Political Competition and Economic Divergence:
European Development Before and After the Black Death*

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Abstract

We document how the Black Death activated political competition and led to economic divergence within Europe. Before the pandemic, economic development was similar in Eastern and Western German cities despite greater political fragmentation in the West. The pandemic led to a divergence that reflected regional differences in politics. After the pandemic, construction and manufacturing fell by 1/3 in the East relative to underlying trends and the Western path. Politics institutionalizing local self-government advanced in the West, but not in the East. This divergence is observed across otherwise similar cities along historic borders and foreshadows a subsequent divergence in agriculture.

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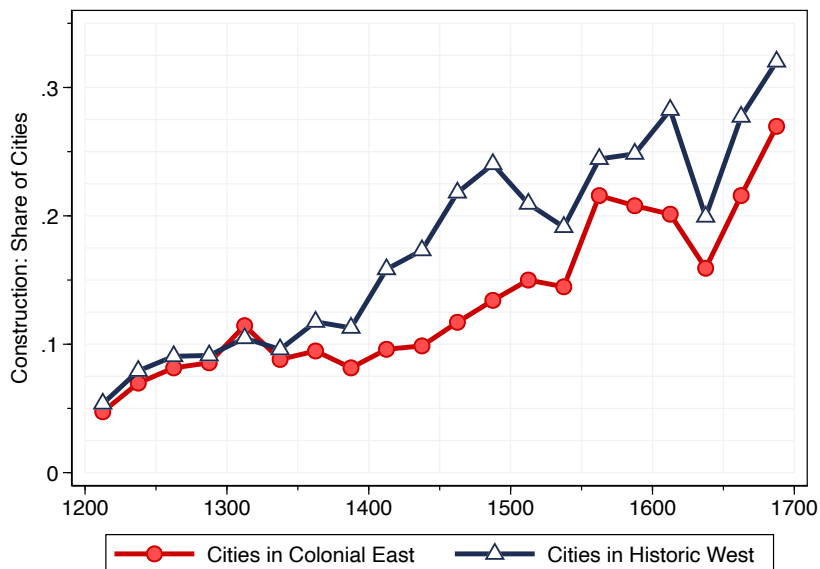
1   Introduction

Political competition is widely viewed as a deep factor driving long-run growth across history. The economic rise of Europe is often attributed to political competition stemming from its historically fragmented state system (Scheidel 2019; Jones 2003; North 1981; Weber 1978).

In this paper, we study how an economic shock activated political competition as a driver of development. We focus on the Black Death pandemic of the mid-1300s. This massive shock to labor supply shifted income away from rulers and landowners and towards cities and labor, inducing distributional conflict and a major divergence in development. While the pandemic led to urban growth, increased bargaining power for labor, and the erosion of feudal institutions in Western Europe, in Eastern Europe it led to depressed urban development and ultimately to new legal restrictions on the mobility of rural labor (Acemoglu, Johnson, and Robinson 2005; North and Thomas 1973; Ogilvie 2014).

We document that political competition directed the response to the shock and that the development of self-governing cities was a leading factor shaping the divergence between the subsequently dynamic West and stagnant East. Political competition among rulers was higher where territories were more fragmented. This had the potential to strengthen the bargaining position of self-governing cities, which are famously viewed as playing a pivotal role in Europe's economic and political transformation on the path to capitalism (Weber 1978; Marx 1965; Anderson 1974). Before the pandemic, political territories were more fragmented in Western Europe than in Eastern Europe, but urban economic activity and city-level institutions followed similar trends and levels. The Black Death induced conflict over rents and made underlying regional political differences relevant. In the West, cities secured greater institutional autonomy and grew. In the East, the political and economic development of cities was depressed. Construction and manufacturing in Eastern cities fell by 1/3 relative to prior trends and the trajectory in the West, as illustrated in Figure 1.

We focus our study geographically where history offers a unique setting for causal identification and where the key cleavage emerged, in German-speaking Europe. We study urban development on either side of the Elbe River, which was a historic border within Germany that divided the more politically fragmented West of Germany from the less fragmented East. This setting enables us to compare development across otherwise similar

Figure 1: 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*. Eastern cities are located East of the Elbe River or its tributary the Saale ($n = 760$). Western cities are located West of the Elbe and the Saale ($n = 1,490$).

and neighboring cities before and after the Black Death. Historians emphasize that, in the period we study, the Elbe River became "the most significant socio-economic divide in Europe" (Kriedte 1983, p. 21-2), "one of Europe's sharpest lines of social and economic demarcation" (Postan 1973, p. 334), and generated the "pivotal comparative case" (Brenner 1976, p. 56) for the political economy of development.[1]

The regional difference in political fragmentation and the border that we study reflect a prior *colonial* process. This process integrated territories East of the Elbe into German-speaking Europe economically and culturally. Between the 900s and 1100s, expansionary German rulers developed planned cities and promoted mass migration by Western German settlers into a less fragmented political geography East of the Elbe (Aubin 1966; Szűcs 1983; Postan 1973). 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 colonial East "organised on rational territorial principles" (Barraclough 1957, pp. 251, 279). In the equilibrium before the pandemic, labor was scarce in Eastern territories whose rulers offered Western settlers a good deal, including city institutions, to relocate (Bartlett 1995).[2]

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[1]It is canonical in economic history that the Elbe River, and its tributary the Saale, traced an economic dividing line (Knapp 1887; Postan 1973; Makkai 1975; Szűcs 1983; Ennen 1987; Ogilvie 1996).

