remain ambiguous for 8% of cities in the early 1200s.[66] Our baseline data assume that in these limited ambiguous cases a city's ruler was stable across the 1200s, barring information to the contrary. However, importantly our finding that regional differences in the structure of political competition (i.e. political fragmentation) were stable before the Black Death is robust to other constructions of the data, for example to dropping all cities with ambiguous data or dropping the 1200-49 period from the analysis.

Political Fragmentation measures political fragmentation at the city-by-time period level. Political fragmentation is calculated as follows.

1. We assign each city its respective territorial lord or ruler in each period using the data on territorial rulers described above.

2. We compute a Herfindahl index of political concentration (HHI_p) for each city using all neighboring cities within a 100km radius. Within a 100km radius, we number the territorial jurisdictions of rulers. We then calculate rulers' shares by: $s_r = x_r / \sum_{j=1}^{N} x_j$, where s_r is the share, x_r is the number of cities belonging to ruler r, and N is the total number of rulers. We compute a Herfindahl index (HHI_p) of political concentration at the city level: $HHI_p = \sum_{i=1}^{N} s_i^2$. We provide an illustration in Figure II.

3. We define: *Political Fragmentation* $= \kappa = 1 - HHI_p$, for all cities period-by-period.

The finding that there was greater political fragmentation in the West is robust to other aggregations of the data. It holds, for example, when political fragmentation is measured in latitude-longitude gridcells or across the 25 or 10 nearest neighbors for each city. Across metrics, regional differences hold along the border and within-ruler. See Table D1.

City Charter Fragmentation measures city charter fragmentation at the city level. To measure city charter fragmentation we assign each city its respective city charter family in 1348 using data from Cantoni (2020), where the "families" are types of city law such as Lübeck Law and Magdeburg Law, and analogously compute a Herfindahl index of city charter concentration (HHI_c) for each city using all neighboring cities within a 100km radius. Third, we define: *City Charter Fragmentation* $= 1 - HHI_c$, for all cities as of 1348.

Construction is a binary variable that takes the value of 1 if a major urban construction project is recorded in the *Deutsches Städtebuch* (Keyser 1939-1974) as coded in Cantoni, Dittmar, and Yuchtman (2018).

Plague 1348-51 records the number of plague outbreaks in a city 1348 through 1351 as recorded in the *Deutsches Städtebuch* (Keyser 1939-1974), which lists outbreaks recorded as "*Pest*" and "*Schwarze Tod*" (Black Death). For example in the entry for Bad Reichenhall in Bavaria, the *Deutsches Städtebuch* indicates: "Pest 1349." (Keyser 1939-1974, Band 5 Teil 2, p. 89) In our translation: "Plague in 1349." Our data records directly observed, city-level evidence on local variation in plague outbreaks, which varies along the border and within-ruler (see also Section III). We observe localized plague exposure during the Black Death

[66] The directly recorded information on rulers declines for the early 1200s, and comprehensive information on dynastic relations and overlapping sovereignties is difficult to reconstruct for the first period in our study (1200-1499), as the earliest genealogical records for rulers of smaller territories are themselves more ambiguous and fragmentary.

for 421 cities, improving coverage in our study area by a factor of six compared to existing datasets, such as Biraben (1975). We address questions about potential misclassification (measurement error) and show there were no regional differences in mortality rates in Section V and Appendix D.1.2.

Military Conflict records the number of military conflicts in a city-period, as documented in Cantoni and Weigand (2021). This measure of *military* conflict captures the impact of 6,000 military conflicts, almost all of which are larger conflicts between rulers and which are recorded in sections 10 and 11 of each city's entry in the *Städtebuch*. It is distinct from our (novel) measure of conflict between cities and lords (i.e. rulers).

Coercive Agricultural Estates records the construction dates of around 6,000 feudal agricultural estates across modern Germany from 1200 to 1800, from Hein (2024), *Die Burgendatenbank: Burgen, Schlösser, Adelssitze und Befestigungsanlagen* ("The castle database: Castles, palaces, noble residences and fortifications"). We specifically measure the construction of estate buildings (*Herrenhäuser*, *Gutshaus*, *Rittergut*), which are indicators of the rise of "the feudal noble estate economy" (von Buttlar 1989, p. 9 – our translation). The dataset excludes present-day Poland, limiting cross-sectional coverage.

Coercive Agricultural Laws measures laws institutionalizing "serfdom" in agriculture, using comprehensive evidence on 85,000 territorial laws from 1300 to 1800 from the Max-Planck-Institut's *Policeyordnungen der Frühen Neuzeit* database (Härter and Stolleis 2023). We identify laws institutionalizing the loss of peasant property rights (*Bauernlegen* and *Besitzverlust*), serfdom (*Gutsherrschaft*), and compulsory labor (*Gesindezwang*). We map these laws to the relevant cities for each period. We include all territories covered by Härter and Stolleis (2023) for the periods during which any law is recorded in a given territory, resulting in an unbalanced panel.

Urban Density measures the number of neighboring cities within 100 kilometers.

Rye Yields measures potential rye yields under rain-fed agriculture within 25 kilometers of the city, using data from GAEZ (Fischer et al. 2021).

Wheat Yields measures potential wheat yields under rain-fed agriculture within 25 kilometers of the city, using data from GAEZ (Fischer et al. 2021).

Distance to Navigable Rivers measures the distance to the closest navigable river, using data from Kraus et al. (1959).

Hanseatic League membership indicates whether a city was a member of the League in 1348, as documented in the *Deutsches Städtebuch*.

Slavic Settlement Name identifies Slavic, Sorbic, and Old Polish roots in city names using an etymological place registry (Niemeyer 2012).

Slavic Settlement Area indicates location within the historic Slavic settlement area border (Wasserscheidt 2023).

Distance to Slavic Settlement Area measures the distance to the historic Slavic settlement border (Wasserscheidt 2023).

Distance to Monastery c. 1350 measures the historic exposure to monasteries in 1350 (Niedersächsische Akademie der Wissenschaften 2023).

Monastery Exposure (in Years) measures the number of years that a city was exposed to the closest monastery (Niedersächsische Akademie der Wissenschaften 2023).

Bishopric Exposure (in 50-Year Periods) measures the sum of all periods that a city was within a bishopric before 1350.

Market Access measures city-level market access to urban population in Europe,

following the methodology of Donaldson and Hornbeck (2016). Specifically, we define market access for city i through:

$$MA_i = \gamma \sum_{j \neq i} \tau_{ij}^{-\theta} pop_j MA_j^{-\frac{1+\theta}{\theta}}$$

where γ is a constant, pop_j denotes the population of city j (in thousands), τ_{ij} represents trade costs between cities i and j, and $\theta > 1$ is a parameter capturing the inverse dispersion of productivity across cities. The terms $\tau_{ij}^{-\theta} pop_j$ in the summation imply that city i's market access increases with lower trade costs to more populous cities, *ceteris paribus*. Conversely, the term $MA_j^{-(1+\theta)/\theta}$ indicates that a higher market access of other cities j reduces MA_i, reflecting competitive effects.[67]

Because detailed destination characteristics are unobserved in our context, we adopt a reduced-form:

$$MA_i^{\text{approx}} = \sum_{j \neq i} \tau_{ij}^{-\theta} pop_j$$

To address concerns stemming from the mechanical correlation of market access and population, we exclude each city's own population from its market access measure.

We parameterize transport costs across four modes of transportation — coast, inland water, land, and transfer— each characterized by distinct cost structures. Land transport involved the highest costs; inland water transport reduced these costs by roughly 75%; and coastal shipping reduced them further by half (Masschaele 1993; Parry 1967). Transfer costs, representing access to the main network, are assumed to be twice that of land transport (Dyer 2002). Therefore, we adopt a transport-cost ratio for coast, inland water, land, and land transfer of $1:4:8:16$, following Masschaele (1993).[68] We calculate market access using population data from Bairoch, Batou, and Chèvre (1988). Our results are robust to using data, proxies, and interpolations from Buringh (2021).

Distance to Trade Route is computed using trade route locations recorded by Holterman et al. (2025).

[67] While the definition of MA_i depends mechanically on the trade elasticity θ, we verify robustness to different values, following Eaton and Kortum (2002), but focus on $\theta = 2$, following recent studies on market access in Early Modern England, e.g., Alvarez-Palau et al. (2025).

[68] Donaldson and Hornbeck (2016) use a cost ratio of 1:50:100 for inland water, land, and transfer in the context of the 19th-century United States, based on estimates for heavy goods by Fogel (1964). For England in 1680, Alvarez-Palau et al. (2025) assume ratios of 1:5:50 for coastal, inland water, and land transport, respectively, and impose a fixed cost for transfers, reflecting their focus on the transport of bulk commodities such as coal.

Table A2: Description of Autonomous Laws

Legal Document	Description	Reference
Willkür, *Stadtsatzung*, *Stadtstatut*, *Stadtordnung*, *Beliebung*	*Willkür*- and *Satzungsrecht* were city laws produced by the cities themselves, often without prior authorization from the ruler. The council established rules and fixed fines and penalties in the event of non-compliance. Penalties were enforced through the council itself or an associated institution. *Willkürrecht* was positive law and could be repealed, replaced, or changed by subsequent *Willküren*. *Willkürrecht* could take precedence over other types of *Stadt*- and *Landrecht* and was at times considered a revolutionary, anti-lordly legal act. Yet more commonly, *Willküren* regulated the daily necessities of economic life.	Ebel (1953); Bader and Dilcher (1999, p. 386); Weitzel (2009, p. 171); Isenmann (2014, pp. 181ff); Ebel (1998, p. 218)
Ratsordnung	Council ordinances were part of the autonomous city law and imposed disciplinary rules on the governance of the council. Violations of council ordinances were subject to fixed fines.	Isenmann (2014, p. 402)
Rezess	*Rezesse* were legal contracts between the council and the citizenry, usually represented by a committee. In their regulatory content, they are similar to *Burspraken*, which were collections of rules and regulations that were announced to the citizens every year (e.g. fire protection, night rest, street cleaning, and guard duty).	Kroeschell (1980, p. 60)

B Framework

We develop a two-sector general equilibrium model in which economic incentives interact with political competition to shape support for structural change. The economy consists of a traditional and a modern sector, the agricultural and urban sectors in our context. The traditional agricultural sector uses fixed land and labor under diminishing returns. The modern urban sector uses labor under constant returns to produce manufactures and services. Labor mobility equalizes wages across sectors. A ruler derives secure rents from the traditional sector and contestable revenue from the modern sector. The ruler can support the modern sector by setting up institutions that raise its productivity. However, the decision to support modern development reflects trade-offs imposed by political competition.

Rulers' support for the modern sector reflects a trade-off between external competition and internal control. External competition among rulers strengthens incentives to support modern development. Internally, this support can erode secure rents and politically empower the modern sector, which may lead to a loss of revenue for the ruler. Rulers may thus face a trade-off between revenue from secure (traditional) and contested (modern) assets.

This trade-off is shaped by factor prices and political competition. When the mobile factor is abundant, the marginal value of retaining this factor in the traditional sector is low, the secure-rent loss from factor reallocation grows less than proportionally with labor, and the risk-adjusted tax base scales with the modern sector.[69] As a result, rulers in more and less competitive political environments support the modern sector. When the mobile factor is scarce, countervailing forces operate: the marginal value of the mobile factor in the traditional sector is high, and redirecting it sharply reduces secure rents, lowering the incentive to support the modern sector. However, scarcity affects relative prices in equilibrium: an exogenous negative labor supply shock raises wages; and under non-homothetic preferences this lowers the share of income allocated to traditional agricultural goods and raises the relative price of modern output, following Engel's Law (Matsuyama 1992; 2019; Voigtländer and Voth 2013). This price effect can dominate the direct negative impact of labor scarcity; shift the balance of power toward cities; and activate political competition as a driver of development.

These countervailing forces generate scope for divergence as rulers now face a coordination problem with two stable equilibria: rulers can either limit support for development, risking the loss of urban revenue to competitors, or accommodate change and accept greater internal risk. By providing cities with credible outside options, competition among rulers destabilizes coordination on the low-support equilibrium. Through this channel, political competition can induce support for structural change when domestic incentives alone do not.

[69] The secure-rent loss grows sub-linearly in labor as agricultural production is Cobb–Douglas with a fixed land factor, whereas urban output is linear in labor. Appendix B discusses the underlying assumptions.

B.1 Environment

B.1.1 Economic Environment

Technology. Agricultural output is produced with land T and labor L_a under a Cobb–Douglas technology, which exhibits diminishing marginal returns to labor:

$$Y_a = A_a L_a^{\alpha} T^{1-\alpha}, \qquad 0 < \alpha < 1.$$

Urban output is produced with labor L_m under constant returns:

$$Y_m = A_m L_m.$$

A_a and A_m are productivity in the agriculture and urban sectors, respectively. Let $\tilde{Y}_m \equiv P_m Y_m$ denote the value of urban output in units of the agricultural numeraire.

Preferences. Each worker supplies one unit of labor and has Stone–Geary preferences with a subsistence requirement for food. Utility is

$$u(c_m, c_a) = \beta \, \ln c_m + (1-\beta) \, \ln(c_a - \underline{c}),$$

with $\underline{c} > 0$ the subsistence consumption level of the agricultural good and $\beta \in (0,1)$ a preference weight for urban consumption. Preferences are non-homothetic, capturing Engel's law: as income rises above subsistence, a larger share of income is spent on urban goods (Matsuyama 1992; 2019; Voigtländer and Voth 2013).

Workers face a budget constraint

$$c_a + P_m \, c_m \;\leq\; w,$$

where the agricultural good is numeraire and P_m is the relative price of the urban good.

If $w > \underline{c}$, utility maximization yields the interior demand functions

$$c_a = \underline{c} + (1-\beta)\,(w - \underline{c}), \quad c_m = \frac{\beta\,(w-\underline{c})}{P_m},$$

and in the corner case $w \leq \underline{c}$,

$$c_a = w, \quad c_m = 0.$$

Wages. Under perfect competition and free labor mobility, wages equal marginal products in both sectors:

$$w_m = A_m \, P_m, \qquad w_a = \alpha \, A_a \, [L(1-n)]^{\alpha-1} \, T^{1-\alpha},$$

where $n = L_m/L$ is the urban labor share. Equating these yields the equilibrium urban labor share

$$n^* \;=\; 1 - \frac{1}{L}\left(\frac{A_m P_m}{\alpha \, A_a \, T^{1-\alpha}}\right)^{1/(\alpha-1)}, \qquad 0 < n < 1, \tag{4}$$

noting that since $\alpha - 1 < 0$, one requires $\left(A_m P_m / [\alpha A_a T^{1-\alpha}]\right)^{1/(\alpha-1)} < L$ for $n \in (0,1)$.

Policy. Consider a policy $s \in \{0,1\}$ that supports urban development and raises urban TFP from A_m to φA_m, with $\varphi > 1$, e.g., through setting up institutions such as granting

a charter that secures self-governance and property rights. To analyze the decision of an individual ruler, we assume the polity is economically small within a larger system of competing states. The ruler is therefore a price-taker on the market for modern goods. Let $n_B(L) \equiv n(A_m; L)$ denote the equilibrium urban labor share in the baseline, and $n_S(L) \equiv n(\varphi A_m; L)$ the share under this supportive policy. Holding total labor L constant, differentiating the equilibrium condition (4) with respect to A_m implies $\frac{\partial n}{\partial A_m} > 0$.[70] Hence

$$n_S(L) = n(\varphi A_m; L) > n(A_m; L) = n_B(L).$$

Because higher A_m raises urban wages (at initial n), labor flows to the city until equilibrium is restored; thus n increases with A_m.[71]

B.1.2 Political Environment

The polity's politics operates on two margins.

External Competition. Externally, rulers compete over the modern sector. Let $\kappa \in [0, 1]$ index the structure of this political market: higher κ means a more fragmented, less concentrated political environment.[72] Let $S_{-i} \in [0, 1]$ denote the fraction of rival rulers willing to support modernization (endogenously determined below). If the incumbent ruler does not modernize, then the probability that the ruler will lose the modern sector – via factor exit, political defection, or competitive eclipse due to external competition – is:

$$q(S_{-i}, \kappa) = \begin{cases} 1 - (1 - S_{-i})^{\kappa}, & \kappa > 0, \\ 0, & \kappa = 0, \end{cases} \tag{5}$$

a reduced-form hazard that increases in S_{-i} and, for $S_{-i} \in (0, 1)$, in κ, with $q(0, \kappa) = 0$. The convention at $\kappa = 0$ represents the absence of an external rival and avoids the undefined expression 0^0 at $(S_{-i}, \kappa) = (1, 0)$. κ acts as the strength of potential competition, with S_{-i} the realized share of modernizing rivals. From a city's perspective, q is the joint probability

[70] Assuming that the urban sector in question is small or faces an elastic external demand for urban goods, so that P_m is approximately constant, as in an open-economy context. Thus, a common world price P_m is taken as given by each polity and does not depend on the ruler's choice s. Thus P_m can shift with system-wide fundamentals (notably the global labor-supply shock) but is approximately invariant to endogenous policy choices. We discuss the implications of aggregate changes in support in the text accompanying Lemma 1.

[71] Differentiating (4) at fixed L yields $\partial n / \partial A_m = -\frac{1}{\alpha - 1} \left(\frac{A_m P_m}{\alpha A_a T^{1-\alpha}} \right)^{1/(\alpha-1)} \frac{1}{A_m L} > 0$ since $0 < \alpha < 1$.

[72] Empirically, we measure κ using an index of external political fragmentation, defined as the complement of political concentration. Let r_i be the ratio of cities initially under ruler i with $\sum_i r_i = 1$, and define HHI $\equiv \sum_i r_i^2$. This formulation allows for an interpretation where κ is the probability that two randomly drawn cities are governed by different rulers. Thus, κ increases in the fragmentation of political power and captures the intensity of potential rivals, holding geography fixed. This mapping follows North (1981) and Stigler (1972). North (1981, p. 27) observes: "Where there are no close substitutes, the existing ruler characteristically is a despot. The closer the substitutes, the fewer degrees of freedom the ruler possesses," and, "The alternative depends upon the structure of competitive political units. The more geographically proximate ones of course have an advantage." Stigler (1972, pp. 92, 97) notes, "strong [political] competition is positively correlated with (i) The number of rivals; (ii) Their similarity of size, and in particular the smaller the share possessed by the largest ruler, the more vigorous competition is likely to be," and proposes political Herfindahl indices. Equivalently, higher κ means "closer substitutes," and higher S_{-i} means those substitutes are modernizing.

that the city finds a viable outside option across the political market.[73] External competition creates credible outside options for cities. When more rival rulers modernize, an unsupported city is more likely to find support elsewhere and thus to defect. Conversely, when few rivals modernize, cities face limited outside options and are less likely to defect. Providing support to the city serves as a commitment device that removes defection risk—by raising local productivity, it reduces urban labor's incentive to leave. In this way, support serves as a strategic device to mitigate pressure from external competition.[74]

Internal Contest. The modern sector can contest the ruler's fiscal authority, with the probability of success determined by the balance of power between the ruler and the city. Let $\rho(\sigma)$ denote the probability that the ruler loses the right to tax contested output and $R(\tilde{Y}_m)$ the extraction by the ruler. We define:

$$\rho(\sigma), \quad \text{where } \sigma \equiv \frac{Y_a}{\tilde{Y}_m - R(\tilde{Y}_m)}, \quad \rho'(\sigma) < 0, \quad \rho''(\sigma) \geq 0. \tag{6}$$

In other words, a relatively larger urban sector (lower σ) makes a loss of fiscal control more likely and this effect is weakly convex, so the marginal impact of σ on ρ diminishes as the countryside becomes dominant. Intuitively, as the city grows in economic strength, it gains greater de facto power to influence or challenge the ruler's fiscal decisions.[75]

B.1.3 Timing

1. Nature draws fundamentals T, L, A_a, A_m, φ.
2. Rulers simultaneously choose their policy $s \in \{0, 1\}$, where $s = 1$ is support for the city.
3. Labor reallocates across sectors; goods and factor markets clear, determining $L_a(s)$, $L_m(s)$ and relative prices.
4. External competition and internal contestation resolve:
   (a) If $s = 1$, the ruler retains the contested revenue $R\big(\tilde{Y}_m^S\big)$ with probability $1 - \rho^S$.
   (b) If $s = 0$, the ruler faces external competition over the modern sector with probability $q(S_{-i}, \kappa)$.

[73] Our qualitative results are robust to alternative specifications for the external threat function, such as a linear form $q = \kappa S$, provided the function remains increasing in both arguments. We adopt this specification because it represents the probability that a city finds at least one modernizing ruler.

[74] We interpret the loss as arising from out-migration of mobile factors, but it may also reflect political realignment or market displacement by rival rulers. We assume support eliminates external risk for tractability. A weaker assumption under which support only reduces this risk (i.e., $0 < q_S < q_B$) would shrink the parameter region of the high-support equilibrium but would not change the qualitative conclusion of the framework.

[75] This reduced-form specification of internal political risk can be derived from an explicit micro-foundation (e.g., effort, bargaining, or coordination in conflict), but the results that follow require only that $\rho'(\sigma) < 0$ and $\rho''(\sigma) \geq 0$. Hence, the specific functional form of $\rho(\sigma)$ is immaterial so long as a stronger urban sector increases the risk of contestation (monotonicity) and does so at a non-decreasing rate (weak convexity). We further note that the qualitative results are unchanged in a simpler variant with $\sigma \equiv Y_a/\tilde{Y}_m$, which treats σ as the de facto balance of power abstracting from extraction; we discuss assumptions on the extraction technology in Assumption 7.

- If a ruler loses to external competition, the ruler receives no revenue from the urban sector.
- If a ruler withstands external competition, the ruler retains the contested revenue $R\big(\tilde{Y}_m^B\big)$ with probability $1-\rho^B$.

5. Payoffs are realized.

B.1.4 Payoffs

The ruler's revenue comes from (i) secure agricultural rents and (ii) contested urban revenue. We compare two policy regimes for a representative city. In the baseline, the city operates at productivity A_m without institutional support. If the ruler adopts institutions supporting modern development, it raises productivity to φA_m.

Let Y_a^B, Y_m^B denote outputs in the baseline regime, and Y_a^S, Y_m^S the outputs under support (all endogenous through labor reallocation). The ruler's expected payoff in each case is:

$$U_B(S,\kappa) = Y_a^B + \big[1-q(S_{-i},\kappa)\big]\big[1-\rho^B\big]\,R\big(\tilde{Y}_m^B\big), \tag{7}$$

$$U_S = Y_a^S + \big[1-\rho^S\big]\,R\big(\tilde{Y}_m^S\big). \tag{8}$$

In the baseline case, with probability $1-q(S_{-i},\kappa)$ the city remains under the ruler (no loss to external competition), and with probability $1-\rho^B$ it does not pose an internal risk; then the ruler collects the urban revenue $R(\tilde{Y}_m)$, where $R'(\tilde{Y}_m)>0$ and $R''(\tilde{Y}_m)\le 0$, reflecting diminishing marginal returns to extraction (e.g., due to an incentive-compatibility or enforcement capacity constraint). In the supported case, external competition is muted, but the city may still challenge the ruler with probability ρ^S.[76]

B.2 Equilibrium

We characterize the rulers' equilibrium support decisions in the political game. Each ruler chooses whether to support ($s_i=1$) or not ($s_i=0$), and we focus on symmetric Nash equilibria. Let

$$S_{-i} = \frac{1}{N-1}\sum_{j\neq i} s_j$$

be the share of rival rulers who support development. Given the rivals' support rate S_{-i}, the net payoff gain from support for a representative ruler is

$$\Delta(S_{-i},\kappa,L) \;\equiv\; U_S - U_B\,,$$

where U_S and U_B are given by (8) and (7), respectively. In words, $\Delta(S_{-i},\kappa,L)$ measures the ruler's incentive to support the city (versus withholding support) given external rivals κ and

[76] We proxy the ruler's secure income as the total agricultural output, Y_a, not just land rents $(1-\alpha)Y_a$. This simplifying assumption implies the ruler is the residual claimant of the entire agricultural surplus, for instance as the ultimate landowner for whom the agricultural wage bill is an internal transfer. This income is 'secure' in the sense that property rights over land are uncontested. Specifying the ruler's secure income as land rents, would reduce the secure rent loss from modernization. However, it would simultaneously increase the city's relative economic power, thus raising the internal contestation risk ρ. The model's fundamental trade-off is therefore robust to this alternative specification.

assuming a fraction S_{-i} of rival rulers support.

In a symmetric equilibrium $S^* \in [0,1]$ the following conditions characterize the set of equilibria:

(i) $S^* = 0$ is an equilibrium if $\Delta(0;\kappa,L) \leq 0$,
(ii) $S^* = 1$ is an equilibrium if $\Delta(1;\kappa,L) \geq 0$,
(iii) any $S^* \in (0,1)$ with $\Delta(S^*;\kappa,L) = 0$ is a mixed equilibrium.

Because $\partial\Delta/\partial S > 0$ (Lemma 1 below), there is at most one interior S^* solving $\Delta(S^*;\kappa,L) = 0$. Corner equilibria $S^* \in \{0,1\}$ can coexist whenever $\Delta(0;\kappa,L) \leq 0 \leq \Delta(1;\kappa,L)$.

The support differential can be expressed using (8)–(7) as

$$\Delta(S^*;\kappa,L) \;=\; \underbrace{Y_a^S - Y_a^B}_{\text{secure rent loss}} \;+\; \underbrace{\Big\{\big[1-\rho^S\big]\,R\big(\tilde{Y}_m^S\big) \;-\; \big[1-q(S^*,\kappa)\big]\big[1-\rho^B\big]\,R\big(\tilde{Y}_m^B\big)\Big\}}_{\text{risk-adjusted urban revenue gain}}. \quad (9)$$

Three components of the ruler's net pay-off are important:

1. *Secure rent loss.* Supporting modern development draws labor out of agriculture, reducing the ruler's secure land rent, as $Y_a^S - Y_a^B < 0$.