[2]We term these territories the "colonial East" following Kuhn (1956), Aubin (1966), and Bartlett (1995).

To study the political economy response to the Black Death, we gather evidence on economic and political development at the city, regional, and village level. We focus on evidence covering 2,000+ cities in German-speaking Europe between 1200 and 1700. First, we construct measures of the local political fragmentation of territories which indicate the potential competition among rulers and bargaining power of cities. Second, to trace economic development, we gather data on construction and manufacturing at the city- and city-sector-time level. Third, we gather evidence on the "essential features" of the self-governing European city (Pirenne 1956, p. 204; Weber 1978, p. 1226), recording: (1) the establishment of city councils, mayors, and charters; (2) the rules governing the selection of councils; (3) jurisdiction rights and appointment rules for city courts; and (4) collective action, including the formation of city alliances, conflicts between cities and lords, and the passage of specifically *autonomous* city laws that promoted economic activity and were legal acts of "anti-lordly revolution" (Ebel 1953, p. 11; Isenmann 2014, p. 437). Fourth, we assemble data on the adoption of laws restricting the mobility of rural labor and on the allocation of land in villages. We also gather novel data on plague outbreaks in cities.

We first document the differences in political fragmentation between the colonial East and the historic West. We find political fragmentation was sharply lower in the East overall and when we compare Eastern and Western cities along the Elbe River border. Despite this regional difference in political structure, major city-level institutions did not vary across regions before the Black Death. We observe no regional differences in the development of city charters, city councils, mayorships, and city law courts before the pandemic.

To study economic development, we focus on the pattern of urban construction, which provides uniquely fine-grained evidence on economic activity.[3] We find that the levels and trends of construction were similar on either side of the Elbe before the Black Death and diverged afterwards, using difference in differences analyses. Our findings hold controlling for potentially time-varying impacts of agricultural potential and distance from the border, measured as a running variable, which could be imagined to matter in ways that trended or shifted in time. Our results also hold when we compare cities along the Elbe border, which had similar access to transport, geographic endowments, plague exposure, and urban density.

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[3]The role of construction as a key urban industry (Le Goff 1988, p. 56) and indicator of city growth in Germany (Enders 2008, p. 95) motivate our focus. Population data are fragmentary. Data on wages in Germany are almost entirely restricted to the period after 1350 and a handful of locations.

Within 100 kilometers of the border, we observe 343 Eastern and 342 Western cities which exhibit (1) differences in exposure to political fragmentation, (2) similar economic trends before the pandemic, and (3) subsequent divergences in construction mirroring the pattern observed across historic Germany. In the manufacturing data, we observe a similar East-West divergence in the 1300s across Germany and along the Elbe boundary. The post-1348 divergence in manufacturing is largest in new industries and muted in established industries.

Where the economic divergence reflects a decline in Eastern cities, we find a political divergence driven by positive shifts in Western cities. Starting in the late 1300s, we find Western cities differentially and increasingly: developing major city institutions such as the council and mayoralty; securing jurisdiction for city courts; entering into alliances; engaging in conflict with lords; and passing autonomous laws. Narrative evidence indicates that these political changes supported economic activity (Isenmann 2014; Weitzel 2009). The divergence in politics is observed across Germany and along the Elbe border.

Evidence on differences in political fragmentation within the colonial East provides additional support for our interpretation. We find that in sub-regions within the East where political fragmentation was higher, and therefore closer to consistently high Western levels, the post-pandemic pattern of urban development was correspondingly more "Western."

Our analysis also addresses key questions concerning identification. The first natural question is whether spatially varying shocks may have driven the political economy divergence we document. The leading candidates are plague, trade, and military shocks, which would need to vary across regions to explain our results. However, our results hold when we compare neighboring cities along the Elbe border, which had similar geographic endowments, access to transport, and exposure to city-level plague and military shocks. Indeed, while a notable literature suggests the divergence was driven by trade shocks that increased demand for agricultural output starting around 1500 (Postan 1973; Wallerstein 1974; Wunder 1978), we observe a sharp divergence in the urban sector already after 1350.

The second natural question is whether the pandemic interacted with cross-sectional differences besides political fragmentation to shape the urban divergence. Our main analysis shows that the prior pattern of urban development was similar in Eastern and Western cities, including along the Elbe border where the religion, language, and cultural origins of the inhabitants were similar. However, an influential literature suggests that a regional difference

in *agrarian* political economy was the key factor directing the impact of the pandemic, and that the urban divergence was itself caused by dynamics in agriculture which resulted from struggles between peasants and landowning nobles (Acemoglu, Johnson, and Robinson 2005; Brenner 1976). Against this view, other leading historians argue that the urban divergence changed bargaining in agriculture and was the necessary prerequisite for major changes in the agrarian sector (Anderson 1974).

To consider whether agrarian political economy may have caused or responded to the urban divergence that we document, we study key dimensions of the agricultural sector: the development of noble estate agriculture at the village-level and the introduction of laws limiting the mobility of agricultural labor East of the Elbe. On each of these dimensions, an East-West divergence in agrarian development appears 150 years after the divergence in urban development which we document starting in the mid-1300s. The urban divergence we document thus predicts major changes in agriculture spatially and temporally.

Our investigation contributes new evidence on the role of political competition in long-run development. Political competition is widely viewed as a driver of growth (Weingast 1995; Besley, Persson, and Sturm 2010; Acemoglu and Robinson 2019). Political competition may constrain rulers, increase the share of income constituents retain, and foster the development of institutions that support growth (North 1981, p. 27). Indeed, the emergence of modern economic growth in Europe is believed to be a structural consequence of political fragmentation because it induced political competition (Scheidel 2019; Jones 2003). However, our study documents that an economic shock activated political competition as a causal factor in European development. We find economic performance was strong in areas with low political fragmentation in the equilibrium before the Black Death and that political fragmentation became a positive factor in growth after the shock to labor supply. Conceptually, our analysis uncovers how a shock to factor prices made differences in the price of politics salient. Empirically, we document that persistent political arrangements have implications that may vary with economic conditions, and that canonically pro-growth institutions acquired their implications through economic processes.

Our study provides some of the first quantitative evidence on one of the most important critical junctures in economic history. A large literature indicates that, 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 2005; Acemoglu 2008; Acemoglu and Robinson 2012; 2019; North and Thomas 1973; Postan 1973). Prior arguments frame the pandemic as a critical juncture in which a common shock interacted with pre-existing differences in agrarian class politics (Acemoglu, Johnson, and Robinson 2005; Brenner 1976).[4] Our investigation has a similar conceptual structure, but unlike prior work examines detailed quantitative evidence and identifies key dynamics running through the political economy of cities, which reflected and promoted the bargaining power of society *vis-à-vis* rulers, in the spirit of Acemoglu and Robinson (2019).[5]

Our analysis traces the development of a pivotal institution promoting economic and political autonomy, the European self-governing city. Strong, autonomous cities raised outside options for the peasantry and lowered the power of rulers and of the landed gentry (Acemoglu and Wolitzky 2011; Anderson 1974). Classic arguments by Weber (1978), Pirenne (1956), and Marx (1965) identify the self-governing city as a core *endogenous* institution that promoted pre-industrial growth and fundamentally set Europe apart from Asia on a path to capitalist economic organization. Recent research shows that grants of urban self-governance rights shaped the development of national political institutions in England (Angelucci, Meraglia, and Voigtländer 2022). In contrast, we study how a major exogenous shock shifted these processes and produced a divergence in economic development. We find evidence that supports the classic view that self-governing cities and contests over city institutions drove long-run development, including through their impact on the larger balance of power and spillovers across sectors (Marx 1965; Weber 1978; Carsten 1954).

Finally, we contribute to a literature on the historic impact of epidemics. Prior quantitative research documents that the Black Death led to growth and lower inequality in Western Europe (Jedwab, Johnson, and Koyama 2022; Voigtländer and Voth 2013a;b; Alfani 2021). During the Protestant Reformation, localized plague outbreaks, which did not drive large shifts in factor incomes, led to increased public goods provision in cities (Dittmar and Meisenzahl 2019). However, no previous quantitative research documents how the Black Death precipitated the political economy divergence that we observe within Europe.

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[4]Brenner's thesis is arguably 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 (Heller 2011; Anderson 2005; Epstein 2000; Harman 1998).

[5]Prior research examines cross-sectional evidence observed centuries after the changes in political economy that we study, almost without exception (Ogilvie and Carus 2014; Ogilvie 2014).

2 History

2.1 Political and Economic Development

Our analysis studies the economic and institutional development of cities in Europe before and after the Black Death, which hit in the 1340s. In the period we study, cities in Europe were politically subject to external feudal rulers, such as princes and counts, but were acquiring autonomous corporate rights: formal institutions that secured self-government, transformed the legal system, and supported economic activity.[6]

The self-governing city was one of the most important institutional innovations in the period we study and arguably all of economic history. 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.[7] 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). 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). However, urban self-government varied within Europe and was not binary: city institutions were contested, multidimensional, and developed differently across cities and regions within Europe.[8]

The institutions of urban self-government were endogenous. These institutions were developed and adopted because the prior regime, "could no longer suffice for the needs of a merchant population" (Pirenne 1956, p. 201; Marx 1965). Demand for these institutions could come from below and from above. Weber's (1978) evidence and theory emphasizes how urban autonomy was typically secured when city residents mobilized and seized power from

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[6]We provide a distilled discussion here and expand and clarify our historical analysis in Appendix B.

[7]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*.

[8]Thus Weber (1978, p. 1255) notes that, "depending upon the distribution of power, the previous agents of the city lord...also regained a share in the administration," and points to the "not infrequent" cases where the takeover from the lord was only partial and lords could appoint officers in city government.

their feudal rulers through revolutionary action from below.[9] However, institutions of city self-government were also established from above by lords aiming to attract merchants and craftsmen, establish new cities, and generate revenue and political power, especially East of the Elbe River (Barraclough 1957; Weber 1978; Bartlett 1995).