2. *Gross urban revenue gain.* Support raises urban productivity (φA_m) and induces labor reallocation to the city, raising urban output ($Y_m^S > Y_m^B$), and expanding the potential tax base $R(\tilde{Y}_m)$ available to the ruler.

3. *Contestable urban revenue at risk.* Urban expansion also increases the risk that the ruler loses control over the urban sector. In the supported scenario, a larger city implies a higher internal contestation probability ($\rho^S > \rho^B$). In the baseline scenario, with probability q the ruler loses the urban sector to rival rulers (see (5)), which results in the loss of the urban sector from the ruler's perspective.

A ruler's incentive to support increases with the prevalence of support among rivals. Intuitively, when more rival rulers pursue modernization, an incumbent who abstains faces a higher risk from external competition: e.g., rival rulers' more productive urban sectors can attract mobile factors, undermining the incumbent's modern sector. This strategic complementarity creates outside options for urban labor and is formalized below.[77]

[77] In our setting, political competition and modernization are strategic complements. External competition heightens the cost of withholding support by providing modern sectors with credible exit options, so every additional supporter strengthens others' incentive to modernize. In other settings, however, political competition can impose negative externalities, e.g. due to fixed costs. A potential way to accommodate this concern in our framework is to further endogenize the price: let the price (or, equivalently, the net surplus factor) decline with the fraction of rulers that support. Support then imposes a negative price externality on all other supporters. This mechanism can be interpreted as market saturation (duplicated fixed costs) or the erosion of rents when a rival can appropriate the gains. Thus, if the price outcome moves against the rulers as more of them modernize, it could dampen or overturn the strategic complementarity. If P_m were to decline with aggregate support S, then $\partial\Delta/\partial S$ would include the additional term $(\partial\Delta/\partial P_m)(\mathrm{d}P_m/\mathrm{d}S)$; Lemma 1 continues to hold whenever the price feedback is sufficiently small (e.g., elastic external demand) or dominated by the outside-option channel q_S.

Lemma 1 (Strategic complements)**.** *For any $\kappa > 0$, support policies are strategic complements. For $S \in [0,1)$,*

$$\frac{\partial \Delta}{\partial S} = \frac{\partial q}{\partial S}(S,\kappa)\left[1-\rho^B\right]R\big(\tilde{Y}_m^B\big) > 0,$$

since $\partial q(S,\kappa)/\partial S = \kappa(1-S)^{\kappa-1} > 0$. Monotonicity at $S=1$ follows by continuity of $q(\cdot,\kappa)$.

Proof. In the baseline (no-support) scenario, an increase in S raises the realignment probability $q(S,\kappa)$ for an unsupported city and thereby lowers the incumbent ruler's expected payoff U_B in (7). For $S \in [0,1)$, differentiating gives $\partial U_B/\partial S = -\frac{\partial q}{\partial S}(S,\kappa)\,[1-\rho^B]R(\tilde{Y}_m^B)$. Thus $\partial\Delta/\partial S = -\partial U_B/\partial S > 0$ for $\kappa > 0$. The result extends to the endpoint by continuity. □

Lemma 1 implies that the best-response curve of the support game slopes upward, and at most one interior symmetric equilibrium can exist. In extreme cases, the coordination problem disappears and the equilibrium is corner: either no ruler supports or all rulers do. Any interior fixed point $S^* \in (0,1)$ is unique.[78]

B.3 Comparative Statics

We next examine how the equilibrium shifts in response to changes in factor prices. We focus on two results: (1) under sufficient factor abundance, all rulers will support the city (policy convergence); and (2) a global shock inducing factor scarcity (labor supply shock) has countervailing effects, creating scope for divergent policies across polities.

B.3.1 Convergence under Labor Abundance

Proposition 1 (Convergence under labor abundance)**.** *There exists a finite threshold $\bar{L} > 0$ such that for any $\kappa \in [0,1]$, if $L > \bar{L}$ then $\Delta(S;\kappa,L) > 0$ for all $S \in [0,1]$. In other words, beyond this threshold every ruler strictly prefers to support the city—even in the absence of external competition ($\kappa = 0$). Consequently, under factor abundance, the unique equilibrium outcome is $S^* = 1$ (all rulers support).*

Proof. Consider the case of no external rivals ($\kappa = 0$). Then $q(S,\kappa) = 0$ for all S, and the support differential (9) reduces to

$$\Delta(S;0,L) \;=\; \underbrace{Y_a^S - Y_a^B}_{<0} \;+\; \Big(\underbrace{1-\rho^S}_{>0}\Big)R\big(\tilde{Y}_m^S\big) \;-\; \Big(\underbrace{1-\rho^B}_{>0}\Big)R\big(\tilde{Y}_m^B\big).$$

As L grows large, diminishing returns to land set in and cap the additional agricultural output from extra labor, whereas urban output Y_m grows roughly linearly with L (due to constant returns). Then $(1-\rho^B)R(\tilde{Y}_m^B)$ and $(1-\rho^S)R(\tilde{Y}_m^S)$ grow at least linearly in L, while the secure rent loss $Y_a^S - Y_a^B$ grows sub-linearly. This holds under the assumption that contested revenue function R is asymptotically linear, in the sense that there exist constants $\tau > 0$ and $\bar{\tilde{Y}} < \infty$ such that $R(\tilde{Y}_m) \geq \tau\tilde{Y}_m$ for all $\tilde{Y}_m \geq \bar{\tilde{Y}}$, and that the contestation

[78] The magnitude of the complementarity, $\partial\Delta/\partial S$, is increasing in κ whenever $S < 1-e^{-1/\kappa}$ and decreasing in κ when $S > 1-e^{-1/\kappa}$.

technology satisfies $\rho(\sigma) \leq \bar{\rho} < 1$ for some $\bar{\rho} < 1$ and all $\sigma \geq 0$. In this case, $\Delta(S; 0, L)$ becomes positive for sufficiently large L. By continuity, there exists some finite $\bar{L}$ such that $\Delta(S; 0, \bar{L}) = 0$ and $\Delta(S; 0, L) > 0$ for all $L > \bar{L}$. Finally, since the presence of external competition ($\kappa > 0$) only increases the ruler's incentive to support (Lemma 1), the condition $\Delta > 0$ continues to hold for all $\kappa > 0$ as well. Hence $L > \bar{L}$ implies $\Delta(S; \kappa, L) > 0$ for every $\kappa \in [0, 1]$, making support a dominant strategy for each ruler and yielding $S^* = 1$ in equilibrium. □

B.3.2 Divergence under Labor Scarcity

We now consider a negative shock to global labor supply and show that it can produce conflicting economic and political effects.

For clarity, suppose first that the ruler's policy is fixed (no strategic response) so that we isolate the purely economic adjustment to a global labor scarcity shock. Totally differentiating the equilibrium urban labor share (4) with respect to L (treating productivity A_m and other fundamentals as fixed) yields:

$$\frac{\mathrm{d}n^*}{\mathrm{d}L} = \underbrace{\frac{\partial n^*}{\partial L}\Big|_{P_m}}_{\text{direct effect}} + \underbrace{\frac{\partial n^*}{\partial P_m}\frac{\mathrm{d}P_m}{\mathrm{d}L}}_{\text{income–price effect}} .$$

The direct effect holding goods prices constant is

$$\frac{\partial n^*}{\partial L}\Big|_{P_m} = \frac{\left(\frac{A_m P_m}{\alpha A_a T^{1-\alpha}}\right)^{1/(\alpha-1)}}{L^2} > 0 ,$$

so a fall in L by itself (with P_m fixed) would lower the urban labor share n^*.

We next focus on the general equilibrium effect. Although each polity is small and takes P_m as given when choosing s, a global labor-supply shock shifts the (system-level) equilibrium price $P_m(L)$ faced by all polities.[79] Solving the goods and factor markets jointly, the urban share n^* is strictly decreasing in L (for interior allocations):

$$\frac{\mathrm{d}n^*}{\mathrm{d}L} = -\frac{1-\alpha}{L} \cdot \frac{(\beta - n^*)(1 - n^*)}{\alpha(1-n^*) + (1-\beta)(1-\alpha)} < 0. \tag{10}$$

Hence a contraction in L raises n^* in our Stone–Geary environment. Intuitively, labor scarcity increases wages $w = \beta\underline{c}/(\beta - n^*)$ and the relative price $P_m = w/A_m$, which shifts demand toward urban goods and draws labor to the city.[80]

[79] Recall that we assume that each ruler treats P_m as parametric when choosing s_i because a single polity is small relative to the integrated market for modern goods. We solve for the *system-level* equilibrium price $P_m(L)$ induced by a common labor-supply shock, holding fixed the polity policy profile. In principle, aggregate support could also affect P_m through system-wide modern productivity; we treat this feedback as second-order under elastic external demand (or a small modern sector in the integrated market). We discuss the implications of endogenous price changes for aggregate changes in support in the text accompanying Lemma 1.

[80] The corner case $w \leq \underline{c}$ implies $n^* = 0$ (no demand for urban goods). Our comparative statics apply to the interior region $w > \underline{c}$, $0 < n^* < \min\{1, \beta\}$.

In sum, a contraction in the global labor force raises wages. Because preferences are non-homothetic, higher wages shift demand towards urban goods, so equilibrium P_m rises. In general equilibrium, the induced price increase from the income effect dominates the direct mechanical loss of labor, leading to an increase in the urban sector's labor share. This insight is consistent with historical evidence: for example, Voigtländer and Voth (2013) find that in the aftermath of the Black Death, the surge in wages and non-food demand more than compensated for the smaller workforce, causing urban sectors to expand. Bairoch, Batou, and Chèvre (1988, p. 253) note that the Black Death led to an increase in the urbanization rate in Europe – driven by the faster growth of urban populations after the shock, due to rural-to-urban migration (see also Abel 1978; Jedwab, Johnson, and Koyama 2022; Edo and Melitz 2023).

We now incorporate the ruler's strategic response to labor scarcity. The economic forces above feed into the support incentive Δ through two channels. On one hand, a higher P_m directly increases the value of urban output (and hence the ruler's potential tax revenue). On the other hand, a larger urban sector heightens the political risks to the ruler. To illustrate these opposing forces on the contested urban revenue component of Δ, hold L fixed and differentiate the urban channels of Δ with respect to P_m. Abstracting from the secure-rent term $Y_a^S - Y_a^B$, we differentiate the contested-urban component of Δ with respect to P_m. For analytical transparency, suppose the contested revenue function is locally linear in valued urban output, $R(\tilde{Y}_m) \approx \tau \tilde{Y}_m$, with $\tau = R'(\tilde{Y}_m)$, denoting the marginal tax rate on urban output. Using $Y_m^B = A_m L_m^B$ and $Y_m^S = \varphi A_m L_m^S$, we obtain:

$$\begin{aligned}\frac{\partial \Delta}{\partial P_m} \;=\; & \tau\, A_m \Big[\, \varphi\big(1-\rho^S\big) L_m^S \;-\; (1-q)\big(1-\rho^B\big) L_m^B \Big] \\ & +\; \tau\, A_m P_m \Big[\, \varphi\big(1-\rho^S\big) \frac{\partial L_m^S}{\partial P_m} \;-\; (1-q)\big(1-\rho^B\big) \frac{\partial L_m^B}{\partial P_m} \Big] \\ & -\; \tau\, A_m P_m \Big[\, \varphi\, L_m^S\, \rho_S'\, \frac{\partial \sigma_S}{\partial P_m} \;-\; (1-q)\, L_m^B\, \rho_B'\, \frac{\partial \sigma_B}{\partial P_m} \Big], \end{aligned} \tag{11}$$

where $q \equiv q(S^*, \kappa)$ is the equilibrium probability of losing to external competition if modernization is not pursued, and ρ_j' denotes the derivative of $\rho(\sigma)$ evaluated at $\sigma = \sigma_j$ (for $j = B, S$). The first term in (11) is a pure valuation effect: holding quantities fixed, a rise in P_m increases the numeraire value of a given urban tax base. The second term is the tax-base expansion effect: a rise in P_m reallocates labor toward the city, so $\partial L_m^j / \partial P_m > 0$, raising urban output and hence revenue. The third term captures the change in contestation risk associated with a larger city, operating through $\rho(\sigma)$ and $\partial \sigma_j / \partial P_m < 0$. Hence each component inside the square bracket is positive, and whenever the adverse political effect is sufficiently stronger under support—for instance, when the supported sector is both larger ($L_m^S > L_m^B$) and more productive ($\varphi > 1$)—the bracketed expression is positive and the third term in (11) is negative. In short, a global labor scarcity shock creates two opposing forces for the ruler: it boosts the potential urban revenue, but it also intensifies the internal threat to the ruler. Thus, under factor scarcity, equilibrium policies can diverge: some rulers (especially those facing intense external competition) will accommodate structural change, while others become more reluctant to do so.

Proposition 2 (Divergence under labor scarcity)**.** *There exists a finite threshold $\bar{L} > 0$ as in Proposition 1. For any $L > 0$ and $\kappa \in [0, 1]$, the symmetric equilibria of the support game*

satisfy:

(i) (Full support) *If $L > \bar{L}$, then for any $\kappa \in [0,1]$ we have $\Delta(S;\kappa,L) > 0$ for all $S \in [0,1]$, and the unique symmetric equilibrium is $S^* = 1$.*

(ii) (No support) *If $\Delta(1;\kappa,L) < 0$, then $\Delta(S;\kappa,L) < 0$ for all $S \in [0,1]$, and the unique symmetric equilibrium is $S^* = 0$.*

(iii) (Multiplicity) *If $\kappa > 0$ and*

$$\Delta(0;\kappa,L) < 0 < \Delta(1;\kappa,L),$$

then the support game has two symmetric corner equilibria, $S^* = 0$ and $S^* = 1$, separated by a unique interior equilibrium $S^\dagger(\kappa,L) \in (0,1)$ satisfying $\Delta(S^\dagger;\kappa,L) = 0$. Under monotone best-response dynamics, the corner equilibria are stable and the interior equilibrium is unstable. Moreover, $S^\dagger(\kappa,L)$ is strictly decreasing in κ.

Proof. Part (i) follows directly from Proposition 1. Proposition 1 establishes the existence of $\bar{L}$ such that $\Delta(S;0,L) > 0$ for all $S \in [0,1]$ whenever $L > \bar{L}$. For any $\kappa \in [0,1]$ and $S \in (0,1)$, we have

$$\frac{\partial \Delta}{\partial \kappa}(S;\kappa,L) = \frac{\partial q}{\partial \kappa}(S,\kappa)\left[1-\rho^B\right] R\big(\tilde{Y}_m^B\big) > 0,$$

because $q(S,\kappa) = 1-(1-S)^\kappa$ implies $\frac{\partial q}{\partial \kappa}(S,\kappa) = -(1-S)^\kappa \ln(1-S) > 0$ for $S \in (0,1)$. Hence $\Delta(S;\kappa,L) \geq \Delta(S;0,L) > 0$ for all $\kappa \in [0,1]$ and $S \in [0,1]$ when $L > \bar{L}$. Support is therefore a dominant strategy and the unique symmetric equilibrium is $S^* = 1$.

For part (ii), fix (κ,L) such that $\Delta(1;\kappa,L) < 0$. Lemma 1 implies that $S \mapsto \Delta(S;\kappa,L)$ is strictly increasing on $[0,1]$. Hence

$$\Delta(S;\kappa,L) \;\leq\; \Delta(1;\kappa,L) \;<\; 0 \qquad \text{for all } S \in [0,1],$$

so a ruler strictly prefers not to support even when all rivals support. The unique symmetric equilibrium is therefore $S^* = 0$.

For part (iii), fix (κ,L) with $\kappa > 0$ and $\Delta(0;\kappa,L) < 0 < \Delta(1;\kappa,L)$. By continuity and strict monotonicity of $S \mapsto \Delta(S;\kappa,L)$ on $[0,1]$ (Lemma 1), there exists a unique $S^\dagger(\kappa,L) \in (0,1)$ such that $\Delta(S^\dagger;\kappa,L) = 0$. The corner points $S = 0$ and $S = 1$ are equilibria because the best response at $S = 0$ is not to support, while the best response at $S = 1$ is to support. Under monotone best-response dynamics, upward-sloping best responses make the corner equilibria stable and the interior equilibrium unstable.

To establish the comparative statics in κ, differentiate the fixed-point condition $\Delta(S^\dagger(\kappa,L);\kappa,L) = 0$ with respect to κ:

$$\frac{\partial \Delta}{\partial S}\big(S^\dagger;\kappa,L\big)\,\frac{\partial S^\dagger}{\partial \kappa} + \frac{\partial \Delta}{\partial \kappa}\big(S^\dagger;\kappa,L\big) = 0.$$

For $S^\dagger \in (0,1)$, Lemma 1 gives $\frac{\partial \Delta}{\partial S} > 0$, and the calculation above implies $\frac{\partial \Delta}{\partial \kappa} > 0$. Hence

$$\frac{\partial S^\dagger}{\partial \kappa} = -\,\frac{\partial \Delta/\partial \kappa}{\partial \Delta/\partial S} < 0,$$

so the interior equilibrium $S^\dagger(\kappa, L)$ is strictly decreasing in κ. □

In words, labor scarcity (a low L) raises the marginal product of agricultural labor since land is fixed, and pushes up equilibrium wages. Higher incomes, in turn, shift demand toward urban goods via Engel's law, reflecting non-homothetic preferences. This general equilibrium price effect partly offsets the direct loss of urban labor, leaving the urban sector relatively larger and more valuable as a tax base. At the same time, a larger urban share increases political risk for the ruler, because a stronger city is more capable of contesting fiscal authority. These opposing forces create the possibility of divergent policy outcomes under labor scarcity.

Outside the multiplicity region, fundamentals pin down the unique policy and political competition does not select the outcome. Political competition matters for selection when both corner equilibria exist; in that region, its effect depends on the adjustment process specified below. Polities facing weak external rivals (low κ) are more likely to end up in the no-support regime described in part (ii), whereas those facing intense rivalry (high κ) are more likely to be in the full-support regime of part (i). When external political competition is weak, the economic gains from modernization are not sufficient to outweigh the heightened internal threat, so rulers optimally stick to no support. By contrast, when rivalry is intense, even a risk-averse ruler may be compelled to support the city: failing to do so would greatly increase the likelihood of losing the city to a rival.

The model further admits configurations in which both corner equilibria exist. For any (κ, L) such that $\Delta(0; \kappa, L) < 0 < \Delta(1; \kappa, L)$, full support ($S^* = 1$) and no support ($S^* = 0$) are symmetric equilibria, separated by a unique interior equilibrium $S^\dagger(\kappa, L) \in (0, 1)$. Under monotone best-response dynamics, the corners are stable and the interior equilibrium is unstable. Higher external fragmentation does not eliminate the low-support equilibrium, but Proposition 2(iii) shows that it lowers $S^\dagger(\kappa, L)$ and therefore expands the basin of attraction of full support under that adjustment process.[81] Small differences in the political environment can then tip otherwise similar societies toward different policies.[82]

B.3.3 Empirical Implications

The framework generates several testable predictions concerning the interaction of political competition and shocks to relative factor scarcity. Below, we examine both quantitative and historical evidence to assess the model's empirical predictions.

Prediction 1 (Pre-shock convergence in urban institutions and development)**.** *When labor is abundant ($L \geq \bar{L}$), Proposition 1 implies $\Delta(S; \kappa, L) > 0$ for all $S \in [0, 1]$. Rulers thus support urban development, irrespective of political competition. Empirically, this implies no significant variation in urban autonomy or growth trends across regions with differing levels of political competition prior to the labor supply shock.*

Before the shock, labor was abundant and support for urban development did not threaten rulers' agricultural rents. Abundant labor enhanced their capacity to risk losses induced by

[81] Other equilibrium-selection rules need not yield the same comparative static.

[82] This rationalizes how close polities can diverge following a common factor-scarcity shock. If post-shock fundamentals place them in the multiplicity region, a more fragmented political environment has a larger basin of attraction for full support under monotone best-response dynamics.

an endogenous labor reallocation to the urban sector and incentivized them to offer a "good deal" to cities (Bartlett 1995, p. 136; Higounet 1986, pp. 88, 255; Barraclough 1957, pp. 254, 274). Consistent with Prediction 1, we find no significant differences in trends or levels of urban autonomy and growth across high- and low-competition regions before 1350 (see Tables I and II, and Figures I, IV, VI, VII, and VIII).

Prediction 2 (Post-shock divergence in urban institutions and development)**.** *Following a sufficiently large negative labor-supply shock ($L < \tilde{L}$), Proposition 2 predicts that the political environment can become critical. When the shock places fundamentals in the multiplicity region $\Delta(0;\kappa,L) < 0 < \Delta(1;\kappa,L)$, both full support ($S^* = 1$) and no support ($S^* = 0$) are equilibria. Under monotone best-response dynamics, higher external fragmentation lowers the unstable threshold $S^\dagger(\kappa,L)$ and expands the basin of attraction of full support. The model therefore predicts a positive interaction between the labor-supply shock and political competition: following the shock, regions with more intense political rivalry are more likely to converge to full support, whereas regions with weaker rivalry are more likely to remain at no support.*

The Black Death provides a natural experiment for this prediction. The Black Death induced conflict over rents. The shock increased labor incomes and shifted demand toward urban products (via Engel's law), enhancing cities' economic importance (Abel 1978; Jedwab, Johnson, and Koyama 2022). Simultaneously, agricultural revenues collapsed, precipitating fiscal crises over secure rents for rulers (Kriedte 1981; Sablonier 1980; Blickle 1989; Graus 1969; Göttmann 1983; Hoffmann 1981; Störmer 1967; Lütge 1950). Cities became increasingly important as sources of fiscal revenue, but they also posed political risks through empowering cities and economic risks through the outside options they provided to rural workers (Blickle 1989; Anderson 1974). The resulting increase in the risk premium led to constitutional provisions banning city alliances and restricting migration into cities (e.g. the Golden Bull of 1356).[83] The structure of external political competition (κ) shaped the political response to the shock. Just west of the Elbe River, the cities of Lüneburg and Hannover capitalized on rulers' competition in the 1370s, formed an alliance, gained the right to dismantle castles, and secured self-governance rights. East of the Elbe, where political competition was low, rulers blocked urban development: in the 1400s the margrave of Brandenburg attacked and built a castle in Berlin, which was called "the bridle on ancient liberties" (Carsten 1954). Empirically, we document a sharp divergence in post-1350 urban autonomy and growth across high and low political competition areas (see Tables I and II,

[83] Blickle (1981, p. 32) synthesizes: "In the wake of the late medieval agrarian crisis, enormously accelerated (if not unleashed) by the fourteenth-century epidemics, agricultural prices fell so far that seigneurs, whose incomes derived almost exclusively from rents in kind, suffered grave losses. Much greater population losses in the towns both sharply reduced the ranks of consumers of agricultural products and led to urban labor shortages, a development which drove wages and prices of manufactures sky-high. Opportunities for wage-earning in the cities must have been so attractive to peasants that by the end of the fourteenth century they fled from the land in unprecedented numbers. The lords were led to fear even greater losses of income, because not only were incomes depressed by low grain prices, but there was a danger of insufficient labor to work the fields. They could only try to stem this flight from the land by expanding their powers over the peasants so as to make flight impossible. Their instrument was serfdom. Against this background of agrarian crisis, the massive emigration of peasant 'subjects' also threatened to destroy the political power of noble and clerical lords. Hence the double function of the establishment or intensification of serfdom: to preserve as much as possible of the economic basis of feudal lordship, and to sustain the lord's political dominion."

and Figures I and VII for the regional divergence; Table III for the time-varying implications of political fragmentation in general).[84]

Prediction 3 (Internal risk and urban collective action)**.** *Post-shock, in high-competition regions that maintained urban support, the model implies a higher internal contestation risk due to a stronger urban sector. We therefore expect more frequent urban collective action—such as city leagues, revolts, or autonomous lawmaking—against rulers in those regions.*

After the shock, Western cities formed alliances and engaged in large-scale conflict with rulers, such as the War of the Cities (1387). In our empirical analysis, we show that where political competition was higher, cities could more credibly threaten or undertake collective action, as we show in data on city alliances, conflicts with rulers, and the passage of autonomous laws (see Figure VII).

Prediction 4 (Factor mobility and the rent-loss channel)**.** *Under labor scarcity, the model predicts that a dominant constraint on modernization is the loss of secure rents from agriculture (the rent-loss channel). In low-competition environments, a ruler who withholds support for the city places a high value on retaining labor in farming to preserve Y_a; in other words, the shadow value of agricultural labor is high when the rent-loss term is large. By contrast, in high-competition environments, a ruler who supports the city comes to rely increasingly on urban revenue. Economic theory predicts that rulers in low competition environments would have a stronger incentive to attenuate this mechanism – primarily by weakening cities' role as an outside option for agricultural labor. (Lewis 1954; Acemoglu and Wolitzky 2011).*

In high-competition environments, cities gained autonomy and drew in mobile labor, limiting coercion in the countryside. Political competition arising from territorial fragmentation famously enabled southwestern German cities to break free from their feudal rulers; this increased villagers' outside options and limited the adoption of coercion in agriculture (Blickle 1989). In Eastern regions, by contrast, rulers restricted mobility and developed coercive agricultural estates. Historical research even suggests that there was regional divergence *within* territories such as Brandenburg that spanned the border (Carsten 1954; Enders 2008; Harnisch 2015; Cerman 2012). Using event-studies, we demonstrate that the development of coercive agricultural estates and laws restricting the mobility of labor respond negatively to increases in urban development with a lag (see Figures IX, X, and E2).

[84] The model also indirectly suggests that post-shock fiscal reliance shifts toward urban and indirect taxes in high-competition regions, while low-competition regions retain greater dependence on agricultural rents. This implies divergent fiscal compositions across regions after the shock. Suggestive historical evidence indicates that Western territories increasingly relied on urban excises and tolls, whereas Eastern rulers remain land-rent based (Droege 1966; Munro 2008; Malinowski and van Zanden 2017). "In the eastern principalities the prince remained *the largest land squire,* financing his court from in-kind estate revenues, whereas western rulers increasingly relied on tolls and excises" (Schmoller 1898, p.18). Further suggestive empirical evidence from capital markets aligns with the model's prediction. Figure C2 shows that, while pre-1350 urban interest rates on heritable and life annuities were similar across regions, a persistent East–West spread emerged in the late fourteenth century. Under the framework developed above, the post-shock premium on Eastern annuities may be suggestively interpreted as compensation for a higher probability that urban autonomy is less secure.