Political fragmentation promoted the rise of autonomous urban governance. Rulers competed over subjects and political fragmentation provided outside options to merchants and craftsmen. The fact that producers could move to another territory constrained rulers and promoted the bargaining power of cities (Scheidel 2019; Jones 2003; North 1981; Weber 1978; Landes 1998). In Europe, the "parcellization of sovereignty. . . alone permitted the political autonomy of the towns and their emancipation from direct seigneurial or monarchical control" (Anderson 1974, p. 193). Cities gained autonomy when able to, "take advantage of divisions among feudal lords and monarchs" (Lachmann 2000, p. 53).

There were political differences East and West of the Elbe River before the Black Death. Starting in the 10th century, German lords expanded their territories East across the Elbe and organized one of the largest processes of mass migration in medieval history.[10] Rulers established hundreds of cities and villages in planned programs designed to generate development, revenue, and power. Territorial lords employed entrepreneurs (*locators*) who planned the location and layout of cities and villages; tax incentives were offered to migrants; recruiting agents were sent to Western Germany and the Low Countries to promote migration; cities were established with self-government institutions granted from above (Kuhn 1956; Aubin 1966; Bartlett 1995). Migrants brought Western technology and culture to, and generated substantial revenue for the landowning nobility in, the less politically fragmented East. Postan (1973, p. 331) notes, "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." The homogeneity of city charters in the East reflects the territorial concentration in which Eastern cities developed and is an indicator of lordly power (Kuhn 1956, p. 85; Schulze 1966, pp. 349-50).

Historians suggest that economic trends were similar before the pandemic. Carsten (1947,

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[9]Weber (1978) repeatedly emphasizes the "revolutionary" and "illegitimate" nature of this "usurpation." Weber (1981, p. 324) stresses the parallel between the early bourgeois revolutions of the middle ages and institutional changes in our time: "The noble, the man of knightly station and feudal qualifications, is watched, deprived of the suffrage and outlawed, as the Russian bourgeoisie were by Lenin." See Appendix B.

[10]Migration may have been equivalent to 2% of German population in the 1200s (Bartlett 1995, p. 144).

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." Urbanists argue that absent the shock, cities in the East, "would have developed in a straight line" (Isenmann 2014, p. 211 – our translation).

The Black Death shifted the relative scarcities of and returns to factors of production. The return to labor rose and the return on landownership fell; the prices for urban products increased relative to prices for agricultural products, leading to a golden age for labor and an era of crisis for the landowning nobility and rulers who derived most of their revenue from agriculture (Abel 1978). The available evidence suggests that the initial patterns were similar in Western and Eastern Germany (Sundhaussen 1990, p. 53). However, systematic data on incomes in historic Germany are almost entirely restricted to the period after 1350 and a handful of cities. We review the available evidence on incomes and prices in Appendix E.

The interplay between the Black Death and political economy is the subject of debate. One argument suggests a causal sequence running from demographic shock to increased bargaining power for labor to pro-growth institutional change, as in Western Europe (North and Thomas 1973). Brenner's (1976) famous study focuses on how the relative power of peasants and lords in Eastern and Western Europe – divided by the Elbe – shaped divergent responses to this shock, a theme echoed by Acemoglu, Johnson, and Robinson (2005). Anderson (1974, pp. 252-3) argues that, "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."[11]

Cities shaped payoffs across sectors and the larger political balance. Cities famously provided an outside option for rural labor (Anderson 1974). Cities also acquired monopoly rights to trade and produce goods and services whose relative prices rose after the Black Death, for example, marketing, milling, and brewing rights. In addition, cities secured rights extending into power politics. The right to demolish castles was a "major political acquisition" (Weber 1978, p. 111). In Brandenburg, cities secured the legal right to destroy nobles' castles (Enders 2008). In the 1320s, Prenzlau received the legal guarantee that no

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[11]Acemoglu, Johnson, and Robinson (2005) note that Brenner's argument is controversial. Indeed, Anderson (2005, p. 275) observes that Brenner offers an "explanation of the origins of capitalism [that] pivots on agriculture alone." See also Enders (2008), Harman (1998), and Aston and Philpin (1985).

castles would be built in its environs (Keyser 5 vols. 1939-1974, Band 1, p. 622). After the Black Death, this changed East of the Elbe, as lords went on an offensive. By the 1430s the margrave of Brandenburg crushed city resistance, forced city authorities to submit at force of arms, and built a castle in Berlin, which contemporaries described as "the bridle on ancient liberties" (Carsten 1954). Just west of the Elbe River, the cities of Lüneburg and Hannover capitalized on rival lords' competition in the 1370s, entering a coalition, gaining the right to dismantle the lord's castle, and securing extensive self-governance and jurisdiction rights.

While we emphasize the interplay between the pandemic and political competition, cross-sectional differences in economic development could also be consequential. The fact that the Black Death was followed by a *decline* in wages in Iberia, has led scholars to argue that the consequences varied with the level of development and could be particularly adverse in less developed, frontier economies (Álvarez-Nogal, Prados de la Escosura, and Santiago-Caballero 2020). Motivated by this observation, our quantitative analysis documents that the divergence we study was not simply between a highly developed West and a frontier East. We observe divergence after the pandemic across Eastern and Western cities along the Elbe border where prior economic development, endowments, access to transport, and overall urban density were similar for cities with *ex-ante* different political fragmentation.

Cultural factors also had the potential to shape the process we study. However, in our quantitative analysis, we find a divergence between neighboring Western and Eastern cities along the Elbe border that were culturally Christianized and Germanized before the period we study.[12] 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 colonial East "replicated the social framework" of the West: "The net result of this colonialism 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

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[12]Our analysis below documents divergence after the Black Death across cities within 100 kilometers of the Elbe. German cultural dominance and Christianity were established in this area before 1200, when our analysis begins. In 1174 the Bishop of Magdeburg could write that in Jüterbog, over 100 kilometers East of the Elbe, "where pagan rites used to be celebrated...the Christian religion flourishes and the defence and protection of Christianity is firm and safe" (quoted in Bartlett 1995, p. 122). Historical evidence also indicates "Germanization was absolute" in provinces of Brandenburg more than 100 km East of the border (Bartlett 1995, p. 299). Below we test for and find no regional differences in church or monastery construction before the Black Death or in cities' distance to pre-Christian pagan shrines (Section 5 and Appendix C).

cultural frontier." However, while the Elbe was not a cultural border, regional differences in political fragmentation and in the formation of self-governing cities may have shaped local political cultures, including in ways likely to become consequential after the pandemic.

2.2 The Demographic Shock of the Plague

The Black Death delivered an immediate shock and initiated an era of recurrent plague outbreaks. 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).

The fact that the Black Death led to recurrent plague outbreaks is significant for the process we study. First, the repeated outbreaks prevented demographic recovery. Kelter (1953, p. 164 – our translation) observes, "The effect of the subsequent epidemics was that [the original shock] was not overcome. They, and most definitely they in particular, kept the crisis going." McNeill (1976, pp. 149-50) similarly argues that, "even the loss of as much as a quarter of the population did not, at first, make very lasting differences...the recurrences of the plague in the 1360s and 1370s altered this situation. Manpower shortages came to be widely felt...the socio-economic pyramid was altered." Second, cities that were not hit by the Black Death, were struck later. Würzberg and Nürnberg did not experience Black Death outbreaks but were hit in the late 1350s and in following years (Isenmann 2014, p. 77). Regensburg was struck "only" in 1357, 1371, 1380; Munich experienced outbreaks in 1356, 1380, and 1396 (Vasold 2003, pp. 295-7). These patterns have motivated historians to emphasize the larger demographic shock, which washed over initial differences.

Taken together, the historical evidence strongly suggests that the economically relevant shock for the dynamics we study was the overall decline in population after 1348, rather than local variation in the pandemic between 1348 and the early 1350s. Our quantitative analysis thus examines the pattern of development before and after the Black Death. Our key results are not driven by local variation in plague outbreaks, as we detail below.

2.3 Economic Borders and Regional Comparisons

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 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). Thus Scott (2001, p. 195) argues that the Elbe River, "marks no clear divide." We examine local heterogeneity below.

3 Data

We gather evidence on city and regional development between 1200 and 1699.

Construction. We use data on city-level construction collected from the *Deutsches Städtebuch*, building on Cantoni (2020) and Cantoni, Dittmar, and Yuchtman (2018). The *Städtebuch* provides encyclopedic coverage of the historical development of over 2,000 places that acquired formal city rights.[13] The data we construct record the timing (start dates) of major construction projects. We classify construction in three sectors: *private* comprises patrician homes and palaces, private merchant halls, and related buildings; *state* comprises town halls, city walls and bridges, and public buildings; *religious* comprises churches and monasteries. 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." Evidence on the timing of construction is relatively unambiguous.

Manufacturing. We construct data on manufacturing from the *Deutsches Städetebuch*, using each city's entry on economic development (*Die Wirtschaft*). We code individual

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[13]Following Cantoni and Yuchtman (2014), we examine all cities in the *Deutsches Städtebuch* except those in East-Prussia (Ostpreußen), which comprises the farthest Eastern finger of settlement in the *Städtebuch*.

activities by sector and use "manufacturing" as a shorthand for a range of industrial, craft, and fabrication activities. The five leading sectors in our analysis are: (1) textiles, (2) food, (3) leather, (4) apparel, and (5) metals. For example, we observe a fulling mill (*Walkmühle*) in Sobernheim in the Rhineland in 1375: this is a textile activity in the period 1350-1399. We observe an iron hammering works (*Eisenhammerwerk*) in Pfreimd, Bavaria in 1387: this is a metals sector activity. Our data record the *presence* of specific activities, but not employment or output. Our analysis focuses on observations we can date at the half-century level, that enable us to study the pattern of manufacturing at relatively high frequency.[14]

Politics. We gather information on politics from the *Deutsches Städetebuch*. We gather evidence on the "essential" political and institutional features that define the autonomous "Western city" (Weber 1978, p. 1226; Pirenne 1956).[15] First, we record the presence of major institutions, focusing on: city councils (*Rat*); mayors (*Burgermeister*); and city charters. Second, we construct information on the rules governing the selection of councils, recording whether the council: was elected; was co-opted (i.e. empowered to select its members); and formally provided for guild participation. Third, we gather information on city courts, including whether: courts were active; cities or lords had ultimate jurisdiction; and cities or lords controlled judicial appointments. Fourth, 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). Autonomous laws governed dimensions of 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).[16] To document and investigate the role of political competition, we gather information on the rulers of each city to construct measures

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[14]Some manufacturing observations are dated at the century level or in terms of eras (e.g. *Mittelalter*). We acknowledge the limitations in these data.