B.4 Discussion

B.4.1 Assumptions

We next discuss the model's underlying assumptions using historical evidence. While such evidence is necessarily qualitative and heterogeneous, a broad range of sources support the plausibility of the economic and institutional assumptions underpinning our framework.

Assumption 1 (Sectoral technologies)**.** *The traditional sector operates under diminishing returns due to a fixed factor like land, while the modern sector exhibits constant returns to labor.*

This distinction is central to our mechanism and standard in dual-sector models. The model requires that the two sectors differ technologically, with agriculture subject to diminishing returns and the modern sector able to expand without such constraints. Historically, this assumption reflects fundamental constraints: agricultural production relied on fixed land, so additional labor faced sharply declining marginal productivity, whereas urban activities such as manufacturing and services were replicable and could scale more freely. This logic underpins a wide class of models, including Voigtländer and Voth (2013), which rely on CRS in the modern sector and diminishing returns in agriculture. At the same time, the present framework requires only a weaker assumption. The stronger assumption of constant returns is convenient and historically plausible, but the comparative statics follow from the weaker requirement that the modern sector produces under less diminishing returns than those in agriculture.

Assumption 2 (Non-Homothetic Preferences)**.** *Household preferences feature a subsistence requirement for food and rising income shifts the composition of demand: in particular, higher incomes increase the budget share spent on urban goods (Engel's law).*

This assumption is crucial for the model's result that a negative labor supply shock can strengthen the urban sector. With homothetic preferences, a smaller labor force would unambiguously shrink the urban sector. Non-homothetic preferences generate an opposing force: as wages rise, demand shifts toward urban goods, raising the relative price of urban output and offsetting or even reversing the direct effect of fewer workers (Voigtländer and Voth 2013). This mechanism is general: quantitative evidence confirms that when incomes grow, the share spent on food declines in favor of urban products (Matsuyama 1992; 2019). This feature of our model captures the documented post-Black Death surge in non-agricultural consumption and urbanization.

Assumption 3 (Trade-off: fiscal gain and risk of urban autonomy)**.** *The model imposes a trade-off between the marginal fiscal revenue from increased urban output and two risks: an economic risk from labor reallocation out of the secure sector, and a political risk that a relatively empowered city may seek to challenge the ruler.*

This trade-off is central to our theory of why rulers might not support structural change. A ruler who improves urban institutions boosts the economy's total output and his potential tax base, but at the cost of ceding some direct control. Offering institutional support was a key commitment device for rulers seeking to attract settlers and raise urban

productivity, thereby expanding taxable output.[85] Over the twelfth and thirteenth centuries "The interest of rulers extended to the foundation of towns which might operate as centres of exchange, defence and revenue-collection. [...] there was an unprecedented wave of urban foundations in Central and Eastern Europe" (Rady 2016, p. 29).[86] While charters increased productivity and tax revenue, they also constrained rulers' authority. The rise of free and imperial cities illustrates how chartered privileges could evolve into full political independence. "Administrative autonomy and ample means were the keys to the towns' successes, which enabled them in course of time to extend their boundaries [...] until in many cases they developed into petty states ready to break free from princely jurisdiction" (Barraclough 1957, p. 324). Bartlett (1995, p. 178) synthesizes: "Princes wanted towns, because they were profitable, but they also harboured fears of them, because they might be unmanageable. [...] It was not until the late Middle Ages, however, that the princely assault on urban autonomy became widespread or effective. [...] In the High Middle Ages, however, princes were more interested in developing towns...than they were in restricting them."

Assumption 4 (Predetermined external political fragmentation)**.** *We treat political fragmentation as a predetermined structural feature of the environment.*

This simplifying assumption is motivated by several considerations. First, our primary objective is to isolate the mechanism linking political fragmentation to development around a shock to relative factor prices. Second, the central shock occurs in a period when fragmentation was relatively stable and began drifting only gradually thereafter. Political fragmentation in our study area was relative stable before 1350 and broadly decreased in five major epochs of centralization: post-Black Death; Protestant Reformation (1500s); Thirty Years' War (1600s); Napoleonic Invasion (1800s); and German unification (late 1800s).[87]

Assumption 5 (Political competition as outside options for cities)**.** *The model implies that political competition provides outside options for cities seeking policy support.*

The existence of multiple competing rulers enabled cities to credibly threaten exit. Rulers competed to attract and retain mobile merchants by offering protection in exchange for

[85]For example, rulers such as Nicholas of Mecklenburg-Werle actively promoted settlement through chartering: "we have committed the land of Parchim...to Christian colonists, inviting them from far and near. We have also built in that land a city, giving it rights and jurisdiction that are appropriate, beneficial and useful for the inhabitants...First, we have granted that free city with all rights to all its inhabitants" (Bartlett 1995, p. 180). Similarly, the 1247 Salzwedel charter extended legal protections to new populations from rival rulers: "we wish that whoever flocks to this new town, German peasants or Slavs, our tenants or those of anyone else, shall come before the judge of that town to answer before him concerning accusations raised against them" (Bartlett 1995, p. 310). Such evidence supports the assumption of competition among rulers over urban populations.

[86]More broadly, charters "effected a transfer of wealth or authority and the creation of new sets of relationships. Its possession, like the possession of a coin, gave power that was removed from either physical strength or the immediate possession of usable material goods." (Bartlett 1995, p. 287).

[87]While our framework treats external fragmentation as fixed, its logic implies a mechanism by which a ruler would seek to endogenously reduce fragmentation if able: lowering cities' outside options raises the value of withholding support and of further internal consolidation. After the Black Death, higher wages and stronger urban demand make the modern sector both more valuable and more politically threatening; in already concentrated settings, where the loss from abstaining is small, rulers therefore gain from engineering a more concentrated external environment to suppress defection pressure.

taxes and control (North 1981). Political fragmentation thus provided cities with outside options (Scheidel 2019; Jones 2003; Weber 1978; Landes 1998; Cox and Figueroa 2021). In Europe, the "parcellization of sovereignty... permitted the political autonomy of the towns" (Anderson 1974, p. 193). Historical evidence shows that the underlying mechanism was that merchants and urban populations could "take their business to another city in case of conflicts," which "determined the protective efforts of local and central governments" as "Europe's fragmentation meant that such a move would typically place them in another principality, creating a strong incentive for rulers to protect trade" (Gelderblom 2013, p. 18). Thus, "the political and legal fragmentation of premodern Europe that harmed trade on many occasions also created competitive pressure... made it increasingly easy for merchants to relocate at low cost when economic or political circumstances changed adversely" (Gelderblom 2013, p. 15). "In such states, a relatively small coalition of nominal subjects could equal the ruler's forces, while individuals, groups, and whole populations had abundant opportunities for defection to competing jurisdictions" (Tilly 1990, p. 21). This mechanism operated across urban German-speaking Europe, the Low Countries, and the Mediterranean (Gelderblom 2013, p. 205).

Political competition could operate through a military channel as well as through the outside option channel emphasized here. Our model is consistent with such a mechanism: competition over the modern sector and its revenues can be military. Losing to external rivals can be interpreted as leading to the loss of the modern sector.[88] Endogenous warfare choices are not modeled explicitly because the historical record shows no systematic regional differences and similar trends in conflict before the shock.

Assumption 6 (Factor mobility)**.** *The model assumes factor mobility across sectors and jurisdictions.*

Historical evidence highlights the importance of migration in providing outside options to both urban and agricultural populations in the long run (Gelderblom 2013; Bartlett 1995). In practice, late-medieval Europe featured numerous barriers to labor mobility. Such frictions would attenuate the rent-loss channel of the model by limiting workers' ability to exit in response to shocks. Precisely because imperfect mobility attenuates this mechanism, rulers had incentives to restrict labor mobility after the labor supply shock, including through the imposition of serfdom. Yet since urban labor and product markets provided outside options for agricultural labor (Acemoglu and Wolitzky 2011), rulers could only effectively enforce such restrictions after limiting the autonomy of cities. Thus, in regions that eventually moved toward serfdom (low-competition East), the model's assumption of free mobility breaks down, but that is itself an outcome of the divergence.[89]

Assumption 7 (Limited Extraction Capacity)**.** *The ruler's ability to extract revenue from the urban sector is constrained. The ruler cannot costlessly confiscate the entire urban output. In the model, this is captured by a concave revenue function $R(\tilde{Y}_m)$, which reflects diminishing returns or an upper bound to effective taxation.*

[88] The model does not explicitly account for annexations in which the entire territory, including the agricultural sector, is absorbed by a competing ruler.

[89] While serfdom is a longer-run institutional response whose incentives are suggested by the model's rent-loss and outside-option logic, it is not formally solved for within the current static equilibrium characterization.

If a ruler could levy arbitrarily high taxes (or expropriate urban production outright) without any backlash, even a ruler with no external competitors would always prefer maximizing Y_m. In such a scenario, the ruler's trade-off would vanish – modernization would be pursued unconditionally. In reality, premodern rulers faced strict constraints on taxation. Information and administrative barriers meant they could not accurately monitor all economic activity (Droege 1966). Tax schedules were often rigid, set by custom or bargaining with cities, rather than optimally tuned to current output (Yun-Casalilla and O'Brien 2012; Ames and Rapp 1977; Le Roy Ladurie and Goy 1980; Brown 2022). There was thus an effective cap on how much of the urban surplus the ruler could extract. By incorporating a revenue function $R(Y_m)$ that saturates (and by keeping the notional tax rate fixed), our model acknowledges these limits.

B.4.2 Prior Commercial Development

We now derive a comparative static examining how the support incentive varies with the prior level of urban development. Hold fixed the post-shock labor force L and common world price P_m, and vary A_m, the model's reduced-form shifter of prior commercial development. This is a local heterogeneity exercise: each polity remains a price taker, so a change in local A_m does not move the system-level price. Because local allocations and payoffs depend on A_m and P_m only through $A_m P_m$ (and $\varphi A_m P_m$ under support),

$$\frac{\partial \Delta}{\partial A_m} = \frac{P_m}{A_m} \frac{\partial \Delta}{\partial P_m},$$

where the right-hand side is the full derivative of (9), including the secure-rent term omitted from (11). The sign is not determined by the maintained assumptions: a higher A_m expands the valued urban tax base but also strengthens the city and raises internal contestation risk.

A conditional extensive-margin result follows under an additional monotonicity condition. Suppose $\Delta(0; \kappa, L, A_m)$ and $\Delta(1; \kappa, L, A_m)$ are continuous and strictly increasing in A_m, and each crosses zero once. For $\kappa > 0$,

$$\Delta(1; \kappa, L, A_m) - \Delta(0; \kappa, L, A_m) = \left[1 - \rho^B\right] R\big(\tilde{Y}_m^B\big) > 0.$$

Let $\underline{A}_m$ solve $\Delta(1; \kappa, L, A_m) = 0$ and $\overline{A}_m$ solve $\Delta(0; \kappa, L, A_m) = 0$. Then $\underline{A}_m < \overline{A}_m$: no support is the unique equilibrium for $A_m < \underline{A}_m$, both corner equilibria exist for $A_m \in (\underline{A}_m, \overline{A}_m)$, and full support is the unique equilibrium for $A_m > \overline{A}_m$. At an interior equilibrium, if $\partial\Delta/\partial A_m > 0$, then

$$\frac{\partial S^\dagger}{\partial A_m} = -\frac{\partial \Delta / \partial A_m}{\partial \Delta / \partial S} < 0.$$

Prior commercial development therefore lowers the coordination threshold and political structure can affect the selected policy in an intermediate range.

We next map this result to the difference-in-differences estimand. Suppose both political environments support the city before the shock, as in Proposition 1, while after the shock a concentrated polity selects the baseline regime and a fragmented polity selects support. Conditional on A_m, the concentrated-minus-fragmented difference-in-differences effect for

outcome y is then

$$D_y(A_m) \equiv y^B - y^S,$$

evaluated at post-shock L and P_m.

For a continuous proxy, $\partial D_y(A_m)/\partial A_m$ is the population analogue of the triple-interaction coefficient. Let $K \equiv \alpha A_a T^{1-\alpha}$, $r \equiv 1/(1-\alpha)$, and denote agricultural employment by

$$\ell_a^B(A_m) \equiv L(1-n^B) = \left(\frac{K}{A_m P_m}\right)^r, \qquad \ell_a^S(A_m) = \varphi^{-r}\ell_a^B(A_m).$$

For the urban labor share,

$$D_n(A_m) = -\frac{1-\varphi^{-r}}{L}\ell_a^B(A_m) < 0, \qquad \frac{\partial D_n}{\partial A_m} = -\frac{r}{A_m}D_n(A_m) > 0.$$

Thus the negative post-shock gap in the urban labor share can become smaller as prior urban productivity rises — a prediction about an allocation we do not observe, and one that runs opposite in sign to the amplification conjecture. For valued urban output,

$$D_{\tilde{Y}}(A_m) = -P_m A_m \left[(\varphi-1)L + \left(1-\varphi^{-\alpha/(1-\alpha)}\right)\ell_a^B(A_m)\right] < 0,$$

and

$$\frac{\partial D_{\tilde{Y}}}{\partial A_m} = -P_m\left[(\varphi-1)L - \frac{\alpha}{1-\alpha}\left(1-\varphi^{-\alpha/(1-\alpha)}\right)\ell_a^B(A_m)\right],$$

whose sign is ambiguous. The negative output gap widens with prior development if and only if

$$(\varphi-1)L > \frac{\alpha}{1-\alpha}\left(1-\varphi^{-\alpha/(1-\alpha)}\right)\ell_a^B(A_m).$$

Because P_m is held fixed, physical and valued urban output have the same slope sign.

The framework therefore does not sign a globally monotone interaction between the shock, political structure, and prior commercial development. Prior development determines whether political structure is pivotal. Conditional on that range, the policy gap is locally constant, the urban-share gap narrows with A_m, and the valued-output gap can widen or narrow. We accordingly interpret the triple interaction in Appendix Table D13 as a descriptive local slope. We note that the border design, which compares cities with similar prior development, documents divergence between cities matched on this dimension, and so suggests that differential prior commercialization is not what drives the post-1350 gap.

B.4.3 Equilibrium Selection and Expectations

The framework does not itself select between the two corner equilibria. Under monotone best-response dynamics, fragmentation lowers the unstable threshold and expands the basin of attraction of full support; with dispersed initial conditions, this makes full support more likely. Under other selection rules, however, the outcome may depend on expectations or initial conditions in ways the model leaves open. An account in which Eastern rulers and cities entered the post-plague period already coordinated on repression—for example, as a legacy of the colonization process and for reasons other than political competition—can therefore fit the same equilibrium allocation. This corresponds to regionally correlated rather

than dispersed initial conditions, and we cannot definitively rule it out.

A few observations bound this concern. First, whether expectations constitute an alternative depends on their source. If beliefs about repression and support were themselves shaped by the concentration of political authority, as the framework implies, since what each ruler forecasts is the conduct of his rivals, then expectations are the channel through which political structure operates rather than an alternative to it. An alternative requires that beliefs derive from something besides the political structure we study. The colonization process is the natural candidate. That account, however, must be consistent with the competitive character of Eastern settlement, in which rulers conceded tax privileges, heritable tenure, and wide-ranging urban freedoms to attract colonists in rivalry with one another. This makes it unlikely that Eastern cities expected repression before the Black Death. However, it is plausible, and consistent with our proposed mechanism, that Eastern cities understood that a major shift in relative prices might precipitate repression. Further, the comparison of cities held by the same ruler on opposite sides of the boundary removes ruler-level explanations, such as fiscal capacity, administrative practice, dynastic strategy, and preferences for repression, which are held fixed by construction. However, it does not hold expectations fixed: a ruler holding territory on both sides of the boundary faces different rival sets on each side.

The location of the threshold separating the equilibrium regions is likewise not identified by the model alone. The observed distributions of political fragmentation make it plausible that the two regions sat on opposite sides with minimal overlap in the distributions (Figure III).

B.4.4 Related Literature

Our framework complements research in the political economy of development by nesting models of interstate competition and domestic political constraints in a two-sector economy to study endogenous structural change. Competition among states is widely viewed as a fundamental driver of development (Besley and Persson 2010; Tilly 1990; North 1981).

Related research emphasizes internal political barriers to development including incentives to delay structural change to preserve control (Acemoglu and Robinson 2006; Bates 1981).[90] Combining these two forces in a two-sector economy allows us to characterize how political incentives to support structural change interact with global factor endowments and relative prices. We find that interstate competition is not an unconditional driver of development: under factor abundance, states may support structural change irrespective of the external political environment, while under global factor scarcity, political competition can make modernization strategically decisive.

Europe's political and economic history motivates our mechanism. The continent was

[90] While our model builds on the core insight of Acemoglu and Robinson's (2006) – that elites may delay development to preserve political control — it differs along several dimensions. First, their model is a reduced-form, single-sector framework with exogenous productivity shocks and no explicit sectoral structure. In contrast, we develop a two-sector general-equilibrium model with endogenous labor allocation, non-homothetic preferences, and sector-specific technologies, allowing us to study structural transformation as an economic process shaped by prices, endowments, and political incentives. Second, whereas Acemoglu and Robinson (2006) model political threats purely internally (via a "replacement effect"), we introduce an explicit strategic model of external political competition — capturing how rulers may lose control to rivals if they fail to modernize.

exceptionally politically fragmented, yet it experienced some of the earliest and most sustained episodes of commercial expansion in history. Canonical accounts resolve this tension by emphasizing the development of state capacity due to military competition (Tilly 1990; Bockstette, Chanda, and Putterman 2002). In this view, centralization solves commitment problems that otherwise deter economic investment or alternatively permits greater power to coerce favorable economic conditions. Our model highlights a complementary channel operating through competition over factors of production. When labor was abundant, rulers optimally set up institutions supporting structural change even without external pressure, because secure rent losses in agriculture were limited and the urban tax base scaled with city size. Under labor scarcity, modernization raised both economic returns and political risks. In this setting, external competition provided mobile factors with outside options, making modernization strategically decisive.

The model provides a framework that rationalizes a range of empirical regularities in European development. First, it explains why there was convergence in chartering or urban institutions across political environments during periods of labor abundance: when fiscal trade-offs were favorable, rulers uniformly supported towns. Second, it accounts for the observed divergence in institutional and economic outcomes after the Black Death. Areas with similar endowments and initial conditions but different levels of political competition began to diverge, as only the latter maintained support. Third, it clarifies how the decline of urban development preceded and enabled the rise of coercive agricultural in the East.

We do not claim to offer a definitive explanation for these patterns. Political development is multifaceted, and growth was shaped by a wide range of strategic, economic, and institutional forces. However, the model presented here isolates a mechanism that is both plausible and supported by quantitative evidence: that fragmentation of power generated competition for factors of production and sources of revenue, and that this competition constrained rulers' actions under adverse shocks that induced distributional conflict.

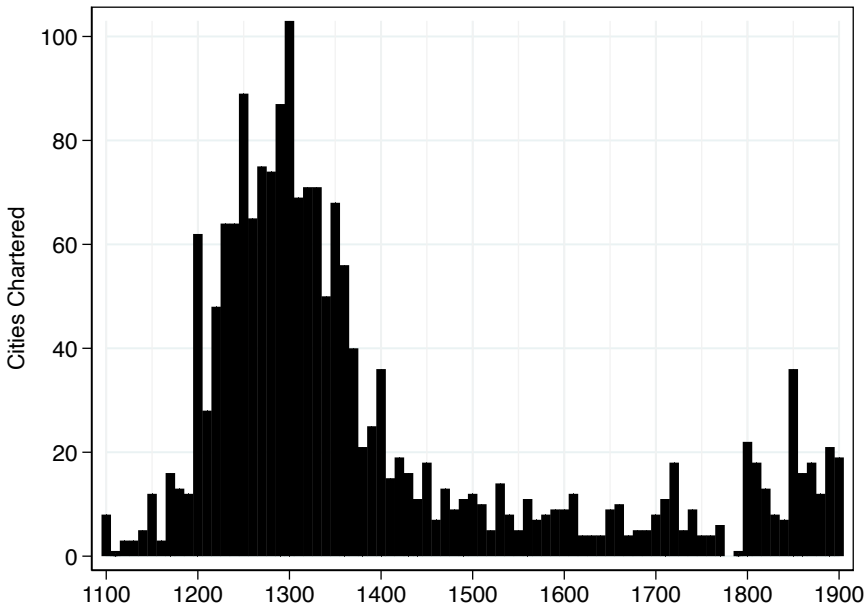
C History

C.1 City Institutions and Urban Development

The development of self-governing cities was a central component in the transformation of economic and social life in medieval Europe. Self-governing cities shaped the development of modern law; fostered the development of trade networks, the division of labor, and financial innovations; supplied capital to lords and the rural sector; and broadly contributed to political and economic development (Isenmann 2014; Chilosi, Schulze, and Volckart 2018; Hohenberg 1995). Self-governing cities set up administrative apparatuses which were forerunners of and to some extent models for, more modern states (Von Gierke 1873).

Europe's urban sector grew dramatically in the Middle Ages, reflecting the larger Commercial Revolution transforming European society. During this period, an enduring structure of urban locations was established in central Europe. Figure C1 traces this development through the legal chartering of German cities, which was concentrated between the 13th and 15th centuries, the period at the heart of our study.[91]

Figure C1: Urban Chartering



This graph shows the number of cities that were granted legal status as cities through the grant of a city charter in 10-year time periods from 1100 through 1900. City charters are recorded in the *Deutsches Städtebuch* and coded by Cantoni (2020).

Research on cities emphasizes key dimensions of political and economic development that define types or models of urban development in Europe.[92] There is broad agreement that the core dimensions of urban autonomy include: (i) commercial activity, (ii) institutions of

[91] We note that cities defined as large settlements involved in production and exchange existed prior to this period of chartering in both the East and West, and that chartering by itself did not imply that settlements were large or economically important (Bartlett 1995; Weber 1978).

[92] There is some distinction or slippage between our use of the term "model" and the "ideal type" in Max Weber's work, which we bracket provisionally.

self-government with independent selection procedures that were capable of producing acts of political autonomy, and (iii) a fortification. Our analysis examines all of these dimensions, with the exception of fortification. Thus, Henri Pirenne observes:

> "In spite of innumerable differences of detail, the towns of the Middle Ages presented everywhere the same essential features, and the same definition may be applied to one and all. We may formulate this definition by saying that the medieval city was a fortified agglomeration inhabited by a free population engaged in trade and industry, possessing a special law, and provided with a more or less highly developed jurisdiction and communal autonomy. The city enjoyed immunities that did not exist in the surrounding countryside." (Pirenne 1956, p. 204)

In his classic discussion of the ideal-typical "Western" medieval city, Max Weber notes:

> "To constitute a full urban community the settlement had to represent a relative predominance of trade-commercial relations with the settlement as a whole displaying the following features: 1. a fortification, 2. a market, 3. a court of its own and at least partially autonomous law, 4. a related form of association [frequently based on an oath], and 5. at least partial autonomy and autocephaly, thus, also, an administration by authorities in the election of whom the burghers participated."(Weber 1978, p. 1226)

Institutions of urban self-government were endogenous, as we discuss in the main text. Before cities developed autonomy, they were largely subject to external feudal rulers. Frequently, cities developed at older sites of production and exchange as and where the legal and economic needs of the merchant population grew (Pirenne 1956). As the Commercial Revolution expanded the urban sector from the 10th century onward, cities' incentives — and capacity — to bargain with rulers intensified, leading to constitutional documents that secured urban liberties and granted governance institutions to promote revenue growth (Lopez 1976; Cantoni and Yuchtman 2014; Angelucci, Meraglia, and Voigtländer 2022; Engel 1993; Kuhn 1975; Stoob 1956).

C.2 Regional Differences in Political Structure

Political structures differed across our study area: west of the Elbe–Saale line, rule fragmented across numerous jurisdictions; east of the line, authority was more consolidated. This difference originated between the ninth and twelfth centuries and reflects the Elbe–Saale's role as the frontier of the Carolingian Empire in the ninth century (Smith 1995 p. 177; Hardt 2001).[93]

[93]It is a stylized fact that Elbe River traces a dividing line in economic history. Szűcs (1983, pp. 131-2) writes: "Where do the internal borders of Europe run? One very pronounced line runs southwards across Europe from the lower course of the Elbe-Saale." Perkins (1986, p. 287) notes, "a sharp contrast, emerging from the later Middle Ages... east and west of the River Elbe and its tributary the Saale, which together formed a line bisecting Germany." Ogilvie (1996, p. 122) observes, "The single most important demarcation in German historical geography is the river Elbe... in theory, the Elbe divided the 'advanced' German societies of the west from the 'backward' ones of the east." However, there was overlap and variation in

In the West, the collapse of the Carolingian Empire precipitated a process of political fragmentation. The initial fracture occurred with the Treaty of Verdun in 843, which partitioned the empire among Charlemagne's heirs. The successor kingdom of East Francia lacked a strong central authority, leading to a devolution of power to regional power holders (Reuter 1991). This process was accelerated by two concurrent shocks. First, recurrent dynastic crises and internal power struggles among Carolingian successors continuously eroded the monarchy's power (Fried 2015). Second, severe and persistent Viking incursions from the northwest diverted royal resources and attention away from the eastern frontier, compelling local dukes and counts to organize their own defense and thereby consolidate their regional authority (Barraclough 1957). The result was a polycentric political landscape in the West characterized by local power structures that resisted centralization for centuries.

East of the Elbe-Saale, a contrasting dynamic of political consolidation unfolded from the 10th to the 12th centuries (Bartlett 1995; Barraclough 1957; Ebert and Kötzschke 1937; Kuhn 1956). The German colonization of territories East of the Elbe has been described as "one of the great facts of European history" and a "laboratory" that offers "one of the most fascinating experiences which social scientists can dream of" (Bloch 1934, p. 598 – our translation). Starting in the 1000s, this process transformed "the political and social substructure of German life," as "[t]he rising territories of East colonial Germany rapidly outstripped the politically disjointed West" (Barraclough 1957, pp. 251, 279).