[15]Our data collection extends beyond Wahl's (2019) pioneering evidence on elections, representation, and guild participation in 282 cities. Bosker, Buringh, and van Zanden (2013) also provide data with a binary measure of participative city government ("communes"), but these data are restricted to larger cities and code Eastern German cities as having participative government when participation was absent. For example, these data code Berlin as a "commune" after the local lord crushed the city government militarily, built a new castle in the city, and eliminated any autonomous government (see Carsten 1954).

[16]The "autonomous laws" comprise: *Wilküren*, *Beliebungen*, *Stadtsatzungen*, *Stadtstatuten*, *Rezesse*, *Rats-* or *Stadt(ver)ordnungen*. See Appendix A for details.

of local political fragmentation, which indicates potential political competition. We gather corroborating information on each city's type or "family" of charter.[17]

Potential crop yields. We measure potential rye yields under rain-fed agriculture within 25 kilometers of each city using the FAO's _Global Agro-Economic Zones_ database.

Plague. We code city-level plague outbreaks recorded in the _Deutsches Städtebuch_.

4 Differences in Political Fragmentation

We begin our analysis by investigating regional differences in political fragmentation.

Figure 2 maps the cities in our analysis, indicates the boundary formed by the Elbe and Saale Rivers, and clarifies how we measure political fragmentation. Cities were subject to external rulers such as princes and counts: over 400 different rulers held legal claims over cities in 1348. We measure city-level political fragmentation as follows. Within 100 kilometers of each city, we calculate the share of cities belonging to each observed ruler; compute a city-specific Herfindahl index (HHI) of political concentration; and define local "political fragmentation" as: $1 - HHI$. Figure 2 illustrates the local variation in political rule around one representative city (see also Appendix A).
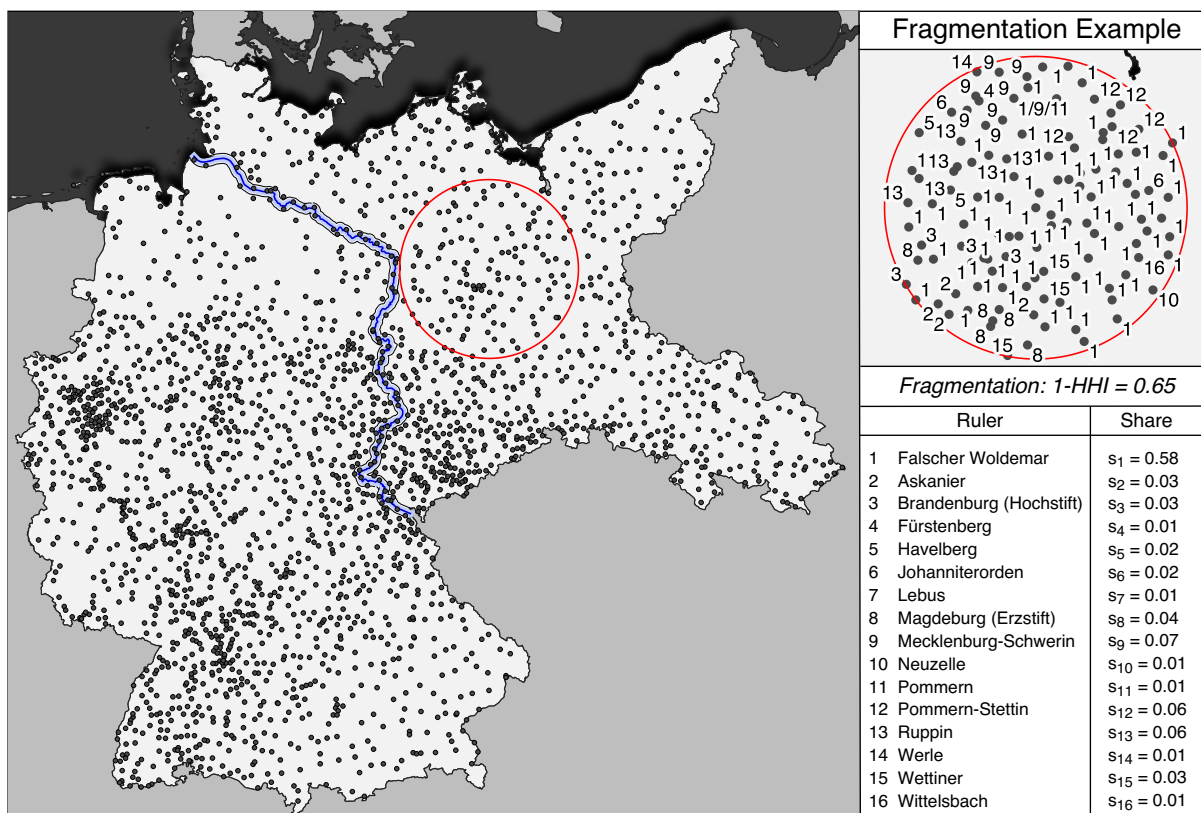
Figure 3 summarizes the regional differences in political fragmentation, embodied in the distribution of our local measure. We observe a sharp difference in political fragmentation between Eastern and Western cities, as shown in Figure 3. Panel A shows that there is effectively no overlap in the distribution of political fragmentation for historic Western and colonial Eastern cities.[18] Panel B, documents that political fragmentation dropped sharply at the border. The sharp difference in political fragmentation we uncover in the data 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 comparison between the colonial East and the historic West.[19]

The observed differences in political fragmentation are persistent and stable over time,

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[17]For information on city charters and "families" of city law we rely on Cantoni (2020). We also thank Davide Cantoni for sharing data on territorial rulers.