Military campaigns began expanding and consolidating territories beyond the Elbe after the fall of the Carolingian Empire in the 9th century and mass migration into the East by German, Dutch, and Flemish settlers was set in motion at the end of the 1000s (Higounet 1986, p. 85). Barraclough (1957, pp. 262-263) observes that Adolf of Holstein's conquest of Wagria in Holstein (1143), "was a model for the future, showing for the first time how, with determination and systematic planning, an area of some two or three hundred square miles could be covered with new villages," and that Henry the Lion, Duke of Saxony, initiated the "Wendish crusade" (1147) which "with its attendant devastation and depopulation, created the opportunity for organized, systematic colonization and ushered in a period of intensive settlement, the effects of which were felt all along the line of the Elbe."

Motivated by the returns to economic development in their territories, Eastern lords supported colonization and migration (Higounet 1986, pp. 88, 285). Margraves in the East posted recruiting agents and advertisements in the West to attract migrants. Eastern lords promised, "good and spacious land, which is fruitful, full of fish and meat, good for pasture" (Bartlett 1995, p. 136), and offered tax exemptions, favorable rents, reduced labor obligations, secure property rights, and institutions securing communal self-government for settlers. Before the Black Death, "all parties competed for the services of German settlers" and "competition for settlers was so great…that the demand for a time far outran the supply" (Barraclough 1957, pp. 254, 273).

The colonization process required capital and organizational resources to attract migrants and set up governance infrastructure. Rulers used existing charters from the West as blueprints. These charters "were western imports" and "essentially sovereign imports" (Kuhn 1975, pp. 238-9; Conrad 1955, p. 10). Historians indicate that the homogeneity of city-charters in the East, which we document in our quantitative analysis, is evidence of

development on both sides of the Elbe (Cerman 2012). Saxony and part of Thuringia were colonial Eastern territories, but developed with greater political fragmentation and a more "Western" political economy (Harnisch 2015, p. 41), which we use to test our theory below.

the process through which urbanization developed in the East in more concentrated colonial territories and with direct support from rulers (Kuhn 1956, p. 85).

Charters in the Colonial East conferred the same privileges as charters found in the West (Wunder 1978) and their introduction "contributed to [the city's] convergence to the Western level" (Ludat 1958, p. 549 – in our translation). In general, the consensus among scholars is that economic development trends were similar across regions within historic Germany before the Black Death and that these trends were independent of the nature of the founding process (Czok 1973, pp. 303f; Czok 1963, p. 33). Further, leading urbanists argue that absent the demographic shock, urbanization in Eastern territories, "would have developed in a straight line" (Isenmann 2014, p. 211 – our translation). Our empirical analysis provides the first quantitative evidence that Eastern and Western cities developed on a similar trend before the Black Death. However, a stronger degree of political concentration left open the possibility – and implicitly lowered the price – of subsequent lordly intervention. In the vocabulary of North (1981) the "prices" in politics varied, reflecting the initial institutions.

While the political process was distinctive in Eastern territories, the process of city chartering also varied within the East and was conditioned by differences in the fragmentation of political rule. A mix of different city charters types (or "families") prevailed in Saxony, Thuringia, and Western Brandenburg including the Altmark and Prignitz. There, cities developed in a setting in which the exercise of lordly power was still constrained by local competition among lords. In contrast, in the more consolidated territories of Central and Eastern Brandenburg, Mecklenburg, and Pommern, towns were founded within a short period of time in a less fragmented political geography and exhibit greater homogeneity in their legal institutions (Schulze 1966, pp. 349-50; Menzel 1975, pp. 134-5).

There is some debate over the nature of the incentives facing settlers. Some historians argue that population pressure in the West pushed migrants Eastwards (Higounet 1986, p. 38; Bartlett 1995, p. 136). Other historians emphasize the role of pull-factors and in some cases dispute the claim that Western Germany was overpopulated (Berend 2016, p. XXIV; Zernack 1975, p. 792; Epperlein 1960, pp. 14-5). This debate notwithstanding, it is clear that "many colonists were not landless men" (Bartlett 1995, p. 138) and that relocation had to be attractive enough to induce migration. The settlers from the West brought agricultural and manufacturing innovations and techniques to Eastern territories, including improved versions of the plow and the scythe, the iron-hammer, the measuring cord, the windmill, and the three-field system (Kuhn 1959, p. 177; Bartlett 1995, p. 152). More generally, the process of migration and colonization took place in and reflected the larger context of economic dynamism associated with the Commercial Revolution.

C.3 Historical Evidence on Incomes

Our investigation is motivated in part by the limited nature of the existing data on incomes and city population in historic Central Europe, which do not permit the temporal and spatial comparisons at the heart of key economic debates and our quantitative analysis.

Historical research indicates that the Black Death led to higher real wages, and that wage movements were initially similar in the East and West. Rich and suggestive but fragmentary evidence on real wage movements is provided by Abel (1978), Achilles (1991, p. 3), Isenmann (2014, p. 86), Kullak-Ublick (1953, p. 126), Schulz (1985), and Wesoly (1985). The patterns of real incomes across regions are discussed by Sundhaussen (1990, p. 53), Abel (1953, pp.

393-95), and Aubin (1910, p. 98).

Systematic quantitative data on wages and labor incomes in historically German-speaking Europe are restricted to a small handful of cities and the period after 1350. Abel (1978) and Kullak-Ublick (1953) gather data from Frankfurt am Main and Göttingen, respectively, that start in 1400. Allen (2010) provides data from Augsburg, Gdansk, Munich, and Leipzig starting in 1500. Pfister (2017) assembles data from Hamburg, Rostock, Speyer, Würzburg, and Xanten beginning in the 1400s and early 1500s. Volckart (2018) is exceptional in gathering archival data from Lübeck starting in the 1350s.

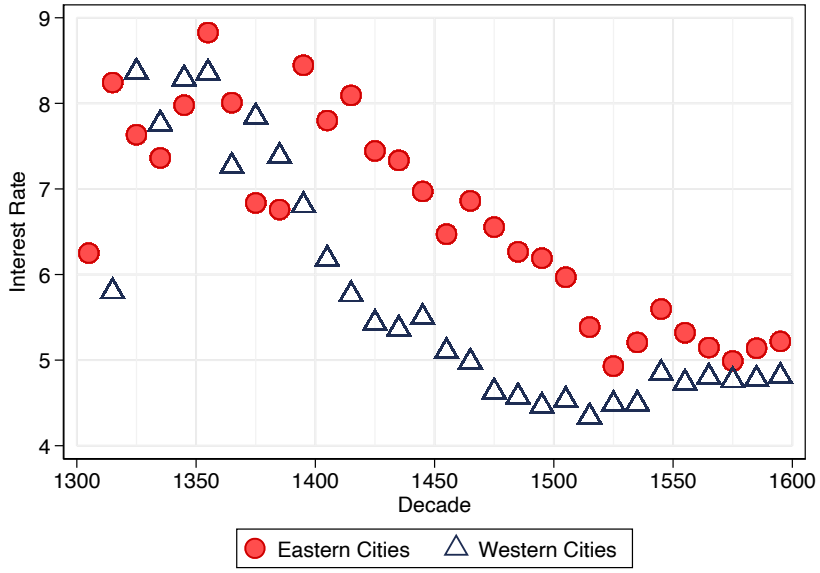
Narrative evidence further indicates that relative factor incomes changed following the Black Death: labor incomes rose relative to incomes derived from owning land or capital.

Before the Black Death, feudal rents were lower in the East (Schoer 1976, p. 35). Settlers in the East faced few or no labor obligations, held land with favorable hereditary rights, and were personally free (Carsten 1954, p. 88; Aubin 1966, p. 468; Blickle 2003, p. 301; Melton 2015, p. 9; Thausing 1912, p. 487; Hagen 1985, pp. 83-84; Kaak 1991, pp. 374-75).

The Black Death initiated what has been described as the "golden age of wage labor" (Abel 1978) and, simultaneously, a crisis for social groups dependent on feudal land rents. Higher labor costs and lower grain prices depressed agrarian profits (Achilles 1991, p. 3; Helbig 1974, p. 231; Cerman 2012, p. 72; Hagen 1985, p. 89). Ultimately, coercive labor institutions were developed in the East, and the timing of their introduction coincided with shifts in income back towards rural landowners in the region (Sundhaussen 1990, pp. 54-55). From the late 1500s, labor dues of three or more days a week were common for tenant farmers ("serfs") in East Holstein, Mecklenburg, Western Pomerania, and Eastern parts of Brandenburg (Cerman 2012; Melton 1988, p. 322; Harnisch 1986, p. 253; North 1999, pp. 53-4). By this time, labor dues had largely disappeared in the West (Blickle 2003, p. 239).

Evidence on interest rates also sheds light on how returns to different factors shifted across time and space. Figure C2 summarizes data on interest rates on heritable and lifetime annuities issued by Eastern and Western cities from Chilosi, Schulze, and Volckart (2018) and Neumann (1865). The data reveal little if any difference between Eastern and Western cities before 1350. However, interest rates diverge in the late 1300s. While interest rates for Western cities experienced a sharp decline after the Black Death, interest rates for Eastern cities decreased at a slower rate until the late 1400s. The level of and wedge between Eastern and Western interest rates could reflect multiple factors, including default risk and related considerations involving the assets that served as underlying collateral, including city property holdings (Chilosi, Schulze, and Volckart 2018). We interpret the data cautiously, but as providing suggestive evidence of differences in the public finances and political economy of Western and Eastern cities dating from after the Black Death.

Figure C2: Interest Rates for City Governments



This figure plots mean interest rates by region-decade for urban governments borrowing across 35 cities. Data are from Chilosi, Schulze, and Volckart (2018) and Neumann (1865).

D Robustness

D.1 Cross-Sectional Differences

D.1.1 Political Fragmentation

Our main analysis measures local political fragmentation in 100-kilometer neighborhoods. Table D1 shows that the pattern of regional differences in political fragmentation is robust to using alternative measures and different definitions of neighbors. We find clear differences across regions in the entire sample and along the border when we construct the fragmentation measure to include only neighbors on either side of the river, when using all neighbors within a grid cell, and when considering the ten and twenty-five closest neighbors.

The finding that political fragmentation varied across regions holds across different samples and models. It holds for the full sample of cities (Table D1, Panel A), for a subsample of cities within 100 km of the border (Panel B), and when including grid-cell (Panel C) or ruler fixed effects (Panel D) for the border sample.[94]

Figure D1 documents variation in political fragmentation at the border. The difference in political fragmentation at the border is consistent with historical research which indicates that the Elbe was indeed a dividing line between a more politically fragmented West and a more centralized East (Barraclough 1957), and motivates our second comparison between closely neighboring cities in the politically concentrated East and fragmented West. The standard measure varies smoothly through the border because neighboring cities on opposite banks share most of the area over which the index is calculated; the regional difference is a difference in means rather than a local jump. When we construct the fragmentation measure to include only neighbors on a city's own side of the river, the measure shifts sharply at the border.

Figure D2 plots the underlying territorial data and the spatial distribution of political fragmentation.[95]

D.1.2 Black Death

An important question for our analysis is whether there were regional differences in the Black Death shock. Our main analysis shows there were limited if any regional differences in the number of city-level plague outbreaks along the border and controls for these differences. In this section, we first discuss our city-level plague exposure measure, including measurement error. We then test for regional differences in the intensity of the shock, measured by plague mortality.

[94] We confirm the significant regional difference in political fragmentation accounting for the possibility of spurious inference due to strong spatial dependence, implementing the low-frequency spatial-unit-root diagnostics and the LBM-GLS correction of Müller and Watson (2024), using the `spur` commands provided by Becker, Boll, and Voth (2025) in Appendix D.2.

[95] The polygons (from Cantoni (2020)) represent rulers' contiguous claims over cities and not the precise locations of historical borders. As a result, territorial borders may understate *de facto* concentration. To address this, we also plot standardized measures of political fragmentation.

Table D1: Robustness of Regional Difference in Political Fragmentation

	A: All Cities			B: Within 100 km Border		
	β: Diff.	SE	Mean	β: Diff.	SE	Mean
Fragmentation (100km)	-0.20***	(0.04)	0.85	-0.09***	(0.02)	0.88
Fragmentation Within Region (100km)	-0.22***	(0.03)	0.85	-0.13***	(0.02)	0.86
Fragmentation (Grid Cell)	-0.21***	(0.04)	0.79	-0.08***	(0.03)	0.82
Fragmentation (25 Neighbors)	-0.20***	(0.04)	0.72	-0.09***	(0.03)	0.76
Fragmentation (10 Neighbors)	-0.20***	(0.04)	0.64	-0.09***	(0.03)	0.67
	C: 100 km: Grid-cell FE			D: 100 km: Ruler FE		
	β: Diff.	SE	Mean	β: Diff.	SE	Mean
Fragmentation (100km)	-0.05***	(0.01)	0.88	-0.06***	(0.01)	0.88
Fragmentation Within Region (100km)	-0.11***	(0.03)	0.86	-0.09***	(0.02)	0.86
Fragmentation (Grid Cell)	-0.04**	(0.02)	0.82	-0.08***	(0.02)	0.82
Fragmentation (25 Neighbors)	-0.06**	(0.02)	0.76	-0.06**	(0.03)	0.76
Fragmentation (10 Neighbors)	-0.06**	(0.02)	0.67	-0.04*	(0.02)	0.67

This table presents regression estimates examining the robustness of the observed differences in political fragmentation between Concentrated Eastern and Fragmented Western cities c. 1348, using models that mirror those in Figure IV. Panels are organized by counterfactual: A. studies all cities, B. focuses on cities within 100 km of the border, C. examines border cities controlling for grid-cell fixed effects (one-degree cells), and D. analyzes border cities controlling for fixed effects for the ruler in 1348. "Fragmentation (100km)" measures political fragmentation considering neighbors within 100 kilometers without imposing regional boundaries. "Fragmentation in Region (100km)" measures political fragmentation considering neighbors within 100 kilometers within regions. "Fragmentation (Grid Cell)" considers all neighbors within a 100-kilometer grid cell. "Fragmentation (10/25 Neighbors)" considers the ten and twenty-five closest neighbors, regardless of distance. We also provide the mean of the variable as a general reference. Standard errors in parentheses allow for spatial correlation within 50 kilometers following Conley (1999).

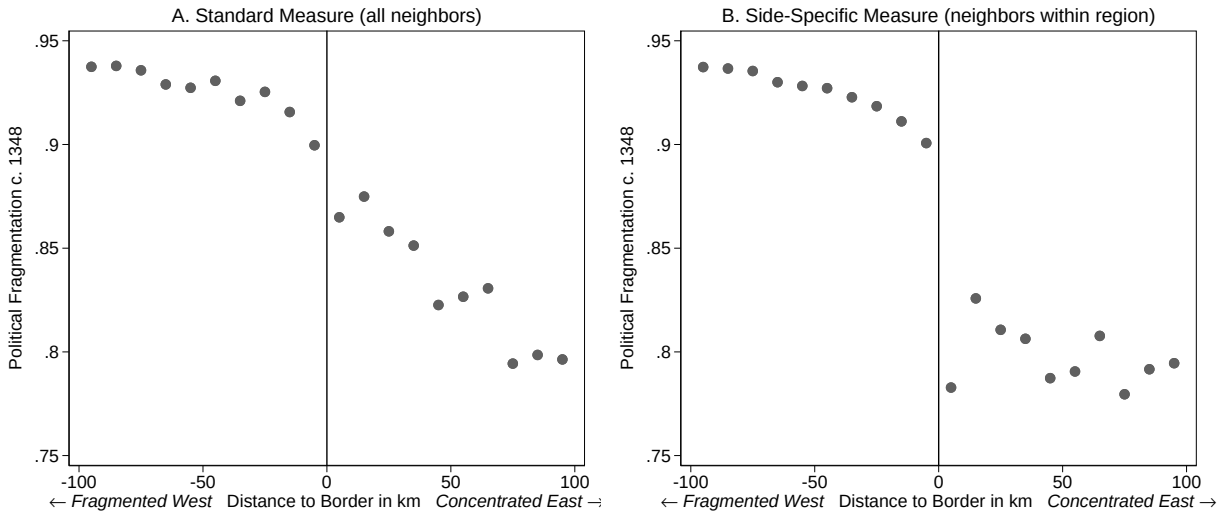
D.1.2.1 Measurement Error

Several further pieces of evidence shape our our analysis as it relates to our measures of city-level variation in exposure to the Black Death, which counts the number of city-level plague outbreaks 1348-51 recorded in the *Städtebuch*.

First, the relationship between our measure of plague exposure and development is informative about the potential role of measurement error in our analysis. In Table D2 below we present our core results (from Tables I and II) showing the parameter estimates on plague shocks. For measurement error to explain our estimated "East × Post" effect, one of two scenarios would be required to hold. In the first scenario, the "missing" outbreaks would have to be concentrated in the West and to have a *positive* association with post-shock development. However, the hypothesis that observed and "missing" plague outbreaks have opposite signed relationships with subsequent development is, we would argue, highly unlikely. In the second scenario, a negative relationship between local plague outbreaks and post-shock development holds for unobserved outbreaks, but it would be necessary for the "missing" outbreaks to both (i) be concentrated in the East and (ii) have a more immediate (level) impact on construction than observed outbreaks, which we also argue is unlikely.

Second, the fact that local plague outbreaks *negatively* predict subsequent local

Figure D1: Political Fragmentation and Distance to the Border



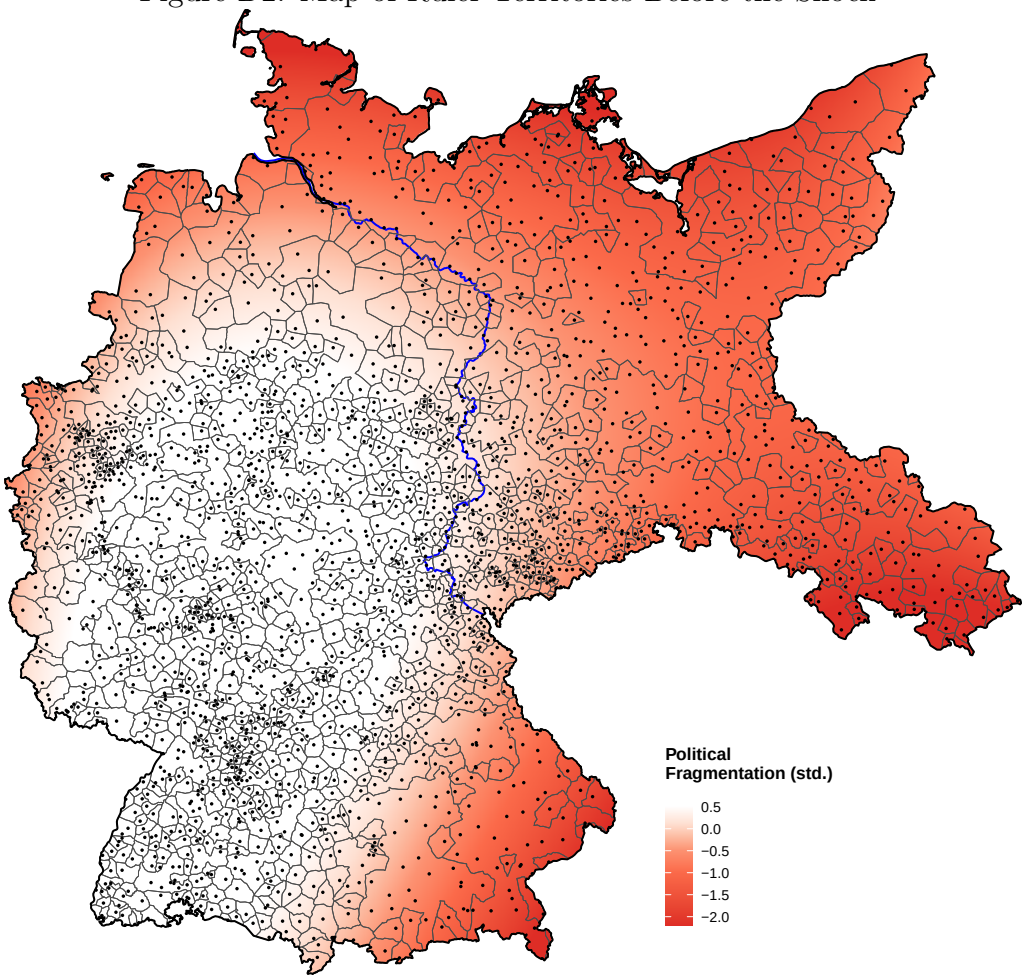
This figure plots binned means of political fragmentation c. 1348 against distance to the Elbe-Saale border (10-kilometer bins, 343 Eastern and 342 Western cities within 100 kilometers). Panel A uses the standard measure, which aggregates rulers within a 100-kilometer radius: because neighboring cities on opposite banks share most of the area over which the index is calculated, the measure varies smoothly through the border and the regional difference appears as a difference in means. Panel B uses the side-specific measure, constructed from neighbors on a city's own side of the border, which shifts sharply at the line.

development trends is interpretively significant. First, this finding is at odds with the hypothesis that the reason Western regions experienced greater "political development" is because they were exposed to worse shocks.[96] Against this hypothesis, we find that (A) the Western advantage in political development did not reflect local variation in the Black Death and (B) where the Black Death actually delivered clear and differentially notable local shocks, political developments leading to the institutionalization of city self-government were retarded. Second, the *negative* city-level relationship between local shocks and subsequent political economy trends indicates how the Black Death shaped development through historically specific channels. The dynamics were different from the distinctive public goods channels active during the era of the Protestant Reformation, which Dittmar and Meisenzahl (2019) show responded *positively* to local outbreaks of the plague in the early 1500s conjuncture when plague was generically localized and the global shock was how the introduction of competition in the market for religion dramatically reoriented politics.

Third, our data can also be compared to the data in Biraben (1975), which provides to our knowledge the previously most comprehensive collective of evidence on plague outbreaks during the Black Death. Several points are notable. Biraben's data focus on France and under-represent other countries: 40% of Biraben's observations are from France and only 11% are from Germany. Further, Biraben's observations on plague outbreaks in German cities are more heavily skewed towards the largest cities than are our plague data, constructed from the *Städtebuch*. As a result, the Biraben data miss many major outbreaks. For the cities in

[96] This is suggested by Gingerich and Vogler (2021), who effectively argue that North and Thomas's (1973) narrative about the Black Death, factor prices, and institutional change holds where – and only where – the shocks were sufficiently large.

Figure D2: Map of Ruler Territories Before the Shock



This map displays territorial control before the Black Death. We overlay ruler territories on a city-level heat map of political fragmentation. Territorial polygons are merged only when contiguous; non-adjacent landholdings are shown separately. As a result, territorial borders may understate de facto concentration. To address this, we also plot standardized measures of political fragmentation. The colored background shows predicted values, on a 1 km grid, from a regression of the standardized city-level fragmentation index (dots) on a cubic polynomial in longitude and latitude, following Dell (2010). Darker red indicates higher concentration, while white indicates higher fragmentation.

our study, the Biraben data record only 32 city-level plague events (outbreaks) during the Black Death proper (1347-1351) and 98 events in the 1300s, whereas the *Städtebuch* records 421 Black Death related events.

D.1.2.2 Mortality

Table D3 investigates potential regional differences in mortality and household desertion rates due to the Black Death (1348-1351). Panel A studies the data from Christakos et al. (2006), following Jedwab, Johnson, and Koyama (2019). Panel B augments the city-level data with evidence on mortality rates at the regional level. Panel C further augments the analysis with evidence on city-level mortality from Keyser (1950). We find no significant differences in Black Death mortality across Eastern and Western regions of German-speaking Europe. Panel D considers data on household desertion rates, another measure of the intensity of the

Table D2: Urban Divergence with Local Plague Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All Cities				100 km Border		
Panel A. Construction Activity							
Concentrated East × Post	-0.08***	-0.10***	-0.16***	-0.18***	-0.22***	-0.22***	-0.23**
	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
Concentrated East × Trend		0.01	0.01	0.02	0.04	0.04	0.06
		(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Concentrated East × Post × Trend		-0.01	-0.02	-0.01	-0.01	-0.01	-0.05
		(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Plague 1348–51 × Post				-0.02	-0.05	-0.03	-0.02
				(0.05)	(0.10)	(0.10)	(0.10)
Plague 1348–51 × Trend				0.03	0.01	0.01	0.01
				(0.02)	(0.04)	(0.04)	(0.04)
Plague 1348–51 × Post × Trend				-0.05**	-0.02	-0.02	-0.02
				(0.02)	(0.04)	(0.04)	(0.04)
Panel B. Political Autonomy							
Concentrated East × Post	-0.07***	-0.09***	-0.23***	-0.27***	-0.24**	-0.24***	-0.19**
	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.09)	(0.09)
Concentrated East × Trend		-0.00	-0.00	-0.01	0.01	0.01	0.01
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Concentrated East × Post × Trend		0.02	0.00	0.01	-0.01	-0.00	-0.02
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Plague 1348–51 × Post				-0.08**	-0.06	-0.05	-0.06
				(0.04)	(0.07)	(0.07)	(0.07)
Plague 1348–51 × Trend				0.10***	0.09***	0.09***	0.08**
				(0.02)	(0.03)	(0.03)	(0.03)
Plague 1348–51 × Post × Trend				-0.13***	-0.12***	-0.13***	-0.12***
				(0.02)	(0.03)	(0.03)	(0.03)
Observations	22500	22500	22500	22500	6850	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Agriculture Controls	No	No	Yes	Yes	Yes	Yes	Yes
Trade & Population Controls	No	No	Yes	Yes	Yes	Yes	Yes
Local Shock Controls	No	No	No	Yes	Yes	Yes	Yes
Cultural Controls	No	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes
Western Cities	1490	1490	1490	1490	342	342	342
Eastern Cities	760	760	760	760	343	343	343

This table presents the estimates examining urban construction (from Table I) and political autonomy (from Table II) showing the estimates on the local plague variables, which are not shown in the main text.