[18]Our baseline analysis assumes the relevant measure of fragmentation is across cities within a region. However, the pattern of regional differences in fragmentation we document is robust to using alternate measures, such as the share of a city's neighbors subject to a different ruler and other definitions of neighbors. Our results also hold when we construct political fragmentation in such a way that, for cities sufficiently close to the border, our measure reflects the fragmentation of jurisdictional claims on both sides of the river.

Figure 2: The Regional Distribution of Cities and Political Fragmentation

Fragmentation Example

Fragmentation: 1-HHI = 0.65

	Ruler	Share
1	Falscher Woldemar	$s_1 = 0.58$
2	Askanier	$s_2 = 0.03$
3	Brandenburg (Hochstift)	$s_3 = 0.03$
4	Fürstenberg	$s_4 = 0.01$
5	Havelberg	$s_5 = 0.02$
6	Johanniterorden	$s_6 = 0.02$
7	Lebus	$s_7 = 0.01$
8	Magdeburg (Erzstift)	$s_8 = 0.04$
9	Mecklenburg-Schwerin	$s_9 = 0.07$
10	Neuzelle	$s_{10} = 0.01$
11	Pommern	$s_{11} = 0.01$
12	Pommern-Stettin	$s_{12} = 0.06$
13	Ruppin	$s_{13} = 0.06$
14	Werle	$s_{14} = 0.01$
15	Wettiner	$s_{15} = 0.03$
16	Wittelsbach	$s_{16} = 0.01$

This figure maps the cities we study and indicates the Elbe-Saale border. Colonial Eastern cities are defined as those East of the Elbe River or its tributary the Saale ($n = 760$). Historic Western cities are defined as those West of the Elbe-Saale ($n = 1,490$). Within 100km of the border, there are 343 Eastern and 342 Western cities. The figure illustrates the local variation that enters our measure of political fragmentation in 1348 for a representative city, circled and magnified at right. This figure records the ruler of a given city and their corresponding share within 100km. Appendix A provides further detail on how measures of political fragmentation are calculated.
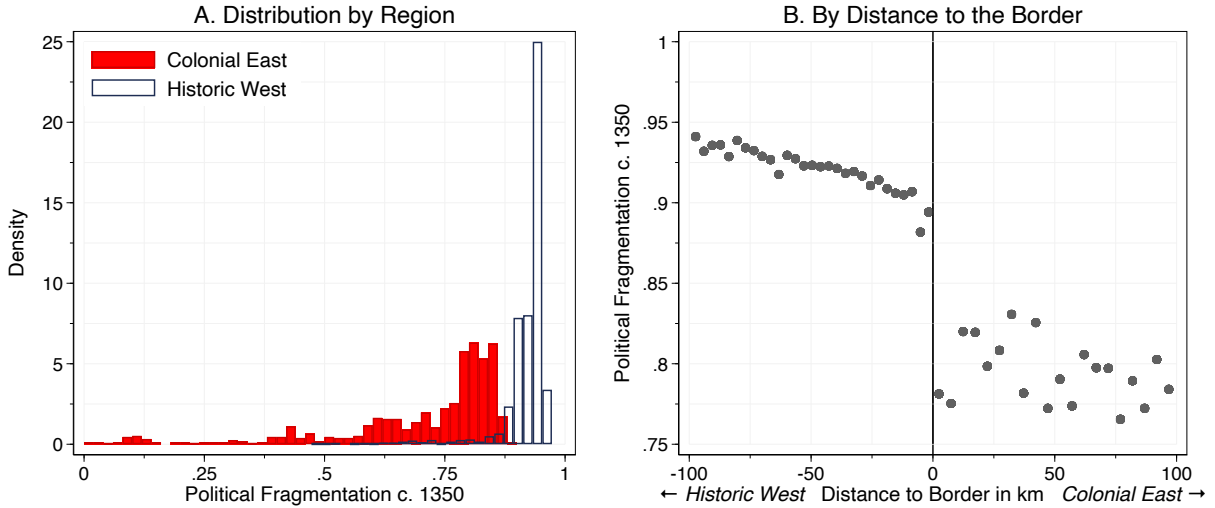
especially along the border. We do, however, observe a small number of Eastern cities exposed to Western levels of political fragmentation, notably in Saxony, which we explore in heterogeneity analysis below.

The first natural question is whether there were cross-sectional regional differences in other dimensions of economic and political life. To characterize regional differences and similarities when the Black Death hit, we compare cities in Eastern and Western Germany as of the mid-1300s, and estimate how political and economic dimensions of urban life shift for Eastern cities in regression models of the form: $y_i = \alpha + \beta(\text{colonial east}_i) + \epsilon_i$.

Appendices A and C provide maps and document local political fragmentation in further detail.

[19]On the border offering a sharp cut, see also Knapp (1887), Postan (1973), Makkai (1975), Szűcs (1983), Ennen (1987), Ogilvie (1996), Bartlett (1995), and Perkins (1986, p. 287).