Black Death, and finds no significant regional differences in desertion rates. This is consistent with a long line of research indicating that the shock was similar across regions, local variation notwithstanding (Lütge 1950; Vasold 2003; Brenner 1976). Our analysis is further supported by Jedwab, Johnson, and Koyama's (2022; pp. 140-1) finding that mortality rates do not vary systematically with city population, population density, transportation, or market access.

Table D3: Mortality and Desertion Rates Across Regions 1348-1351

	Mean		t-test	
	West	East	Difference	p-value
Panel A. Mortality – Christakos et al. (2006)				
Mortality Rate	0.386	0.394	-0.008	0.951
Observations	4	5	9	9
Panel B. Christakos et al. (2006) including Regions				
Mortality Rate	0.386	0.471	-0.085	0.519
Observations	4	7	11	11
Panel C. Christakos et al. (2006) & Keyser (1950)				
Mortality Rate	0.477	0.494	-0.017	0.889
Observations	10	7	17	17
Panel D. Desertion Rates				
Desertion Rate	0.273	0.300	-0.027	0.388
Observations	26	10	36	36

This table presents summary statistics examining differences in mortality and desertion rates in the wake of the Black Death 1349-1351 between Eastern and Western cities. Column 1 displays the mean for Western cities. Column 2 shows the mean for Eastern cities. Column 3 examines the difference in means across regions. Column 4 displays the p-value of the difference using a t-test. Panel A uses city-level mortality data from Christakos et al. (2006). Panel B uses mortality data from cities and regions from Christakos et al. (2006). Panel C uses city-level data from Keyser (1950) in addition to Christakos et al. (2006). Panel D explores household desertion rates using data from Christakos et al. (2006).

D.1.3 Culture and Religion

D.1.3.1 Ethnolinguistic Differences

Alongside politics, culture and religion have been suggested as major drivers of European development (Landes 1998; Henrich 2020). Our main quantitative analysis documents a divergence between neighboring Western and Eastern cities that were culturally Christianized and Germanized *before* our study period (Section II). The analysis also controls for a wide set of cultural factors (Section V). Still, the intensity of Christianization and related influences may have varied at unobserved margins across regions. Before the main colonization, Slavic settlement was concentrated east of the Elbe–Saale line, raising the possibility that the East differed culturally as well as politically. We acknowledge this possibility and present additional analyses that guide our interpretation.

First, historical evidence indicates that the Elbe–Saale line was not a sharp ethnolinguistic boundary before colonization. Smith (1995, p. 177) observes that, "The political frontier along the Elbe did not follow the linguistic divide between German and Slav." Hardt (2001, pp. 224-31) similarly notes that there were, "Slavonic tribes, living on both sides of the river Elbe" and that, "The Elbe had, however, been crossed long before [the late 700s CE] by Slavonic immigrants to the regions nowadays called the Hannoversches Wendland and the Altmark," and that "in the Lenzen region the Elbe could once again unite a region of Slavonic settlement on both sides of the river, as was the case in several other regions."

The Slavic settlement border also extended into further western regions, including parts of present-day Bavaria. While one might posit a distinct "frontier culture" (Bazzi, Fiszbein, and Gebresilasse 2020), the fact that Western settlers populated the East, makes it unlikely that initial individual-level cultural differences were principal factors driving the observed divergence.[97] More generally, historians emphasize rapid integration of the Slavic population in linguistic, legal, and demographic terms (Zernack 1975; Graus 1970; Rady 2016). Graus (1970, p. 42) notes that, "It is modern [pre-WWII] historians who, over-emphasizing the national aspect, have 'discovered' an apparently racial and national impulse behind the story of the conversion. In reality, there was no singular 'conversion of the Slavs' any more than a singular 'conversion of the Germans'." Consistent with historians who emphasize a broader trend towards cultural uniformity (Bartlett 1995, p. 310), we find no differential trends in church construction or in city-level institutional development in 1200–1349 (Figure VIII; Figure D8; Figure VI).

Second, our empirical strategy directly addresses potential confounding cultural channels. The baseline specifications (i) control flexibly for distance to the border, (ii) compare near neighbors, and (iii) allow for time-varying effects of cultural exposure. To this end, we assemble detailed measures of historical Slavic influence: Slavic, Sorbic, and Old Polish toponyms from an etymological registry (Niemeyer 2012); the area of and distance to the historical Slavic settlement border (Wasserscheidt 2023); historical exposure and distance to monasteries circa 1350 (Niedersächsische Akademie der Wissenschaften 2023); and cumulative exposure to the church, measured as the total time a city lay within a bishopric before 1350 (Göttingen Academy of Sciences 2020). All main results are robust to controlling for the potentially time-varying impact of these variables.

Third, to further test whether common social or cultural features of the East, besides political concentration, could explain the divergence, we compare the development of more and less concentrated regions *within* the East with similar cultural histories. We find political concentration was associated with reduced post-shock development in areas exposed to the same colonization process and prior Slavic culture. In particular, we observe a divergence between the more fragmented East (Saxony–Thuringia) and the more concentrated East (Brandenburg, Mecklenburg, and Pomerania), which underscores the role of political structure rather than culture *per se* (Table IV). Carsten (1954, p. 193) observes: "The territories of the house of Wettin [Saxony] were 'colonial' lands like those of the margraves of Brandenburg."

While we cannot rule out that unobserved cultural differences across neighboring cities became salient for growth after 1350, our analysis and interpretation are consistent with the observations of leading historians who note that, "From their beginnings, the princely states of eastern Europe differed from their western prototypes, though the differences were not mainly economic or social in origin, but political and constitutional" (Postan 1973, p. 331) and that the East "replicated the social framework" of the West: "The net result. . . [was] the spread. . . of the cultural and social forms found in the Latin Christian core. The new lands were closely integrated with the old. Travellers. . . would not be aware of crossing any decisive social or cultural frontier" (Bartlett 1995, p. 306). As Szűcs (1983) discusses, the regions of German-speaking Europe located East of the Elbe River were part of a larger

[97] The Western migrants to the East were attracted by the extensive, institutionalized rights and freedoms offered by Eastern rulers before the Black Death, which makes it unlikely that migrants were differentially less committed to institutionalized rights and freedoms (see Appendices C and D.2 for details).

Table D4: Urban Divergence and Inheritance Norms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcomes: Construction and Autonomy						
	All Cities				100 km Border		
Panel A. Construction Activity							
Concentrated East × Post	-0.08***	-0.10***	-0.16***	-0.18***	-0.22***	-0.22***	-0.23**
	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
Concentrated East × Trend		0.01	0.01	0.02	0.04	0.04	0.07
		(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Concentrated East × Post × Trend		-0.01	-0.01	-0.01	-0.01	-0.01	-0.05
		(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Panel B. Political Autonomy							
Concentrated East × Post	-0.07***	-0.09***	-0.24***	-0.27***	-0.23**	-0.24***	-0.20**
	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.09)	(0.09)
Concentrated East × Trend		-0.00	-0.00	-0.01	0.01	0.01	0.02
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Concentrated East × Post × Trend		0.02	0.00	0.01	-0.01	-0.00	-0.02
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Observations	22500	22500	22500	22500	6850	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table replicates the estimates examining urban construction and political autonomy in Tables I and II including interactions controlling for inheritance norms as documented by Bartels, Jäger, and Obergruber (2024).

"Western European" economic and cultural space before the Black Death and *became* an "Eastern" other in the period we study.

D.1.3.2 Inheritance Norms

We also test whether our findings could be driven by differences in historical inheritance norms. Recent research finds both inequality and entrepreneurship shift when we compare areas in contemporary Germany where inheritance was historically divisible and to similar areas where inheritances were historically indivisible (Bartels, Jäger, and Obergruber 2024). Table D4 shows that our estimates are unchanged when we control for time-varying differences in inheritance divisibility, as documented by Bartels, Jäger, and Obergruber (2024). However, because we observe data on local inheritance norms only after the shock (i.e., post-treatment), we interpret this exercise with caution.

D.1.3.3 City-Age and Foundation Type

Our results are robust to controlling for city age and for top-down foundations (Table D6; Tables I and II).[98]

[98] We find no differential relationship between settlement age and post-pandemic economic or political outcomes. Top-down foundations are negatively associated with political outcomes on average, but the association is statistically insignificant in border samples. Crucially, our main "Concentrated East × Post" estimate is stable to including these cultural and institutional controls.

Table D5: Regional Aspects of Religion and Society When the Pandemic Struck

	(1)	(2)	(3)	(4)	(5)	(6)
	All Cities			Within 100 km of Border		
	β East	SE	Mean	β East	SE	Mean
Religion and Culture						
Pagan Worship Site	0.00	(0.04)	0.27	-0.06	(0.05)	0.28
Monastery Construction 1200-1349	0.01	(0.02)	0.10	0.01	(0.02)	0.10
Age of Settlement	-1.99***	(0.27)	3.19	-0.77	(0.47)	2.68
Top-Down Foundation	0.03***	(0.01)	0.03	0.01	(0.01)	0.02

This table presents regression estimates of differences between concentrated Eastern and fragmented Western cities in the mid-1300s from models that mirror Figure IV. Rows are organized by outcomes: "Pagan Worship Site" is an indicator for a site of pagan worship site close to a city. We collect data on all known pagan sites from Ernst (2023) and create an indicator equal to one when a pagan site falls within a city polygon, using boundary definitions of Cantoni (2020). "Church Construction 1200-1349" and "Monastery Construction 1200-1349" are binary measures recording the construction of churches and monasteries over this period. "Age of Settlement" indicates the centuries since the settlement was first mentioned at the time of the Black Death. "Top-Down Foundation" indicates cities founded top-down by a lord. These measures are constructed from the *Städtebuch*.

Table D6: Robustness to Different Types of Foundation

	Construction		Politics	
	All Cities	100 km Border	All Cities	100 km Border
Concentrated East × Post	-0.18***	-0.23***	-0.27***	-0.25***
	(0.05)	(0.07)	(0.05)	(0.08)
Age × Post	0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Top-Down Foundation × Post	-0.04	-0.07	-0.12**	-0.18
	(0.08)	(0.19)	(0.06)	(0.12)

This table presents regression estimates examining differences between concentrated Eastern and fragmented Western regions after 1350, controlling flexibly for the time-varying impact of different foundation types from models that mirror Columns 4 and 6 of Tables I and II. Rows are organized by control: "Age of Settlement" indicates the centuries since the settlement was first mentioned at the time of the Black Death. "Top-Down Foundation" indicates cities founded top-down by a lord. Standard errors in parentheses allow for arbitrary spatial correlation within 50 kilometers following Conley (1999).

D.1.4 Population

A natural concern is that initial population levels differed systematically across regions at the onset of the Black Death. If western cities were initially larger, subsequent population growth – driven, for example, by an ongoing Commercial Revolution – may have pushed them over critical demand thresholds for urban construction or institutional autonomy. This would generate patterns similar to those documented in our main results.

To examine this possibility, we draw on three complementary datasets: Bairoch, Batou, and Chèvre (1988), Buringh (2021), and our extension based on the *Deutsches Städtebuch*. Bairoch, Batou, and Chèvre (1988) records city population at most once per century,

resulting in an unbalanced panel with sparse coverage. The sample includes cities that reached a population of at least 5,000 by 1800. Among these, 128 have estimates for 1500, and 75 for 1400. Buringh (2021) builds on and extends these data using interpolation and additional online sources. The *Deutsches Städtebuch* extends this data slightly. Taken together, we gather information for 273 cities exceeding 1,000 inhabitants in 1300.[99] While the absence of records does not definitively imply small size, the presence of population figures in a given century strongly suggests that the city was relatively large. However, available population figures may miss important dimensions of development, such as changes in urban infrastructure and institutional arrangements, which shaped urban life in important ways.

Table D7 presents estimates of average population differences between East and West around 1300. Eastern cities appear slightly smaller on average, but the magnitude of the difference is economically modest and statistically insignificant. This difference further attenuates by two-thirds in the 100-kilometer border sample. We extend this analysis using alternative threshold indicators for urban size (above 1,000; 5,000; 10,000; 20,000; and 25,000 inhabitants), and do not detect significant regional differences.

We also examine population growth. Prior to 1300, growth rates did not differ significantly across regions. Between 1300 and 1400, however, eastern cities experienced significantly lower growth, both in the full and border samples. Because the population data are observed at century marks, the 1300–1400 window straddles the shock, and the Eastern shortfall cannot be timed within the century. The pre-1300 similarity in levels and growth is therefore the operative pre-shock evidence; the 1300–1400 differential is consistent with a post-1348 onset but cannot by itself confirm it. The more precise evidence on timing comes from our construction and institutional outcomes, whose event studies break at the Black Death.

While the analysis above can only be suggestive, these findings indicate that initial urban population levels were unlikely to account for the divergence we observe. Nonetheless, given inherent limitations in premodern population data, we cannot conclusively rule out the implications of initial population differences. To address remaining concerns, all main specifications include time-varying controls for baseline urban population in 1300 and threshold indicators. Our findings hold expanding the set of population thresholds examined.

D.2 Time-Varying Differences

While the Black Death was the great shock of the Middle Ages and is linked by historians to the specific processes we study, it is natural to inquire about the possible role of other shocks with the potential to either interact with underlying political fragmentation or to vary across regions and time and thus to explain the patterns we uncover in the data, including shifts in economic development, military conflict, natural disasters involving famine and other (non-plague) diseases, and major social and religious movements.

[99] This includes 178 western and 95 eastern cities in the full sample, and 35 western and 50 eastern cities within a 100-kilometer band around the border.

Table D7: City Population Differences across Regions around 1300

	(1)	(2)	(3)	(4)	(5)	(6)
	All Cities			Within 100 km of Border		
	β East	SE	Mean	β East	SE	Mean
Population 1300	0.02	(0.02)	0.08	0.03	(0.03)	0.09
Population 1300 (Buringh)	-0.03	(0.02)	0.19	-0.01	(0.04)	0.18
Population 1300 (Städtebuch)	0.00	(0.01)	0.02	0.02	(0.02)	0.02
Population 1300 (max)	-0.02	(0.02)	0.20	0.00	(0.04)	0.20
Population 1300 ($>$ 1,000)	0.01	(0.01)	0.03	0.01	(0.01)	0.03
Population 1300 ($>$ 5,000)	-0.01	(0.01)	0.02	-0.01	(0.01)	0.02
Population 1300 ($>$ 10,000)	-0.01	(0.00)	0.01	-0.01	(0.01)	0.01
Population 1300 ($>$ 20,000)	-0.00	(0.00)	0.00	-0.00	(0.00)	0.00
Population 1300 ($>$ 25,000)	-0.00	(0.00)	0.00	-0.00	(0.00)	0.00
Population Growth (1200-1300)	0.00	(0.00)	0.00	0.01	(0.00)	0.00
Population Growth (1300-1400)	-0.02**	(0.01)	-0.02	-0.04***	(0.02)	-0.03
Population Growth (1400-1500)	0.00	(0.00)	-0.01	0.00	(0.01)	-0.00
Population Growth (1500-1600)	-0.00	(0.01)	-0.01	-0.03*	(0.01)	-0.01
Population Growth (1600-1700)	0.00	(0.01)	-0.02	0.01	(0.01)	-0.02

This table presents regression estimates examining regional differences in city populations before and after the Black Death. Population data are drawn from Bairoch, Batou, and Chèvre (1988), supplemented by Buringh (2021) and the *Deutsches Städtebuch*. "Population 1300" is the inverse hyperbolic sine of population (in thousands). The indicators "Population 1300 ($>$ X)" equal one if population exceeds the specified threshold. "Population Growth (1200–1300)" denotes the population growth between 1200 and 1300.

D.2.1 Shifts in Economic Development

D.2.1.1 Commercial Revolution

While our analysis documents similar regional trends in economic development before the Black Death, it is possible that common, "global" shifts in economic development before the Black Death could have independently increased the salience of political structure for development. For example, an acceleration in the prior Commercial Revolution could have increased the incentives for cities to bargain with rulers and thereby activated underlying political structure as a factor in development, as we acknowledge in Section V.

Our main analysis shows that the economic, institutional, and political development of cities followed relatively smooth trends, and did not accelerate, before the Black Death. However, it is possible that economic development shifted on other margins before or just at the time of the Black Death.

To assess this possibility and the role of the Commercial Revolution, we examine several sources of additional evidence.

First, we examine the development of urban market rights within German-speaking Europe, as previously been studied by Cantoni and Yuchtman (2014). Figure D3 presents data on the grants of market rights across cities in our data and shows that there was a smooth trend in the growth of market right grants before the Black Death and that year-on-year growth rates were relatively high and stable across the period 1200 through 1349, before falling afterwards.

Second, we examine data on major trade fairs and trade tolls, which reflect and proxy for commercial activity. We examine data from Holterman et al. (2025), which capture annual changes in economic activity across Northern Europe, which coverage extending beyond our immediate study area into the Low Countries, Denmark, the Baltic coast, and Poland in the East, and starting in 1300. In these data, we observe stable patterns of growth in measures of commercial activity across the early 1300s and no evidence of an acceleration in commercial activity when or just before the Black Death hit. We observe similar patterns if we restrict the data to our study area.

Third, we study measures of urban and total population. Figure D5 presents data on total and total urban population in Germany, drawn from McEvedy and Jones (1978) and Buringh (2021), respectively. In these data, we observe total and urban population growing along relatively stable trends between 1100 and 1300, and falling after the Black Death. We acknowledge, however, that these data are coarse and measured with error. First, because population estimates are recorded only every century, these data indicate only that population growth trends were stable before 1300 and do not shed light on growth at higher frequencies or on growth in the 1300-1348 period. Second, both the total and urban population data are constructed based on limited and imprecise underlying data. For example, while the data on total urban populations derive from city-level estimates, over half of the city population figures in Buringh (2021) are interpolated and a further substantial fraction are constructed based on proxies, such as city age and/or spatial area. We therefore view this evidence as suggestive rather than definitive, and do not use interpolated data in our main text analysis.

Third, as we cannot definitively rule out the possibility of an unobserved prior acceleration interacting with political structure, given the limitations of premodern data, we further extend our analysis to flexibly account for potential non-linear regional pre-trends. We augment our baseline difference-in-differences specifications by including region-specific second and third degree polynomial functions of time. These flexible regional trend controls enable us to estimate the post-1350 break accounting for potential underlying patterns of pre-existing and accelerating differences in regional dynamism. We find that our estimates

Figure D3: Urban Market Rights

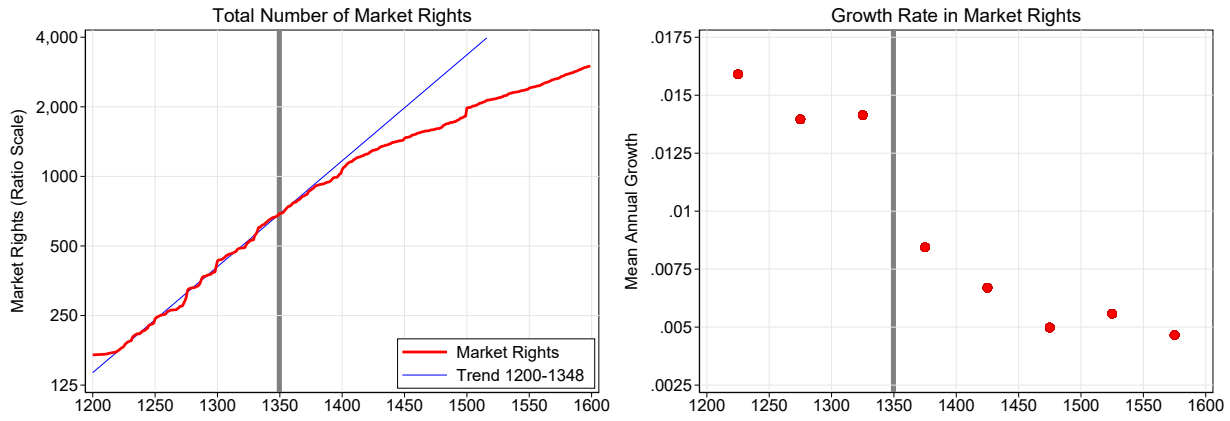


Figure plots number of market right grants across cities in our analysis against the 1200-1348 trend (at left) and the mean growth rate in market rights in half-century periods (at right). Data from Cantoni (2020).

Figure D4: Trade Fairs and Trade Tolls

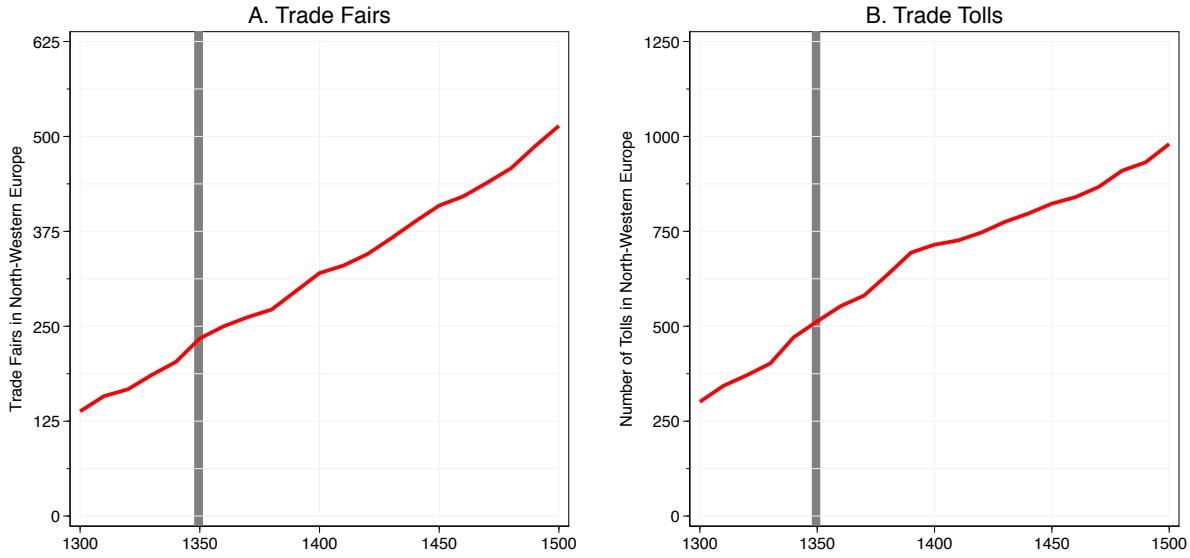


Figure plots number of active trade fairs and tolls in Northwest Europe, using data from Holterman et al. (2025).

remain robust to this specification, as shown in Table D8.

At the same time, the above evidence also demonstrates a pre-existing dynamism across our study area before the shock. Therefore, our analysis underlines the foundational importance of the Commercial Revolution. We argue that political structure conditioned regional responses to the opportunities and risks created by the Commercial Revolution. The Black Death supplied an exogenous shift in relative prices that amplified these forces, providing a potentially cleaner test of a channel that was central to long-run European

Figure D5: Total and Urban Population in Germany

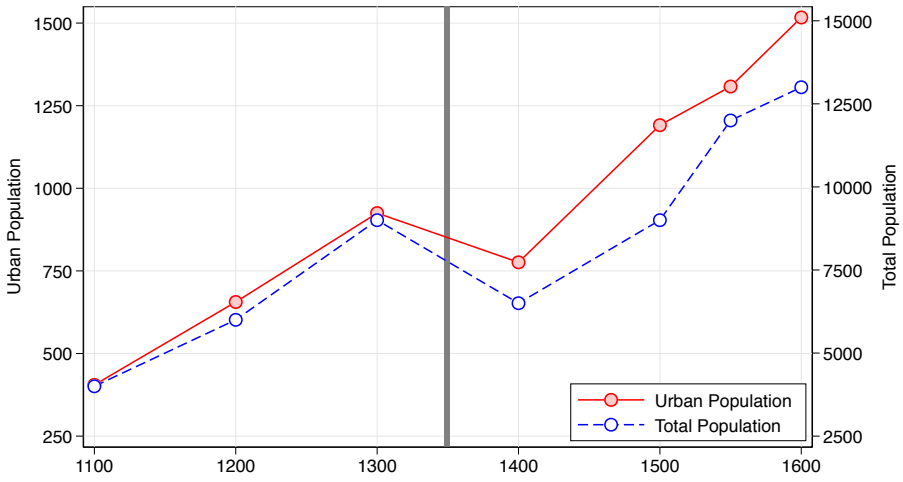


Figure presents data on total population (in thousands) in Germany from McEvedy and Jones (1978) and urban population (in thousands) in German cities from Buringh (2021).

Table D8: Urban Divergence with Non-linear Trend Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All Cities				100 km Border		
Panel A. Construction Activity							
Concentrated East × Post	-0.08***	-0.10***	-0.16***	-0.18***	-0.21***	-0.22***	-0.22**
	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
Concentrated East × Trend		0.01	0.01	0.03	0.05	0.05	0.08
		(0.01)	(0.02)	(0.02)	(0.04)	(0.04)	(0.05)
Concentrated East × Post × Trend		-0.01	-0.02	-0.05*	-0.04	-0.03	-0.08
		(0.01)	(0.02)	(0.03)	(0.05)	(0.05)	(0.07)
Panel B. Political Autonomy							
Concentrated East × Post	-0.07***	-0.09***	-0.23***	-0.26***	-0.23**	-0.24**	-0.18*
	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.09)	(0.09)
Concentrated East × Trend		-0.00	-0.00	0.00	0.03	0.02	0.05
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Concentrated East × Post × Trend		0.02	0.00	-0.03	-0.06	-0.04	-0.10
		(0.02)	(0.03)	(0.03)	(0.05)	(0.05)	(0.06)
Observations	22500	22500	22500	22500	6850	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Agriculture Controls	No	No	Yes	Yes	Yes	Yes	Yes
Trade & Population Controls	No	No	Yes	Yes	Yes	Yes	Yes
Local Shock Controls	No	No	No	Yes	Yes	Yes	Yes
Cultural Controls	No	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes
Western Cities	1490	1490	1490	1490	342	342	342
Eastern Cities	760	760	760	760	343	343	343

This table presents the estimates examining urban construction (from Table I) and political autonomy (from Table II), additionally controlling for second- and third-degree polynomials of the regional pre-trend.

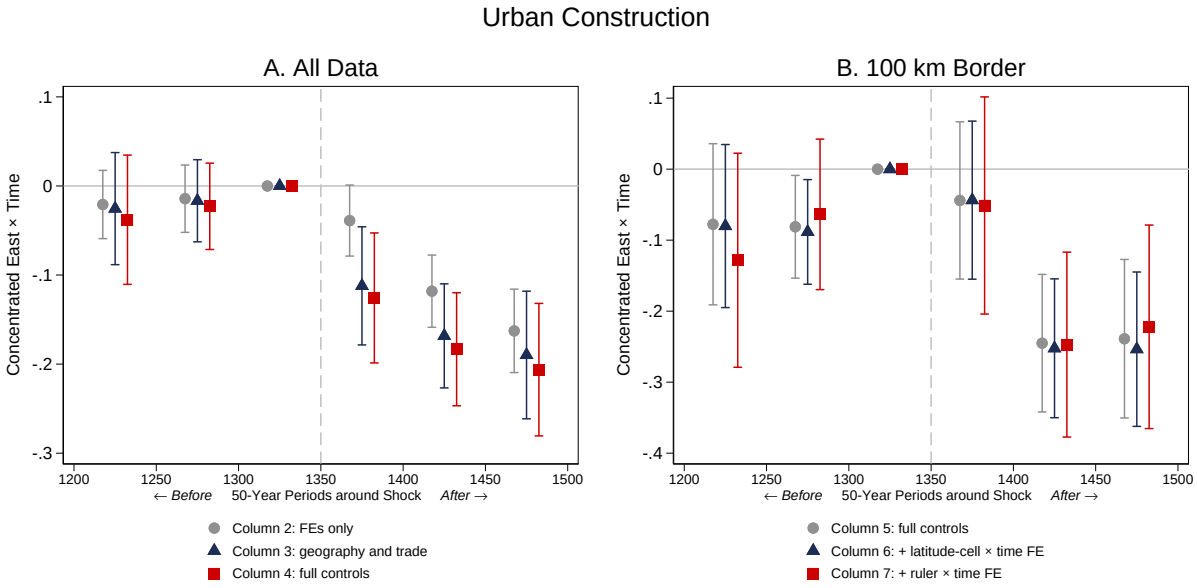
development.

D.2.1.2 Event Studies with Controls

Our event-study figures in the main text plot estimates from specifications without time-varying controls, so that the reader sees the raw variation in the data. Figures D6 and D7 report the controlled counterparts under each specification of Tables I and II: for the full sample, fixed effects only and the control sets of columns 3 and 4; for the border sample, the full controls of column 5, adding latitude-cell × time fixed effects (column 6) and ruler × time fixed effects (column 7). Across specifications, the pre-period estimates are close to zero and the post-1350 estimates are negative; controls leave the construction estimates similar and strengthen the political-autonomy estimates.[100]

[100]Figure E3 reports the coercive-estates event study with and without the geography and trade controls of Column 3. The pre-shock estimates are close to zero in both. Under controls the estimates remain positive after 1650 at smaller magnitudes, with 1750 significant in both samples and 1700 significant in the full sample only. The intermediate periods turn slightly negative in the full sample. Part of the estate expansion follows the agricultural endowments that the controls absorb.

Figure D6: Urban Construction Event Study with Controls



This figure plots event-study estimates for urban construction under each specification of Table I. Panel A uses all cities: fixed effects only, the controls of column 3, and the full controls of column 4. Panel B restricts the sample to cities within 100 kilometers of the border: the full controls of column 5, adding latitude-cell × time fixed effects (column 6) and ruler × time fixed effects (column 7). Standard errors allow for arbitrary spatial correlation within 50 kilometers following Conley (1999); bars indicate 95% confidence intervals.

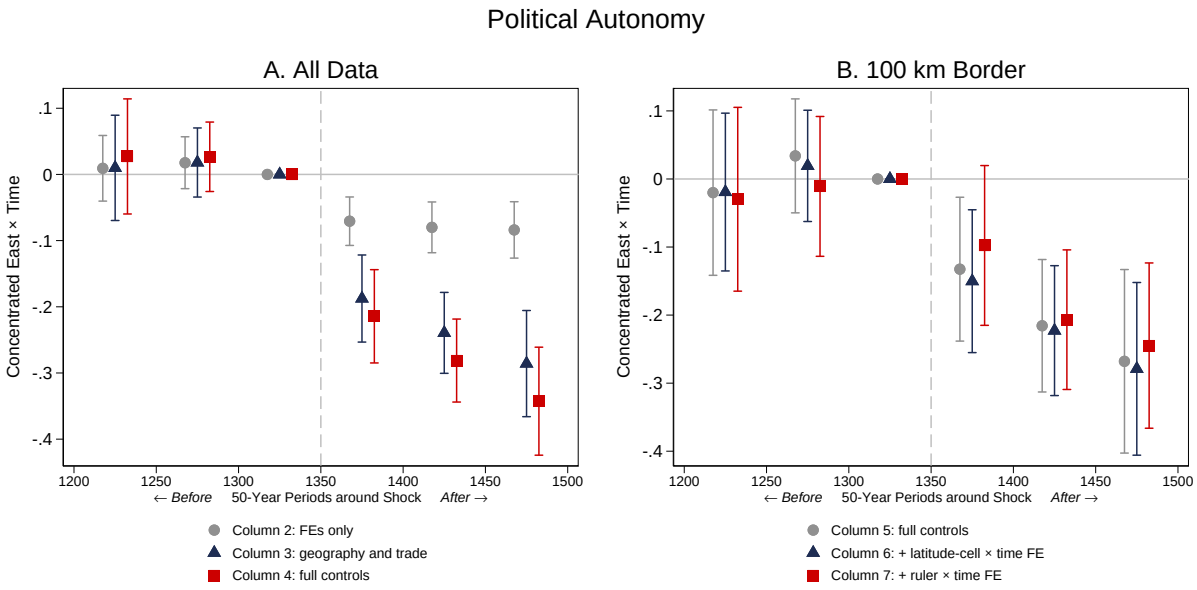
D.2.1.3 Trade Networks

A potential concern regarding our main findings is whether trade networks may have varied systematically across regions prior to the Black Death.

To clarify the scope of this concern, it is important to note that the main results in Tables I and II control for the time-varying impact of trade, trade networks, and trade potential through multiple channels, including membership in the leading commercial organization (the Hanseatic League), agricultural productivity in key export crops (rye and wheat), proximity to navigable rivers, and "market potential" measured using the methodology of Donaldson and Hornbeck (2016). We also show no regional differences in distance to trade networks in Figure IV.

To consider residual questions relating to trade networks, we draw on the most comprehensive reconstruction of trade networks to date: the Viabundus dataset (Holterman et al. 2025), which documents over 10,500 trade routes in our study area. This dataset originates from the digitization of Friedrich Bruns and Hugo Weczerka's *Hansische Handelsstraßen* (1962–1968) and reflects a multi-decade effort coordinated by the Institute for Historical Regional Studies at the University of Göttingen, the Research Center for Hanse and Baltic History, and partner institutions including Aarhus University, the University of Magdeburg, and Tampere University. It incorporates extensive archival research and geospatial mapping by dozens of scholars, resulting in a detailed representation of both overland and waterborne transport routes. Our analysis finds no significant regional differences in trade network connectivity before the Black Death (Figure IV). In Table D9, we confirm the robustness of our main findings across regions once we allow for a potential time-

Figure D7: Political Autonomy Event Study with Controls



This figure plots event-study estimates for political autonomy under each specification of Table II. Panel A uses all cities: fixed effects only, the controls of column 3, and the full controls of column 4. Panel B restricts the sample to cities within 100 kilometers of the border: the full controls of column 5, adding latitude-cell × time fixed effects (column 6) and ruler × time fixed effects (column 7). Standard errors allow for arbitrary spatial correlation within 50 kilometers following Conley (1999); bars indicate 95% confidence intervals.

varying impact of access to trade routes. Two limitations of the dataset warrant mention. First, large parts of Bavaria and Baden-Württemberg are not covered, resulting in a slightly smaller sample. Second, while the dataset records the construction dates, dates are available for only about five percent of all route segments. While we exclude all segments known to have been constructed after 1350, we cannot fully rule out the possibility that some of the remaining routes were established at a later date.

D.2.1.4 Religious and Secular Construction

While our main analysis studies urban construction as an aggregate outcome it is natural to wonder whether regional patterns of construction disaggregated by religious and secular uses follow similar or different trajectories, including because patterns of religious construction could plausibly proxy for underlying cultural factors.

We therefore estimate event studies that enable us to compare the regional shift in religious and secular construction after the Black Death. Figure D8 shows that secular and religious construction fell after the Black Death shock and, broadly speaking, evolved in a similar manner. In terms of differences, we find that secular construction fell somewhat more in the 1350-1399 period but that religious construction fell more on average over the 1350-1499 period, reflecting a differential increase in Western religious construction in 1400-1499. This pattern holds if we further disaggregate secular construction between secular private and secular public (or state sector) construction.

The similarity of the two series reflects the institutional reality of church building in the towns we study. Church building was financed out of commercial wealth (Buringh et al.

Table D9: Shifts in Urban Construction (Controlling for Trade Routes)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcomes: Construction Activity or Political Autonomy						
	All Cities				100 km Border		
Panel A. Construction Activity							
Concentrated East × Post	-0.08***	-0.10***	-0.17***	-0.20***	-0.22**	-0.23***	-0.29***
	(0.01)	(0.03)	(0.06)	(0.07)	(0.09)	(0.09)	(0.11)
Concentrated East × Trend		0.01	0.02	0.03	0.05	0.05	0.09**
		(0.01)	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)
Concentrated East × Post × Trend		-0.01	-0.02	-0.02	-0.02	-0.02	-0.06
		(0.01)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)
Panel B. Political Autonomy							
Concentrated East × Post	-0.07***	-0.09***	-0.24***	-0.27***	-0.29***	-0.30***	-0.23**
	(0.01)	(0.03)	(0.07)	(0.08)	(0.09)	(0.09)	(0.10)
Concentrated East × Trend		-0.00	0.01	0.00	0.01	0.01	0.01
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Concentrated East × Post × Trend		0.02	-0.03	-0.02	-0.01	-0.00	-0.01
		(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Observations	22500	22500	12750	12750	5940	5940	5940
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trade Route Controls	No	No	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

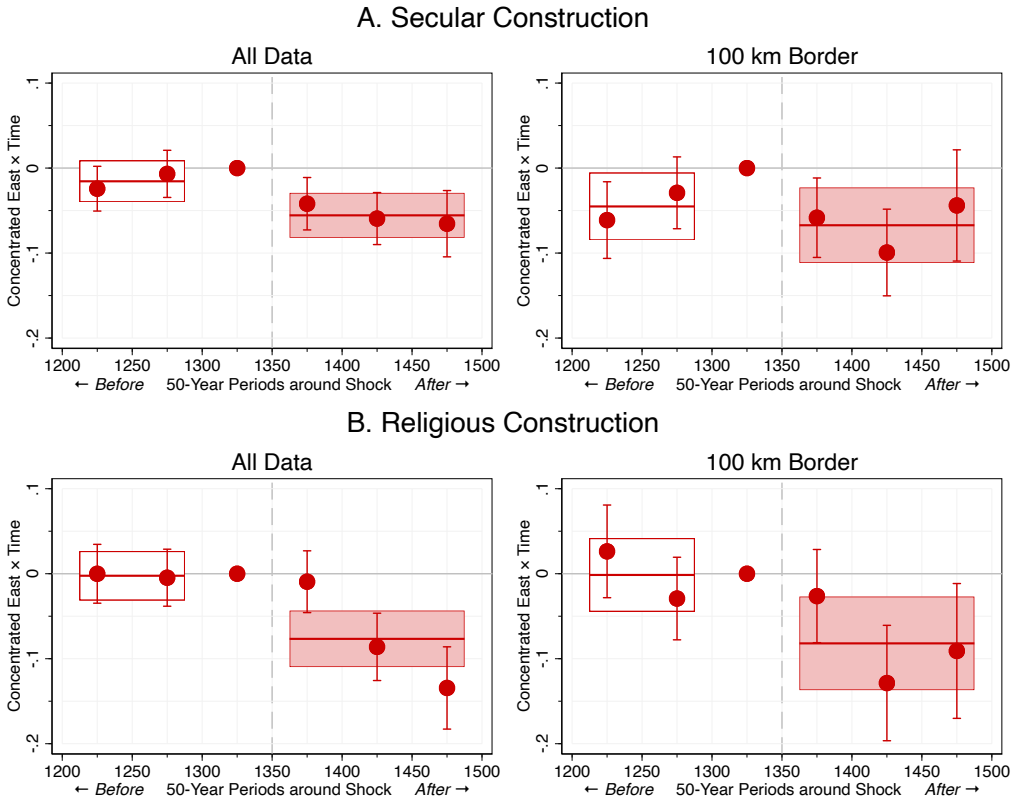
This table presents regression estimates for urban construction (Panel A) and political autonomy (Panel B). Outcomes, specifications, and control variables follow those used in Tables I and II. In addition, we introduce "Trade Route Controls" in columns 3-7, accounting for the time varying effects of the distance to trade routes, including post period, trend, and post-trend interactions. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following Conley (1999).

2020), and city councils controlled much of church-building finance (Reitemeier 2005), so religious construction was part of the same urban growth process as secular construction rather than a distinct cultural sphere. We therefore treat construction, religious and secular alike, as a proxy for growth, and rely on the political autonomy index (Table II) as the direct evidence on the institutional channel.

Our quantitative findings are consistent with the positive relationship between commercial development and religious construction pointed to by recent economic history research. Buringh et al. (2020, p. 14-25) observe:

> "increasing commercialisation and urbanisation... underpinned the ambition to erect ever larger and more elaborate churches... commercial opportunities were an increasingly prominent component of Western Europe's great church building boom... Once initiated, the big boom prevailed almost everywhere, fitfully gathering momentum throughout the 11th and 12th centuries. These were the centuries when Lopez's commercial revolution took off and, as it got under way, church building in maritime towns displayed progressively greater dynamism than that at other locations. After c. 1200 the disparity between ports and landlocked towns became increasingly pronounced, implying that commercial factors and the cost advantage of shipping bulky goods by water were of growing importance in

Figure D8: Secular and Religious Construction



This figure plots estimates from event studies studying regional differences in city-level "Secular" (non-religious) and "Religious" construction. Standard errors estimated allowing for spatial correlation using the methodology of Conley (1999).

shaping the distribution of construction activity."

Buringh et al. (2020, p. 2) further note that:

> "Construction work was normally sustained over periods of years and decades and hence was a manifestation of confidence in the future based on an assessment of the income streams required to bring such ambitious projects to completion. They required enterprise, planning and organisation of a high order, substantial inputs of capital and labour (both skilled and unskilled), and assemblage of impressive quantities of resources - stone, brick, lime and sand, timber, iron, lead, copper, glass and much else (Prak 2011). Each major project was an intrinsically economic undertaking with significant multiplier effects for the wider economy. Further, technological advance was as fundamental to church building as it was to economic progress.... Plainly, there are good reasons for connecting rising church building activity with growing economic prosperity and technological progress, and vice versa. Certainly, in Holland during the century after the Black Death an increase in GDP per capita of about 80% (Van Zanden and van Leeuwen, 2012) was accompanied by a doubling of church-building activity per capita."

Historical research further documents that religious construction was important in the wake of the Black Death. Thus Lütge (1966, p. 258 – our translation and emphasis) writes:

> "The construction industry became of particular importance during [the post-Black Death] period, as the number of buildings being constructed was large. Alongside town halls, granaries, and patrician houses, *it was church building in particular that kept the building industry busy, as the number of new church constructions and extensions that began soon after the Black Death and during its repeated resurgences was striking.* For example, the foundation stones for Erfurt Cathedral were laid in 1349, for the Frauenkirche in Eßlingen in 1350, for the hall choir of the main parish church in Schwäbisch-Gmünd in 1351, for Antwerp Cathedral in 1352, for the rebuilding of the Freiburg Minster choir in 1354, for St. James's Church in Hamburg in 1354, for Frauenkirche in Nuremberg in 1355, for St. Martin's Church in Landshut in 1389, and for the rebuilding of St. Mary's Church in Gdansk in the year of the plague, 1348. The donations of the bourgeoisie, who were seized by fear of existence, gratitude and certainly also by the joy of representation, were rich, even exceedingly rich. . . ."

On church financing, Reitemeier (2005, pp. 16, 608) observes that "the citizens of the towns not only took the organization and financing of church construction into their own hands" but that "in the vast majority of urban cases it was exclusively the city council that controlled the use of funds". Reitemeier (2005, p. 608) concludes:

> "If the church building symbolized the city's self-confidence outwardly, then within the church the churchwardens represented the self-conception of the council and the leading families. There is no evidence of influence in the opposite direction. There was no separation between religious life in the church and the urban social order."

D.2.2 Other Shocks

D.2.2.1 Reformation, Peasants' War & Thirty Years' War

While our analysis traces the regional divergence in development after the Black Death, later events, such as the Reformation (c. 1517), the Peasants' War of 1524–25 and the Thirty Years' War (1618–1648), could also have influenced urban development directly or through their interaction with local political structures.

It is thus possible that the urban divergence we trace reflects the layered or cumulative effect of several shocks, not just the interaction between the Black Death and prior regional differences in political structure.

Our baseline analysis shows that a significant regional divergence in urban development is observed in the 1350–1500 period, before the Protestant Reformation (1517), the Peasants' War (1524), and the Thirty Years' War (1618–1648). We document this in our event studies examining urban construction (Figure VI) and urban political autonomy (Figure VIII), and in our pre-1500 difference-in-differences analysis (Table IV). We also find that the regional decline in urban construction in the East was concentrated in the 1350–1499 period and stabilized thereafter (Figure IX), although this invites questions concerning whether shocks after 1500 may have limited regional decline in the East and thus potentially muted the East–West divergence.

To address questions about the potential role of later religious and social events, including their possible interaction, we extend our analysis as follows. We test whether the Protestant

Reformation may have contributed to the regional divergence through its potential impact on urban development. We operationalize this test by extending our analysis to account for differences in development associated with city-level Protestantism in the post-Reformation era. We similarly test for differences in development associated with city-level exposure to the Peasants' War, which spanned much of Southwestern Germany, and the Thirty Years' War.

To do so, we augment our baseline specifications, which models the time-varying effect of political institutions (T_i), to also account for time-varying outcomes associated with religious and social shocks. These are proxied by cross-sectional indicators for Protestant affiliation, exposure to the Peasants' War, and exposure to the Thirty Years' War, respectively (P_i). We estimate:

$$\begin{aligned} y_{it} = {} & \beta_1(T_i \times post_t^{1350}) + \beta_2(T_i \times trend_t) + \beta_3(T_i \times post_t^{1350} \times trend_t) + \\ & \theta_1(P_i \times post_t^{1500}) + \theta_2(P_i \times trend_t) + \theta_3(P_i \times post_t^{1500} \times trend_t) + \\ & \phi_1(P_i \times T_i \times post_t^{1500}) + \phi_2(P_i \times T_i \times trend_t) + \phi_3(P_i \times T_i \times post_t^{1500} \times trend_t) + \\ & \gamma_1(x_i \times post_t) + \gamma_2(x_i \times trend_t) + \gamma_3(x_i \times post_t \times trend_t) + \alpha_i + \delta_t + \epsilon_{it} \end{aligned} \tag{12}$$

The findings in Tables D10, D11, and D12 indicate that the divergence we document is not driven by the local exposure to these later shocks. This holds despite the fact that we find some shifts in urban development associated with local variation in these shocks. While our results indicate that the main divergence emerged earlier and was not driven by these major shocks, assessing the long-run effects and potential interactions of these later shocks remains an important task for future research.[101]

Lastly, it is important to note that the divergence in agriculture increased after 1500 and accelerated after 1650, after the Thirty Years' War. This is consistent with historical arguments suggesting that laws restricting labor mobility reflected changes in incentives offered by international markets for grain (Postan 1973) and the prior political and economic developments we document, specifically the decline of Eastern towns (Enders 2008; Carsten 1954). Systematic data on the quantity of grain exported from Eastern Germany does not exist, but evidence from sedimentary pollen grains indicates that the large increases in the supply of grain date from the 1500s, when prices rose (Izdebski et al. 2016).

D.2.2.2 Prior Commercial Development

In our framework, the Commercial Revolution built the urban sector whose control became contested after the shock (Section VII.A). A natural question is whether the post-1350 divergence varies with pre-1350 commercial development. In the framework, prior development shapes whether political structure is pivotal at all rather than scaling the effect smoothly: where prior development is sufficiently low, no ruler supports the city; where it is sufficiently high, all do; political structure selects outcomes only in between (Appendix B). Table D13 reports the direct triple interaction of the difference-in-differences terms with

[101] For example, our finding that local exposure to the Peasants' War is associated with increased urban autonomy in the East after 1500 is striking (Table D11). This finding is consistent with our analysis examining within East heterogeneity: within the East the Peasants' War was overwhelmingly concentrated in Thuringia and Saxony, which we find were differentially more fragmented and displayed more urban autonomy and construction before the Peasants' War, in the 1350-1500 period (Table IV).

Table D10: Urban Divergence and Protestant Reformation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcomes: Construction and Autonomy						
	All Cities				100 km Border		
Panel A. Construction Activity							
Concentrated East × Post 1350	-0.09***	-0.10***	-0.15***	-0.18***	-0.21***	-0.22***	-0.22**
	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
Reformation × Post 1500	0.04	0.03	0.03	0.03	0.00	-0.01	0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.07)	(0.07)	(0.08)
Reformation × East × Post 1500	0.02	0.03	0.04*	0.05*	0.05	0.04	0.05
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)	(0.05)
Panel B. Political Autonomy							
Concentrated East × Post 1350	-0.09***	-0.09***	-0.23***	-0.27***	-0.23**	-0.24**	-0.19**
	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.10)	(0.10)
Reformation × Post 1500	-0.01	-0.00	0.00	-0.00	-0.09*	-0.10**	-0.06
	(0.02)	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.05)
Reformation × East × Post 1500	0.02**	-0.02	0.01	0.00	0.05	0.05*	0.05
	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Observations	22500	22500	22500	22500	6850	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table replicates the estimates examining urban construction and political autonomy in Tables I and II including interactions as specified in Equation 12. We measure exposure to the Reformation using an indicator for whether a city ever became Protestant, based on data from Cantoni (2020).

pre-1350 membership in the Hansa, the leading commercial organization, across the seven specifications of the main tables. The baseline estimate is stable throughout. In the full sample, the divergence is larger for Hansa cities: the triple interaction is negative and significant for both outcomes once trend terms are included. The full-sample interaction is identified from cross-regional variation in commercialization away from the border, so we interpret it as a descriptive local slope rather than a structural parameter. In the border sample, which compares neighboring cities with similar prior development, the interactions are statistically insignificant. For construction, the interaction is positive and insignificant; for political autonomy, the insignificant interaction remains negative but is both substantially attenuated and more imprecisely estimated.

D.2.2.3 Military Conflict

Military conflict is a central theme in the literature on European state-building and economic development (Tilly 1990; Hoffman 2015). In our context, conflict could play two distinct roles: as a confounding factor that pre-dates the divergence we document, or as a mechanism for the post-1350 divergence. We address each of these possibilities in turn.

We start by considering whether pre-existing differences in conflict could confound our main analysis. In the main text, we present evidence suggesting no differential pre-trends in conflict (Figure IV). To further probe the confounding effects of conflict, we test for and find no differences across regions in city-level military destruction either before the Black Death,

Table D11: Urban Divergence and Peasants' War

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcomes: Construction and Autonomy						
	All Cities				100 km Border		
Panel A. Construction Activity							
Concentrated East × Post 1350	-0.08***	-0.10***	-0.16***	-0.18***	-0.21***	-0.22***	-0.23**
	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
Peasant War × Post 1500	-0.07	-0.07	-0.06	-0.06	-0.24**	-0.27**	-0.25**
	(0.06)	(0.06)	(0.06)	(0.06)	(0.12)	(0.12)	(0.13)
Peasant War × East × Post 1500	-0.04	-0.04	-0.09	-0.08	-0.07	-0.05	-0.01
	(0.07)	(0.07)	(0.07)	(0.07)	(0.11)	(0.10)	(0.11)
Panel B. Political Autonomy							
Concentrated East × Post 1350	-0.07***	-0.09***	-0.23***	-0.27***	-0.24**	-0.25***	-0.20**
	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.09)	(0.09)
Peasant War × Post 1500	-0.01	-0.00	0.02	0.03	-0.02	-0.04	-0.08
	(0.04)	(0.04)	(0.04)	(0.04)	(0.09)	(0.09)	(0.10)
Peasant War × East × Post 1500	0.24***	0.22***	0.19***	0.16***	0.23***	0.23***	0.30***
	(0.06)	(0.05)	(0.05)	(0.05)	(0.08)	(0.08)	(0.08)
Observations	22500	22500	22500	22500	6850	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table replicates the estimates examining urban construction and political autonomy in Tables I and II including interactions as specified in Equation 12. Exposure to the Peasants' War is measured using data from Blickle (1981).

using data from Cantoni (2020). This finding holds when we compare all cities and when we focus on cities along the Elbe border.

One could still wonder whether differences in select large-scale wars could shape the outcomes we trace. The two most significant wars and plausible candidates during our study period are the Hussite Wars and the Polish-Lithuanian-Teutonic War, however, the timing and location of these conflicts rule them out as potential causal factors.

The Hussite Wars between adherents to Hussite Christianity and royal-catholic troops broke out in the 1420s. The timing and location of the Hussite wars indicate they are not plausible confounders in our analysis. In terms of timing, the major battles were towards the end of the 1420s, whereas we document an economic divergence dating to the mid-1300s using granular data on city construction (Figure I). In terms of location, the Hussite wars were largely outside our study area and enter our study area only in: Saxony, where we observe an attenuated divergence (Section VII.B); in Bavaria and Franconia, i.e. West of the border; and in Silesia, in the far East, outside the 100 km border where we document large effects. The Hussite conflict thus did not shape development over the periods and locations where our analysis detects the divergence.

The Polish–Lithuanian–Teutonic War also played out almost entirely outside our study area in the early 1400s. The conflict led to destruction and protracted crisis in the Teutonic Order's territories (Henning 1964, p. 41). The main conflict played out in the Order's territories in East Prussia, outside our study area. The region of Neumark, which we do study and borders the territory of the Teutonic Order, arguably was affected via spillovers.

Table D12: Urban Divergence and Thirty Years' War

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcomes: Construction and Autonomy						
	All Cities				100 km Border		
Panel A. Construction Activity							
Concentrated East × Post 1350	-0.07***	-0.11***	-0.16***	-0.19***	-0.22***	-0.23***	-0.23**
	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
Thirty Years War × Post 1600	0.01	0.01	0.01	0.01	0.03	0.01	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.06)
Thirty Years War × East × Post 1600	-0.04	-0.06*	-0.05*	-0.05	-0.08	-0.08	-0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.06)
Panel B. Political Autonomy							
Concentrated East × Post 1350	-0.06***	-0.09***	-0.24***	-0.27***	-0.23**	-0.24**	-0.19**
	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.09)	(0.09)
Thirty Years War × Post 1600	-0.10***	-0.09***	-0.08***	-0.08***	-0.07**	-0.05	-0.04
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Thirty Years War × East × Post 1600	0.02	-0.02	-0.03*	-0.02	0.00	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Observations	22500	22500	22500	22500	6850	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table replicates the estimates examining urban construction and political autonomy in Tables I and II including interactions as specified in Equation 12. We measure exposure to the Thirty Years' War using all conflicts between 1618 and 1648, as documented by Cantoni and Weigand (2021).

However, our findings do not depend on the inclusion of data from this limited region. Further, this conflict started in 1409, half a century after we first document a divergence.

Next, we investigate whether conflict acted as a mechanism for the divergence. One possibility, consistent with our main argument, is that political fragmentation in the West fostered more frequent, smaller-scale conflicts between cities and lords as cities vied for autonomy. Indeed, our main analysis shows that such conflicts did increase differentially in the West after the Black Death. A related hypothesis is that the divergence was driven by a general shift in large-scale warfare, as emphasized by Hoffman (2015). To test this, we replicate our main difference-in-differences specification using a comprehensive measure of all documented conflict events from Cantoni and Weigand (2021) as the outcome variable. The results, presented in Table D15, show a differential increase in the overall frequency of conflict in the West after 1350, but not in our border sample. This suggests that while specific types of conflict related to local political contestation may have been a channel, a general increase in the intensity of warfare was not the primary mechanism driving the divergence.

More broadly, the changing nature of warfare may have been a crucial scope condition for our findings. A primary advantage of large, centralized states is their capacity for resource mobilization for war. In the late medieval period, however, warfare was highly labor-intensive. By drastically increasing the cost of labor, the Black Death may have eroded the main military advantage of concentrated states. We acknowledge that this could provide a background condition for our findings.

Table D13: Urban Divergence and Pre-1350 Hansa Membership

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All Cities				100 km Border		
Panel A. Construction							
Concentrated East × Post	-0.08***	-0.09***	-0.14***	-0.17***	-0.24***	-0.24***	-0.26**
	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
East × Post × Hansa	-0.01	-0.46**	-0.47**	-0.47**	0.42	0.46	0.51
	(0.08)	(0.19)	(0.19)	(0.19)	(0.29)	(0.29)	(0.32)
East × Post × Hansa × Trend		-0.15*	-0.15*	-0.14*	0.13	0.14	0.23*
		(0.08)	(0.08)	(0.08)	(0.13)	(0.13)	(0.14)
Observations	22500	22500	22500	22500	6850	6850	6850
Mean Outcome	0.27	0.27	0.27	0.27	0.24	0.24	0.24
Panel B. Political Autonomy							
Concentrated East × Post	-0.07***	-0.08**	-0.22***	-0.26***	-0.23**	-0.24**	-0.18*
	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.10)	(0.09)
East × Post × Hansa	0.04	-0.35***	-0.32**	-0.32**	-0.19	-0.17	-0.21
	(0.07)	(0.13)	(0.13)	(0.13)	(0.20)	(0.19)	(0.23)
East × Post × Hansa × Trend		-0.23***	-0.21***	-0.20***	-0.11	-0.10	-0.05
		(0.06)	(0.07)	(0.06)	(0.09)	(0.08)	(0.10)
Observations	22500	22500	22500	22500	6850	6850	6850
Mean Outcome	0.62	0.62	0.62	0.62	0.59	0.59	0.59
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Agriculture Controls	No	No	Yes	Yes	Yes	Yes	Yes
Trade & Population Controls	No	No	Yes	Yes	Yes	Yes	Yes
Local Shock Controls	No	No	No	Yes	Yes	Yes	Yes
Cultural Controls	No	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table interacts the difference-in-differences terms with pre-1350 membership in the Hanseatic League. Panel A examines the construction indicator of Table I; Panel B examines the political autonomy index of Table II. Specifications and samples follow those tables: columns 1-4 examine all cities, adding the trend terms (column 2), the geography, agriculture, trade, and population controls (column 3), and the local-shock and cultural controls (column 4); columns 5-7 restrict to cities within 100 kilometers of the border with the full control set, adding latitude-cell × time fixed effects (column 6) and ruler × time fixed effects (column 7). The specification is fully saturated in Hansa interactions: Hansa × Post enters in column 1, and Hansa × Trend and Hansa × Post × Trend enter from column 2, from column 3 as part of the trade controls; East × Trend × Hansa is included but not reported. Standard errors in parentheses allow for arbitrary spatial correlation within 50 kilometers following Conley (1999).

D.2.2.4 Famine

Major famines struck Europe in the years 1315-1317. Harvest failures interacted with cattle-born diseases and reduced the population by as much as 10% in this period (Campbell 2016, pp. 258-9; Rösener 2012; Bennett and Hollister 2006, p. 362).

For these famines to explain the regional divergence, it would be necessary for either (1) the direct impact of famines to vary regionally or (2) these famines to have regionally varying implications reflecting other differences across regions. Historical research indicates that the famine and disease-related shocks of the early 1300s did not vary across regions

(Campbell 2016) and affected "East and West Germany in the same way" (Henning 2020, p. 412 – our translation). Indeed, our evidence shows that city-level economic and political development was similar before and after these shocks before the Black Death, including for similar border cities. We also find no observable regional shift in the level or trend of economic activity associated with the famines in the early 1300s.

In addition, the famines of the early 1300s had implications for urban development that were unlike those of the Black Death. The famines led to increases in grain prices and lower real wages, unlike the Black Death. Moreover, the Black Death "achieved what even the Great European Famine of 1315–22 had been unable to bring about, namely a big and enduring positive check to human populations" (Campbell 2016, p. 14, 108, 166).

D.2.3 Migration and Regional Sorting

D.2.3.1 Potential Sorting Before the Shock

It is natural to wonder whether regional sorting before the Black Death may have shaped the process we study. It is possible that the rulers or the settlers who established themselves in Eastern territories before the Black Death may have had distinctive characteristics and propensities, which interacted with the shock to relative prices.

It is possible that rulers in the East were distinctive. For example, it is conceivable that Eastern rulers were more predisposed or exposed to forms of "authoritarianism" and for this reason responded differentially to the Black Death shock. Our granular comparisons across neighboring border cities subject to the same ruler are designed to absorb and rule out this form of potential omitted variable bias.

It is also possible that Western settlers and urban dwellers who selected into the East were distinctive. The fact that we find few if any regional differences in city-level political development and collective action before the Black Death is, we argue, significant but does not rule out unobserved, underlying differences that became salient after the shock to relative prices. Further, direct evidence on the underlying preferences and capacities for collective action of settlers and urban dwellers are not available. However, there is a rich body of narrative evidence on Western the migrants who moved East before 1350 and the environment they chose to relocate to. It is widely recognized by historians that personal and collective freedom were high in Eastern territories before the Black Death and that extensive freedoms in the East induced migration from the West (Sections II and C.2; Barraclough 1957). This evidence suggests to us that, if anything, migrants would have been selected on a "taste" for freedom and not on characteristics that predisposed them to submission.

Table D14: Military Destruction Across Regions When Pandemic Struck

	(1)	(2)	(3)	(4)	(5)	(6)
	All Cities			Within 100 km of Border		
	β East	SE	Mean	β East	SE	Mean
Military Destruction 1200-1350	0.00	(0.01)	0.07	-0.00	(0.02)	0.05

This table presents regression estimates examining differences in exposure to military conflict between concentrated Eastern and fragmented Western cities in models that mirror Figure IV. "Military Destruction" is the number of large-scale military conflicts that incurred destruction of capital and financial losses.

Table D15: Conflict Dynamics across Regions after 1350

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcomes: Conflict						
	All Cities				100 km Border		
Concentrated East × Post	-0.05**	0.05	-0.14**	-0.20***	-0.02	-0.04	0.06
	(0.02)	(0.04)	(0.06)	(0.07)	(0.08)	(0.07)	(0.08)
Concentrated East × Trend		0.01	0.02	0.03	0.01	0.01	0.01
		(0.01)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
Concentrated East × Post × Trend		-0.04**	0.01	-0.00	-0.03	-0.03	-0.04
		(0.02)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)
Observations	22500	22500	22500	22500	6850	6850	6850
Mean Outcome	0.20	0.20	0.20	0.20	0.14	0.14	0.14
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table estimates the differential change in conflict patterns after 1350 using specifications that mirror our main results in Tables I and II. We measure conflict using all conflicts between as documented by Cantoni and Weigand (2021).

D.2.3.2 Potential Sorting After the Shock

Migration may have been an underlying channel for the divergence in urban construction we estimate. The close integration between East and West may have facilitated reverse migration, which could have contributed to supporting the new equilibrium after the Black Death over time. Table D16 uses data based on individual-level information on elites from the *Deutsche Biographie* to test for differential migration patterns across the border after the shock. In column 1, we observe an increase in the share of migration out of Eastern regions after the shock. However, this increase is driven by the trend after the shock (column 2), suggesting that regional migration was a result and not a cause of changes in the divergence in development across regions. Further, we find no evidence of differential sorting across regions once time-varying controls are included (column 3) or when we study cities at the border (columns 4–7). While we interpret these findings cautiously as providing suggestive evidence that differential regional migration did not trigger the observed divergence, we acknowledge the inferential limitations imposed by the nature of the underlying data and its limited sample size.[102]

D.3 Inference

D.3.1 Standard Errors

Our baseline regression analysis in Table I estimates standard errors allowing for spatial correlation within 50 kilometers. Our results are robust to other common approaches, such as using different distance thresholds for spatial HAC standard errors or clustering at various geographic levels. Table D17 presents our analysis with standard errors clustered at the city

[102]Note that, we observe only 654 individuals between 1200 and 1500 for which we have information on the places of birth and death.

Table D16: Regional Sorting after the Shock

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcome: Share of Cross-Border Migration						
	All Cities				100 km Border		
Concentrated East × Post	0.02***	-0.01	-0.00	-0.01	-0.02	-0.02	-0.00
	(0.01)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Concentrated East × Trend		0.00	0.00	0.01	0.01	0.01*	0.00
		(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Concentrated East × Post × Trend		0.01***	0.00	-0.00	-0.01	-0.01	-0.00
		(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	22500	22500	22500	22500	6850	6850	6850
Mean	0.02	0.02	0.02	0.02	0.04	0.04	0.04
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Trade Controls	No	No	Yes	Yes	Yes	Yes	Yes
Local Shock Controls	No	No	No	Yes	Yes	Yes	Yes
Cultural Controls	No	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table presents regression estimates in which the outcome is the share of cross-border migration. The unit of analysis is the city-half-century from 1200 through 1699. Columns 1-4 examine 2,250 German-speaking cities. Columns 5-6 examine 685 cities within 100 kilometers of the border between "East" and "West." "Concentrated East × Post" interacts an indicator for Eastern cities and an indicator for time periods from 1350 forwards. "Concentrated East × Trend" interacts an indicator for Eastern cities with a time trend measured in centuries. Control variables in all specifications as in Table I. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following Conley (1999).

and grid-cell level, as well as spatial HAC standard errors allowing for correlation within 50 kilometers (our baseline), 100 kilometers, and 200 kilometers. We also employ SCPC (Spatial Correlation Principal Components) adjusted standard errors adjusted for arbitrary forms of stationary spatial dependence Müller and Watson (2022; 2023).

To test and adjust for the possibility of spurious inference generated by strong spatial dependence, we further implement the low-frequency spatial-unit-root diagnostics and the LBM-GLS correction of Müller and Watson (2024), using the `spur` commands provided by Becker, Boll, and Voth (2025). The procedure first applies the low-frequency stationarity (LFST) test to each variable of interest. If the null hypothesis of stationarity ($I(0)$) is rejected, we then assess the evidence for a spatial unit root using the low-frequency unit root (LFUR) test. When a series appears to be non-stationary (i.e., the $I(0)$ null is rejected while the $I(1)$ null is not), we render it stationary by applying the generalized spatial differencing implied by the Lévy-Brownian GLS (LBM-GLS) transform. Subsequent regressions on these transformed variables use SCPC projection standard errors, ensuring asymptotically valid inference under arbitrary spatial correlation.

We first apply these diagnostics to our pre-shock political fragmentation measure, with results reported in Table D18. In the full sample (Column A), the LFST test strongly rejects the null of stationarity, while the LFUR test fails to reject the null of a spatial unit root ($p = 0.35$). This indicates strong spatial dependence, suggesting that standard inference may be insufficient. When we restrict the sample to the border region (Column B), the evidence for non-stationarity persists, with the LFST test still rejecting the null of stationarity.

Table D17: Standard Errors of Shifts in Construction and Autonomy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcomes: Construction and Autonomy						
	All Cities				100 km Border		
Panel A. Construction Activity							
Concentrated East × Post	-0.08	-0.10	-0.16	-0.18	-0.22	-0.22	-0.23
Clustered SE (City)	(0.01)	(0.02)	(0.04)	(0.05)	(0.08)	(0.08)	(0.11)
Clustered SE (Grid Cell)	(0.02)	(0.03)	(0.04)	(0.04)	(0.07)	(0.06)	(0.10)
Spatial SE (50km)	(0.01)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)
Spatial SE (100km)	(0.02)	(0.04)	(0.05)	(0.06)	(0.08)	(0.08)	(0.10)
Spatial SE (200km)	(0.02)	(0.05)	(0.06)	(0.06)	(0.08)	(0.08)	(0.09)
Spatial SE (SCPC)	(0.01)	(0.02)	(0.04)	(0.05)	(0.08)	(0.08)	(0.11)
Panel B. Political Autonomy							
Concentrated East × Post	-0.07	-0.09	-0.23	-0.27	-0.24	-0.24	-0.19
Clustered SE (City)	(0.02)	(0.02)	(0.03)	(0.04)	(0.06)	(0.06)	(0.09)
Clustered SE (Grid Cell)	(0.03)	(0.03)	(0.06)	(0.05)	(0.08)	(0.07)	(0.08)
Spatial SE (50km)	(0.01)	(0.03)	(0.06)	(0.06)	(0.10)	(0.09)	(0.09)
Spatial SE (100km)	(0.02)	(0.04)	(0.07)	(0.07)	(0.11)	(0.10)	(0.09)
Spatial SE (200km)	(0.02)	(0.05)	(0.07)	(0.06)	(0.09)	(0.09)	(0.08)
Spatial SE (SCPC)	(0.01)	(0.02)	(0.04)	(0.05)	(0.08)	(0.08)	(0.09)
Observations	22500	22500	22500	22500	6850	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table replicates the estimates examining urban construction and political autonomy in Tables I and II using different methods of computing standard errors.

However, once we account for fine-grained spatial heterogeneity by including grid-cell or ruler fixed effects (Columns C and D), we can no longer reject the null of stationarity, suggesting these fixed effects absorb much of the strong spatial trend. Given the non-stationarity in our main cross-sectional specification (Column A), we perform a robustness check by applying the LBM-GLS transformation. After this transformation and using SCPC standard errors, the estimated east-west difference in political fragmentation remains statistically significant, confirming the robustness of our finding.

Table D18: Spatial Dependence Diagnostics for Political Fragmentation

	A: All Cities	B: Within 100 km	C: Grid-cell FE	D: Ruler FE
Concentrated East	-0.15**	-0.21***	-0.80***	-0.74***
	0.06	0.06	0.03	0.04
p-value for H_0: I(1) (LFUR test)	0.35	0.50	0.12	0.11
p-value for H_0: I(0) (LFST test)	0.00	0.01	0.20	0.39
Observations	2250	2250	685	685

This table presents regression estimates for the pre-shock difference in political fragmentation and spatial dependence diagnostics for the outcome variable. Diagnostics follow Müller and Watson (2024) and are implemented using the `spur` package of Becker, Boll, and Voth (2025). Panel B reports p-values for the LFUR test of a spatial unit root (H_0: I(1)) and the LFST test of stationarity (H_0: I(0)). Standard errors in parentheses.

We next apply the diagnostic procedure to our main panel outcomes, construction and political autonomy, reporting mean p-values across time periods in Table D19. The results stand in stark contrast to our findings for the pre-shock cross-section. For both construction and autonomy, and in both the full and border samples, we consistently fail to reject the null of stationarity at conventional levels (all LFST test p-values are > 0.05). For instance, in the full sample, the LFST test yields p-values of 0.27 for construction and 0.78 for autonomy (Columns 1 and 2). Furthermore, in these specifications, the null of a spatial unit root is rejected. This suggests that our main panel outcomes are spatially stationary ($I(0)$). This is likely because the panel structure, which implicitly differences out time-invariant spatial patterns, and the inclusion of time-varying controls already account for the slowly-moving spatial trends that can cause spurious inference.

Table D19: Spatial Dependence Diagnostics for Main Panel Regressions

	A: Full Sample		B: Within 100 km Border	
	(1)	(2)	(3)	(4)
	Construction	Autonomy	Construction	Autonomy
Concentrated East × Post	-0.18***	-0.10***	-0.15***	-0.18***
	0.05	0.02	0.06	0.06
Concentrated East × Trend	0.08	-0.03	0.16	0.05
	0.08	0.05	0.15	0.17
Concentrated East × Post × Trend	-0.04	0.02	-0.04	-0.02
	0.07	0.04	0.11	0.13
p-value for H_0: I(1) (LFUR test)	0.05	0.01	0.21	0.27
p-value for H_0: I(0) (LFST test)	0.27	0.79	0.14	0.07
Observations	22500	22500	6850	6850

This table reports the main difference-in-differences estimates from Tables I and II (columns 4–5, with the full set of controls) for the full and border samples, together with spatial-dependence diagnostics for the panel outcome variables. Diagnostics follow Müller and Watson (2024) and Becker, Boll, and Voth (2025). For panel outcomes, we report the mean p-value from tests run on each period. The consistent failure to reject the null of stationarity (H_0: I(0)) in Panel B indicates that LBM-GLS transformation is not necessary for these panel specifications. Standard errors in parentheses.

D.3.2 Placebo Borders

To test whether our main result is driven by the specific political economy differences along the Elbe-Saale line rather than by rivers as geographic features, we conduct a placebo exercise. We replicate our baseline analysis using sixteen other major navigable rivers in our study area as borders and, as shown in Table D21, find no systematic post-1350 shifts in either urban construction or political autonomy. The estimated interaction effects are economically close to zero and almost uniformly statistically insignificant, reinforcing the interpretation that the divergence we document is unique to the Elbe-Saale political boundary. Note that we define treatment as an indicator equal to one if a city lies on the right bank when facing downstream and that the results are robust to instead defining sides by a global eastward orientation.

The placebo exercise examines outcomes. A separate question is whether political

Table D20: Elbe-Saale Rank among River Borders

	Elbe-Saale	Median Placebo River	Rank
All cities	28.1	2.2	2 of 17
100 km border sample	23.5	6.1	1 of 17

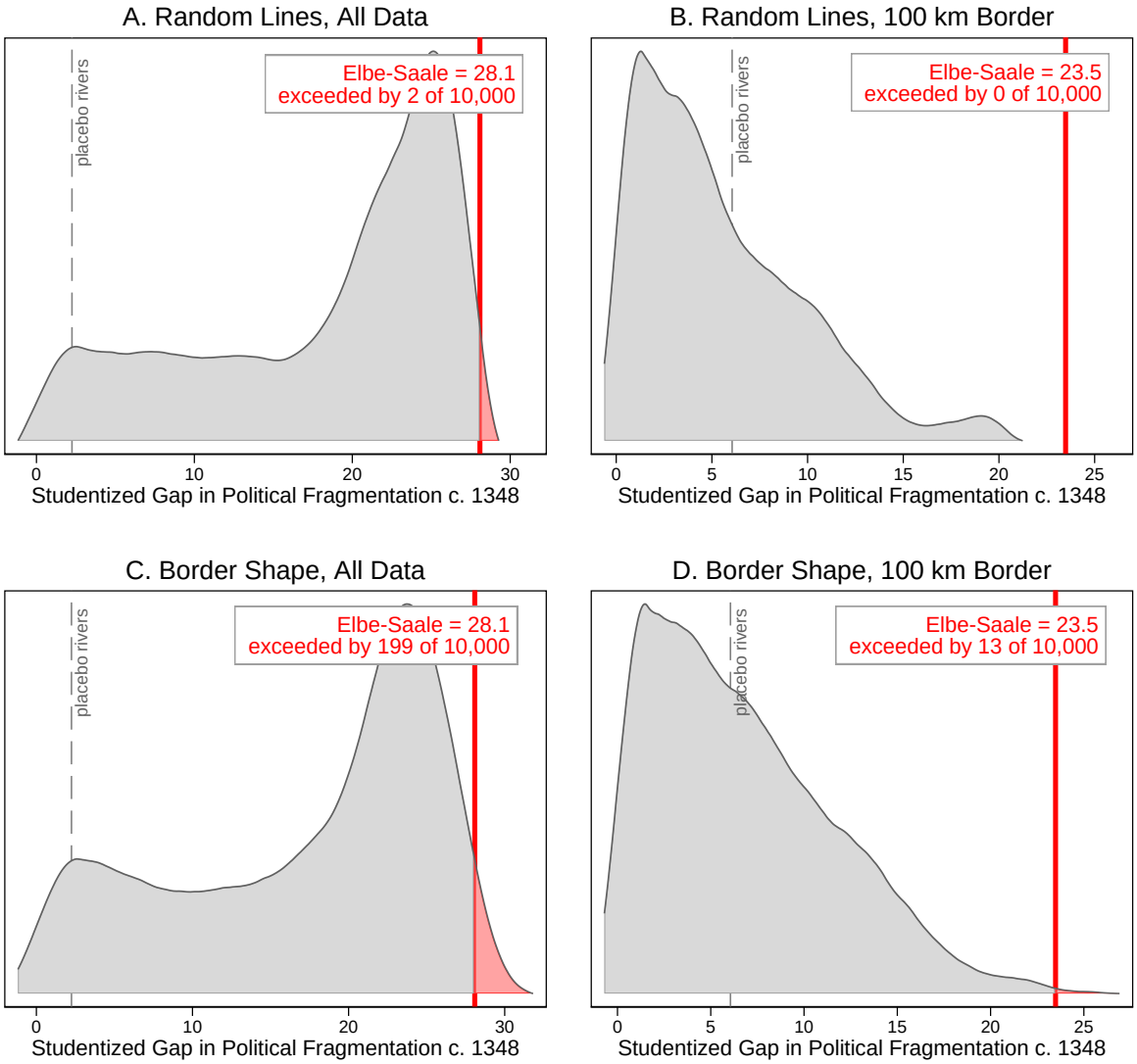
This table ranks the seventeen river borders, the Elbe-Saale and the sixteen placebo rivers of Table D21, by the studentized gap in political fragmentation c. 1348 across their banks. Placebo-river gaps are computed within the river's own region, as in Figure D9; the middle column reports their median. The Elbe-Saale ranks first of seventeen in the border sample and second in the full sample, behind the Inn; under exchangeability, an exact rank test yields $p = 1/17 = 0.059$ and $p = 2/17 = 0.118$.

fragmentation itself, the treatment underlying our comparison, breaks at the Elbe-Saale specifically rather than at rivers in general. We answer it with randomization inference.

We place 10,000 random borders through the study area, straight lines and random placements of the actual border polyline, each splitting cities into two sides at least as balanced as the actual border, and compute the studentized gap in mean fragmentation c. 1348 between the sides. Figure D9 locates the Elbe-Saale in the resulting distributions. Among cities within 100 kilometers of the line, the Elbe-Saale statistic is exceeded by none of the 10,000 random lines and by 13 of the 10,000 placements of the border shape; in the full sample, by two and by 199. The figure also marks the median studentized gap across the sixteen placebo rivers of Table D21, computed within each river's own region so the East-West break itself cannot contribute: 6.1 in the border sample and 2.2 in the full sample, against 23.5 and 28.1 at the Elbe-Saale. These comparisons are conservative: random borders that partially align with the actual divide embed the Elbe-Saale break itself. Among the seventeen river borders themselves, the Elbe-Saale ranks first in the border sample (Table D20), an exact rank p-value of $1/17 = 0.059$. In the full sample it ranks second, behind the Inn ($p = 2/17 = 0.118$); within 100 kilometers of the Inn, the gap is 7.8.

Figure D1 presents the underlying variation without estimation: the standard measure varies smoothly through the line, while the side-specific measure shifts sharply at the border.

Figure D9: Randomization Inference: the Fragmentation Gap at the Elbe-Saale



This figure locates the Elbe-Saale in the distribution of studentized gaps in mean political fragmentation c. 1348 across 10,000 random borders: straight lines through the study area in Panels A and B, and random placements of the actual border polyline in Panels C and D. Panels A and C use all cities; Panels B and D use cities within 100 kilometers of the border. Draws leave at least 25 percent of cities on the smaller side, as the actual border does. Red lines mark the Elbe-Saale statistic, and the shaded tails count the random borders that exceed it. Dashed lines mark the median placebo river of Table D21, computed within the river's own region.

D.3.3 Political Fragmentation: IV & Heterogeneity

Our analysis of political economy mechanisms studies the relationship between city development and political fragmentation measured continuously (Section VII.B). We estimate regressions that mirror our comparison of concentrated Eastern and fragmented Western cities but focus on political fragmentation interactions as causal variables. We

Table D21: Shifts across Placebo River Borders

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outcomes: Construction and Autonomy						
	All Cities				100 km Border		
Panel A. Construction Activity							
Placebo River × Post	0.00	0.00	-0.01*	0.00	-0.02	-0.02	-0.01
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Placebo River × Trend		0.00	-0.00	0.00	-0.01	-0.00	-0.01
		(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Placebo River × Post × Trend		-0.00	0.00	-0.00	0.01	0.01	0.01
		(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Panel B. Political Autonomy							
Placebo River × Post	-0.00	0.01**	0.01	0.00	0.00	0.00	-0.01
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Placebo River × Trend		-0.00	-0.01**	-0.00	0.00	0.01	-0.00
		(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Placebo River × Post × Trend		-0.00	0.00	-0.00	-0.00	-0.00	0.01
		(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Observations	360000	360000	360000	360000	55500	55500	55500
River FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes	No
Ruler × Time FE	No	No	No	No	No	No	Yes

This table reports estimates for placebo borders defined by major navigable rivers within our study area, examining post-1350 shifts in urban construction (Table I) and political autonomy (Table II). The specifications replicate all columns of the baseline tables and replace the interaction with the East indicator by an indicator for being located on one geometric side of each of the sixteen major navigable rivers in 1500 documented in Kraus et al. (1959), excluding the Elbe and Saale. Sides are defined with respect to the river's local tangent at the city's nearest point. "Placebo River" equals one if the city lies on the right bank when facing downstream. Results are robust to defining sides instead by a global eastward orientation. The estimation sample is constructed by stacking city–river observations: for each river, we compute the side indicator for every city, pool the sixteen river-specific samples and include river fixed effects. This yields 360,000 observations in the full sample and 55,000 in the 100 km border sample.

estimate models:

$$y_{it} = \beta_1(frag_i \times post_t) + \beta_2(frag_i \times trend_t) + \beta_3(frag_i \times post_t \times trend_t) \\ \beta_4(x_i \times post_t) + \beta_5(x_i \times trend_t) + \beta_6(x_i \times post_t \times trend_t) + \alpha_i + \delta_t + \epsilon_{it} \tag{13}$$

We focus on the parameter estimate β_1, which estimates how outcomes shifted differentially in the post-1350 period for cities exposed to greater political fragmentation. We estimate (13) using OLS and two instrumental variable strategies, which examine variation in political fragmentation induced by (i) a geographic location East of the Elbe-Saale line and (ii) by lineage extinction in the period just before the Black Death. We instrument for political fragmentation and include instruments for each political fragmentation interaction in our IV analysis. Our estimates control for the time-varying implications of distance from navigable rivers measured as a running variable, Hansa membership, and city plague shocks (the x_i), as well as city and time fixed effects (α_i and δ_t).

Lineage extinctions as an instrument. Our second IV strategy uses exogenous lineage extinctions that shifted political fragmentation in a short period before the Black Death. A lineage became "extinct" when a ruling family failed to produce an heir. This constituted "the most common impediment to territorial survival" and was "largely uncontrollable" (Cantoni, Mohr, and Weigand 2024, p. 17). Thus "biological chance played a decisive role in the formation of a territory"(Andermann and Weiß 2018, p. 219 – in our translation).

Lineage extinctions shifted political fragmentation because larger territorial rulers often incorporated affected territories into their realm. For example, the House of Wittelsbach experienced their greatest territorial growth due to the extinction of several Bavarian dynastic families over the 1100s and 1200s. In feudal law, territorial holdings of lineages dying without heirs were often transferred to the next higher ruler (Krieger 1989, p. 2039; Schlinker 2012, p. 4). Indeed, historians indicate that lineage extinction was a leading cause for greater territorial concentration: "There was a tendency to greater concentration, but it arose not from a policy of "state-building" but from the gradual extinction of many medieval families of the upper nobility."[103] (Brady 1998, p. 233; see also Schubert 1998, p. 200)

When we use lineage extinctions in a short time window before the Black Death as a shifter of political fragmentation, we find that a one standard deviation increase in the number of lineage extinctions per neighbor in the 50 years before the Black Death results in a 5pp. decrease in political fragmentation. The instrumental variable estimates reveal that differences in political fragmentation shifted by ruler deaths strongly and positively predict shifts in construction and political development after the Black Death.

Interpretation and Identification. A basic result frames what follows: we find no significant relation between local variation in political fragmentation and urban development before the Black Death, and a significant relation only afterwards. This is consistent with a setting in which political structure lay latent before the shock. Our interpretation of the IV estimates reflects three considerations: how to interpret the estimated effect, the exogeneity of lineage extinctions, and whether the instrument survives exclusion diagnostics.

1. Political fragmentation as a proxy. Political fragmentation is a fundamental, observable *proxy* for what North (1990) terms the political and institutional "matrix." The identifying assumptions are that the post-1350 variation in our instruments is conditionally exogenous and shaped development only through its influence on this matrix, which we measure with political fragmentation. The historical analysis strongly suggests that political fragmentation shaped differences in an interlocking set of political and institutional factors, whose effects our quantitative analysis does not disaggregate. Our argument thus emphasizes the causal role of politico-institutional differences that were shaped by geography and lineage extinctions.[104]

2. Instrument Exogeneity. To consider the exogeneity of the lineage extinctions we study how the "Deaths" IV and political fragmentation were related to our outcomes before

[103]Lineage extinctions were a common phenomenon. In our sample, around 15% of all cities have been directly affected by a lineage extinction between 1300 and 1350. Below, we document that lineage extinctions in the period before the Black Death shifted local political fragmentation levels downwards.

[104]The question of attribution here is similar to that raised by measures of institutions studied in the previous literature, such as indices of constraints on executive authority and property rights, and the civil or common law origins of legal systems. These measures of institutions also capture central components in interrelated "institutional matrices" and are emphasized to model and analyze complex reality.

the Black Death. Table D22 shows the instrument and endogenous variable are not correlated with outcomes before 1350: neither predicts differences in city-level development during the period preceding the Black Death. This independence is necessary but not sufficient for identification.[105]

Table D22: IV and Outcomes Before the Black Death

	(1) Construction	(2) Politics	(3) Construction	(4) Politics
Deaths	-0.0024	-0.0039		
	(0.0048)	(0.0058)		
Fragmentation			-0.0030	0.0110
			(0.0341)	(0.0420)
Observations	6750	6750	6750	6750
Time FE	Yes	Yes	Yes	Yes

This table presents regression estimates examining the relationship between the instrument, political fragmentation, and pre-period outcomes. We restrict the sample to the periods before the Black Death (1200-1300) and estimate random-effects regressions of construction and political autonomy with half-century fixed effects. Columns 1-2 use the level of the standardized instrument "Deaths" per neighbor; columns 3-4 use the level of political fragmentation in 1348, the endogenous regressor of Table III. Standard errors in parentheses are clustered by city.

3. Exclusion restriction diagnostics. Questions about the exclusion restriction are natural, particularly for the IV using lineage extinctions. We support it in two steps: with (A) controls for the specific channels through which succession crises might act directly and (B) diagnostics that bound *any* remaining off-channel effect without naming its source.

A. Named channels. It is plausible that dynastic shocks could impact development through other channels, such as military conflict and uncertainty. These channels are not specific to the post-shock era, and we address the most immediate one, military conflict, directly. Military conflict might respond to lineage extinctions and shape city development independently of political fragmentation. We therefore treat conflict as an alternative channel of the extinction shock, not as a consequence of fragmentation, so that controlling for it is informative rather than a bad control. Our results are robust to controlling for conflict (Columns 1–2 of Table D23). Accounting for the time-varying impact of lagged political fragmentation in 1200 (Columns 3–4), the estimates remain positive and significant, if less precisely estimated. These controls address a key channel we can name, but they cannot by themselves rule out an off-channel effect we have not specified, which motivates the channel-agnostic diagnostics below.

B. Bounding the unnamed channel. Two diagnostics examine this remaining failure mode: whether an off-channel effect is present and how large a violation the results tolerate.

- *Is a direct effect present?* A direct off-channel effect would appear where fragmentation did not respond to dynastic deaths. Splitting cities at the median absolute change in

[105]The instrument reflects extinctions in 1300–1348, just before the shock. We regress earlier outcomes (1200–1300) on this exposure and find no relationship. Because 1300–48 extinctions cannot causally affect earlier development, this is a test of exogeneity: a relationship would arise only if extinction exposure were correlated with persistent city characteristics that also shaped earlier growth. The null is consistent with exposure being uncorrelated with such persistent characteristics.

local fragmentation (Table D24), dynastic-death exposure predicts post-1350 declines only where fragmentation responded most. For construction the below-median coefficient is zero (0.000, s.e. 0.024) against −0.035 (0.015) above; a direct effect outside the fragmentation channel would appear in the below-median group and does not, though this compares a subsample selected on realized response. For political autonomy the below-median estimate (−0.033, s.e. 0.024) is imprecise and not distinguishable from zero, so the split is sharp for construction and inconclusive for autonomy. Because the split is by realized response, we present it as a descriptive probe rather than a test.

- *How large a violation is tolerated?* Both estimates survive a sizable exclusion violation, tolerating off-channel effects of 43 percent of the reduced form for political autonomy and 11.5 percent for construction, though this gap overstates how much the outcomes differ in robustness. Following Conley, Hansen, and Rossi (2012), we report the maximal direct effect, as a share of the reduced form, under which the IV estimate retains significance, assuming the direct effect is proportional to the first stage. The two IV estimates are equal to two decimals ($\hat{\beta} = 0.60$ for both outcomes), and the gap in bounds reflects the nonlinear sensitivity of the plausible-exogeneity threshold to the estimate's initial distance from the significance cutoff ($t = 2.56$ vs. 2.72; see Table III for the IV estimates). The instrument's first stage is common to both outcomes ($F = 89.85$), so the difference in bounds arises entirely at the second stage. These tolerated shares thus establish an ordering, not a ratio—both estimates survive, autonomy with more slack—and the fourfold spread reflects the nonlinearity of the bound near the cutoff rather than a fourfold difference in the strength of identification.

Corroborative role. The IV estimates for our two outcomes (construction and political autonomy) have offsetting robustness profiles: each clears a meaningful bar on one diagnostic. We therefore treat the instrument as corroborative: the border and within-ruler designs identify the divergence without it, so neither the 11.5 percent bound nor the subsample probe governs the paper's identification.

We also report descriptive evidence on the competitive environment rulers faced

Table D23: Political Fragmentation IV Regression Estimates

	(1) Construction	(2) Politics	(3) Construction	(4) Politics
Political Fragmentation × Post	0.54**	0.56***	0.64*	0.78**
	(0.22)	(0.20)	(0.36)	(0.33)
Observations	22500	22500	22500	22500
City and Time FE	Yes	Yes	Yes	Yes
Dynamic Conflict Control	Yes	Yes	No	No
Lagged Fragmentation Control	No	No	Yes	Yes

This table presents IV estimates examining the robustness of the effect of political fragmentation on construction and political autonomy using ruler deaths as an instrument. The regressions mirror Table III, but include additional time-varying controls. Columns 1-2 control for conflict dynamically. Columns 3-4 control for the time-varying impact of lagged political fragmentation in 1200. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers.

Table D24: Dynastic Shocks: Outcome Shifts by Fragmentation Response

	(1)	(2)
	Construction	Political Autonomy
Exposure × Post, Below-Median Response	0.000	-0.033
	(0.024)	(0.024)
Exposure × Post, Above-Median Response	-0.035**	-0.029**
	(0.015)	(0.013)
Observations	22500	22500
Mean Outcome	0.27	0.62
City and Time FE	Yes	Yes
Time-Varying Controls	Yes	Yes

This table interacts standardized dynastic-death exposure with the post-1350 indicator, separately for cities whose absolute change in local political fragmentation between 1300 and 1350 lies above the median and cities at or below it. The median absolute change is 0.028; cities at or below the median (1,125 cities) form the below-median group and cities above it (1,125 cities) the above-median group. The absolute value classifies cities by whether their local political structure moved, in either direction. The dependent variables are urban construction (column 1) and political autonomy (column 2), as in Tables I and II. Specifications include group-specific trend and post-trend interactions of exposure and the time-varying controls of Table III. Standard errors in parentheses allow for arbitrary spatial correlation within 50 kilometers following Conley (1999).

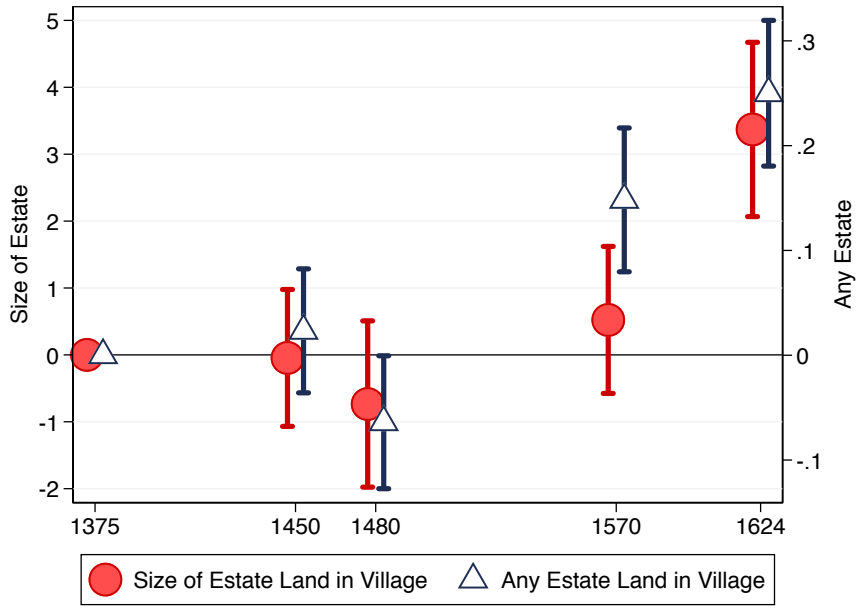
(Table D25). For each city, we count the distinct territories entering and exiting its 100-kilometer environment per half-century, from the annual ruler panel. Cities in the fragmented West saw consistently more rulers arrive and disappear than cities in the concentrated East, before and after the Black Death, in the full sample and along the border. In our framework we do not model ruler replacement; it would constitute an off-equilibrium threat, analogous to entry threats in contestable markets (Baumol 1982), and the entry and exit of rivals in a city's environment is the observable counterpart of that threat. Realized transfer of the rule over a given city is rare, about one percent of city-years, and shows no differential shift at the shock.

Table D25: Ruler Entry and Exit in the Local Environment

	Pre-Black Death (1250–1349)		Post-Black Death (1350–1699)	
	West	East	West	East
Panel A. All Cities				
Entries	11.8	8.2	7.6	4.5
Exits	13.6	6.2	11.8	7.6
Panel B. 100 km Border				
Entries	9.8	9.1	7.6	6.0
Exits	13.0	9.9	11.4	10.0

This table reports the mean number of distinct territories entering and exiting a city's 100-kilometer environment per half-century, from the annual ruler panel. A territory enters in a half-century if it holds at least one city within 100 kilometers of the reference city in that half-century but not in the previous one; an exit is the reverse. Entries and exits are counted per half-century and averaged per city within each window. Panel A uses all cities; Panel B uses cities within 100 kilometers of the border.

Figure E1: The Development of Estate Agriculture



This figure presents estimates of time-period fixed effects in panel regressions examining estate agriculture in Brandenburg, conditional on village fixed effects (see text). The first outcome is the size of noble estates, measured in *Hufen* units in a village-year. *Hufen* were units of land equivalent to 40 acres or 16 hectares. The second outcome is an indicator for any estate agriculture. The data comprise 1,540 observations on land use at the village-year level across 342 villages observed in the censuses of 1375, 1450, 1480, 1570, and 1624 (Carsten 1947). Standard errors are clustered by village used to construct 95% confidence intervals.

E Agricultural Divergence

E.1 Land Devoted to Noble Estates

Our baseline analysis documents the expansion of coercive agriculture after 1500 using quantitative evidence on the development of nobles' estates measured by construction events for estate buildings. To further study the size and presence of individual estates, we examine administrative data on the allocation of land to estate agriculture at the village level. We rely on the Brandenburg land book (*Landbuch*) and cadastral tax register (*Schosskataster*), which record village-level data on the total number of 40-acre plots and the number of plots allocated to noble estates in 1375, 1450, 1480, 1570, and 1624 (Carsten 1947). We study the time-series variation in the number of plots devoted to estate agriculture and the presence of estate agriculture, measured as a binary variable.[106] We estimate regressions: $y_{it} = \alpha_i + \delta_t + \epsilon_{it}$. The outcome is the number of 40-acre plots in a village devoted to estate agriculture or an indicator for any estate agriculture. The α_i and δ_t are village and time fixed effects.

Figure E1 presents our estimates. We find that the amount of village land allocated to

[106] We focus on the time-series because there is limited cross-sectional variation in Brandenburg in agricultural endowments and because the data are exclusively from the provinces of Brandenburg located East of the Elbe (see Carsten 1947). Thus, unfortunately, we do not have data on the allocation of village land in the Altmark, the Brandenburg province located West of the Elbe, where we do find relatively more "Western" patterns of urban economic and political development after the Black Death.

estate agriculture and the probability of any estate agriculture were effectively unchanging from the late 1300s across the 1400s, and rose systematically only in and after the 1500s. Several observations frame our interpretation of the evidence. First, these data confirm estate agriculture developed over a century after the divergence in urban political economy that we document. On this point, we quantitatively verify an observation on timing made by historians (e.g. Anderson 1974; Carsten 1954). Second, patterns in other regions where estate agriculture developed are consistent with the evidence from Brandenburg. In village-level data from Mecklenburg, which became a center of export agriculture using coerced labor in the 1600s, production on estates also remained limited after the Black Death: we find that less than 10% of plots were on *demesne* estates in the second half of the 1500s, when the overall number of occupied plots was 19% below pre-1348 levels.[107] Third, within Brandenburg, estate agriculture developed most post-1500 in areas where urban development declines were largest 1350-1500.

E.2 Outside Options in Labor and Product Markets

We next examine channels through which differences in urban development offered outside options and shaped coercive agriculture. We focus on the establishment of textile industries and urban agricultural markets, which provided key outside options for the rural labor market and product market, respectively. Our treatment variable is the interaction between (i) cross-sectional variation in urban development in the period after the shock (1350-1499) and (ii) time period indicators ($x_i \times time_s$). This specification is motivated by the fact that urban development shifted 1350-1499 while coercion in agriculture did not, and by the fact that persistent differences in urban outside options were established in this period. We estimate:

$$y_{it} = \alpha_i + \delta_t + \sum_s \beta_s (x_i \times time_s) + u_{it} \tag{14}$$

Figure E2 presents our estimates. We find that cross-sectional, post-shock variation in the establishment of textile industries and agricultural markets (1350-1499) became negative predictors of coerced agriculture after 1500, when coercion itself increased.[108] The results indicate that the urban divergence shifted outside options in labor markets and shaped the subsequent divergence in agriculture.

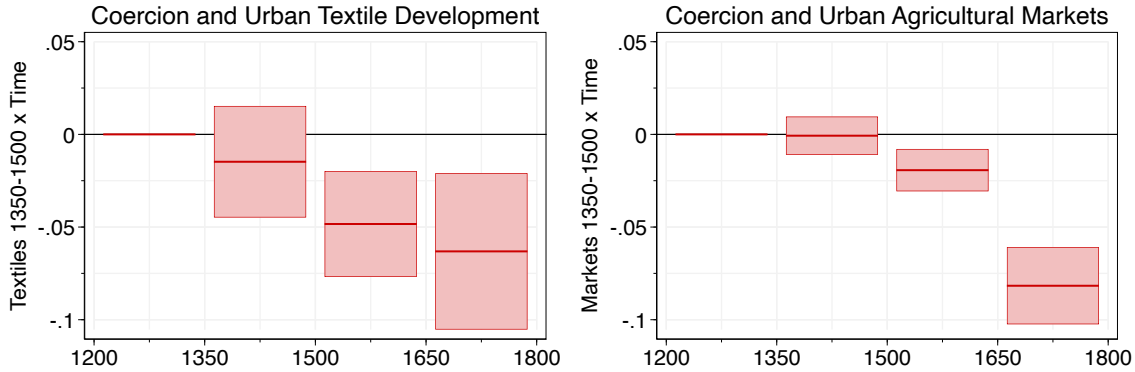
E.3 Timing of Agrarian Divergence

We examine the timing of agrarian divergence in more detail and present event-study estimates for coercive agricultural estates (Figure E3). Relative to 1200, the concentrated East and the West show no significant difference in estate agriculture through 1500.

[107] We calculate these figures from village-level data from Mecklenburg compiled by Maybaum (1926). We compare the number of plots devoted to estate agriculture to the number of total plots in a village over the period 1550-1599. The Mecklenburg data do not allow us to track estate agriculture in the panel, but we find a 19% reduction in total land under cultivation at the village level relative to pre-1350 levels.

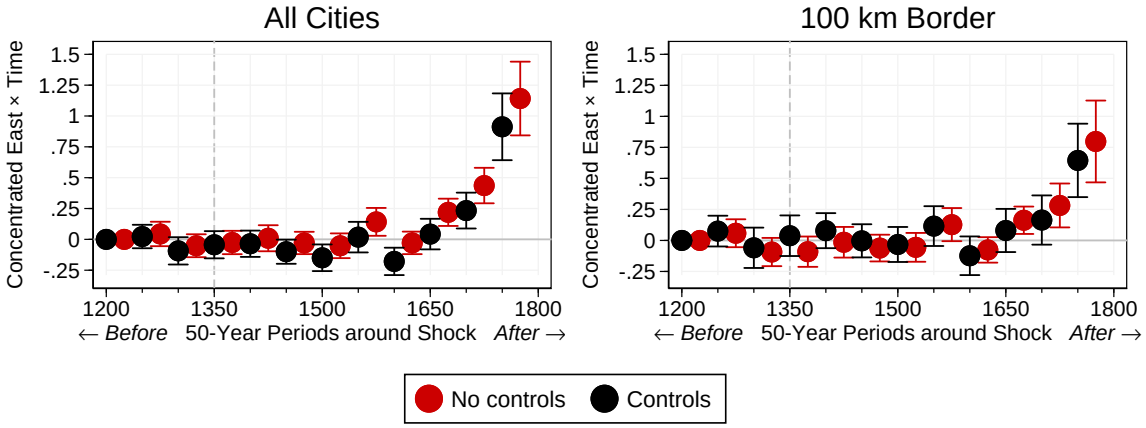
[108] We find a subset of urban markets studied by Cantoni and Yuchtman (2014) were salient outside options.

Figure E2: Urban Markets After the Shock and the Emergence of Coercive Agriculture



This figure plots estimates of the response of coercive agriculture to post-shock cross-sectional differences in urban development by plotting the β's estimated: $y_{it} = \beta_{1350}(x_i \times d_{1350}) + \beta_{1500}(x_i \times d_{1500}) + \beta_{1650}(x_i \times d_{1650}) + \alpha_i + \delta_t + u_{it}$, where: x_i are textile industry events or urban markets for agricultural products in 1350-1500; the d_t are indicators for 150-year periods; α_i and δ_t are city and half-century fixed effects. Standard errors allow for arbitrary spatial correlation within 50 kilometers, following Conley (1999).

Figure E3: Expansion and Emergence of Coercive Agriculture



This figure presents event-study estimates for coercive agricultural estates. The left panel uses all cities and the right panel cities within 100 kilometers of the border. Red markers report estimates with city and half-century fixed effects only. Black markers add the geography and trade controls of Column 3 of Table I, interacted with the post-1350 indicator and the post-1350 trend. Estimates give the difference between the concentrated East and the West in each half-century relative to 1200, the omitted period. The dashed line marks 1350. 95% confidence intervals are constructed using spatial standard errors following Conley (1999).

E.4 Agrarian Politics

While our investigation shows that the urban divergence predicts the agricultural divergence, influential historians hypothesize that the agricultural divergence may have reflected differences in the balance of power between the landowning nobility and tenant farmers less connected to the urban sector (Brenner 1976) and that peasant revolts may indicate the power of tenant farmers (Blickle 1988; Bierbrauer 1980).

In the context of our study, several observations are important. First, there were relatively few peasant revolts in German-speaking Europe before 1500. Bierbrauer (1980) provides the most comprehensive body of evidence and records 43 peasant revolts between 1350 and 1499

in the territories we study. With the exception of the Bundschuh movement of the late 1400s in Southwest Germany, far from the Elbe and Saale, none of these remotely compare in magnitude to the Peasants' Revolt of 1381 in England or the German Peasants' War (1524-6).[109] Second, there is no evidence of differential peasant mobilization along the Elbe boundary over the decades immediately following the Black Death, when we observe sharp changes in urban political economy, so far as we are aware. Third, before 1500 almost no revolts are observed along the Elbe border: all but two conflicts are located south of Frankfurt am Main; all but four conflicts are located south of Stuttgart.[110]

[109]Two of the 16 revolts recorded by Bierbrauer (1980) were very small local affairs, indicated only in footnotes. A majority of the revolts recorded occur in Switzerland and Alsace, outside our study area.

[110]We note that revolts are imperfect proxies for political power: the absence of revolts does not necessarily imply low bargaining power; the presence of revolts does not necessarily imply high bargaining power (Wunder 1978). However, along this key dimension, which previous scholarship emphasizes, we do not see differences in rural politics preceding or predicting the changes in urban politics in our analysis.

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