Figure 3: Political Fragmentation in the Colonial East and the Historic West

This figure plots the distribution of city-level political fragmentation in the colonial East and historic West in 1348. For each underlying city i, city-level political fragmentation is measured by: $1 - HHI$, a Herfindahl index of the concentration of feudal rule (rulers' sovereignty claims) across all cities within a 100 kilometer radius in a given region. Panel A graphs the distribution of political fragmentation by region for all cities. Panel B presents a binned scatter plot of city-level political fragmentation against distance from the border for the 343 Eastern and 342 Western cities located within 100 km of the border.

We quantitatively confirm there were systematic regional differences in political fragmentation before the Black Death in Table 1. We find corroborating evidence that the fragmentation of city charter "families" was also significantly lower in the East, reflecting the territorial concentration under which cities developed and indicating lordly power.[20] These regional differences in political fragmentation indicate the lower level of potential political competition among rulers, and the lower bargaining power of cities, in the colonial East.[21]

In contrast, we observe no differences in major city-level institutions including city charters, councils, and the presence of mayors. While Colonial 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.[22]

Similarly, we observe limited if any economic differences across regions before 1350. We find no evidence of differences in construction or manufacturing between Eastern and Western

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[20]We measure charter fragmentation analogously by constructing Herfindahl indices of the local concentration of charters belonging to different legal families, such as Magdeburg Law or Lübeck Law.

[21]Our analysis and interpretation follow North (1981, p. 27), who 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."

[22]In Appendix C we discuss other aspects of city institutions, including formal market rights.

Table 1: Development Differences in the Colonial East When the Pandemic Struck

	(1)	(2)	(3)	(4)	(5)	(6)
		All Cities			Within 100 km of Border	
	β: Diff.	SE	Mean	β: Diff.	SE	Mean
Political Fragmentation						
Political Fragmentation c. 1350	-0.22***	(0.03)	0.85	-0.13***	(0.02)	0.85
City Charter Fragmentation c. 1350	-0.17***	(0.03)	0.81	-0.17***	(0.06)	0.76
City Institutions						
City Charter by 1350	-0.02	(0.06)	0.47	-0.02	(0.08)	0.35
Council by 1350	0.01	(0.04)	0.25	0.03	(0.07)	0.21
Mayor by 1350	-0.06**	(0.03)	0.13	-0.00	(0.02)	0.08
Economics						
Construction 1200-1349	-0.01	(0.03)	0.30	0.01	(0.06)	0.28
Manufacturing 1200-1349	-0.00	(0.01)	0.06	0.01	(0.01)	0.03
Urban Density: Neighbors 50km	-11.69	(7.44)	49.36	6.96	(10.10)	52.83
Rye Yields (Log)	0.09***	(0.03)	8.35	0.04	(0.05)	8.37
Shock						
Plague 1348-51	-0.04**	(0.02)	0.10	-0.04	(0.03)	0.09

This table presents regression estimates examining political and economic differences between Colonial Eastern and Historic Western cities in the mid-1300s from models: $y_i = \alpha + \beta colonial_i + \epsilon_i$, where *colonial* is an indicator for cities in the Colonial East. Columns 1-3 examine all cities ($n = 2,250$). Columns 4-6 examine cities within 100 kilometers of the Elbe-Saale boundary ($n = 685$). Columns 1 and 4 show the estimates $\hat{\beta}$. Columns 2 and 5 display standard errors. Columns 3 and 6 provide the mean of the dependent variable. Rows are organized by outcomes: "Political Fragmentation" and "City Charter Fragmentation" are as described in the text. "Charter by 1350", "Council by 1350", and "Mayor by 1350" are indicators. "Construction 1200-1349" and "Manufacturing 1200-1349" are binary measures recording manufacturing and construction activities over this period. "Urban Density" measures the number of neighboring cities within 50 kilometers. "Rye Yield" is the logarithm of potential yields within 25 kilometers of a city. "Plague 1348-1351" measures the number of major outbreaks during the Black Death. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers following Conley (1999).

cities over the period between 1200 and 1349. Our estimates of the Eastern shifts before the pandemic are close to zero, statistically insignificant, and relatively precisely estimated. We study trends in construction and manufacturing in our analysis below. When we examine potential yields growing rye, the key agricultural export crop over the period we study, we observe Eastern cities were located in higher yield locations. The difference in potential yields becomes smaller and statistically insignificant along the Elbe-Saale border. However, we examine and account for the potentially time-varying consequences of differences in agricultural productivity in our analysis below. In Appendix C, we show there were no regional differences in proxies for culture, such as monastery and church construction.

Finally, we consider differences in the Black Death shock. We observe fewer plague outbreaks in Eastern cities during the Black Death and that this difference becomes statistically insignificant when we examine cities along the border. We show in our quantitative analysis below that local plague differences do not drive the observed post-pandemic economic and political divergence between regions. In fact, we find that city-level outbreaks during the Black Death *negatively* predict political and economic development at the city-level. The lower frequency of plague in the East during the Black Death was thus, if anything, associated with differentially positive outcomes. We also show that there are no observable differences in mortality rates across regions. See Appendix D.

5 Economic and Political Divergence

5.1 Economic Development

5.1.1 Construction

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).[23]

The first key finding in our analysis is that construction was increasing in a similar manner in Eastern and Western cities before the Black Death and diverged afterwards (Figure 1 above). The share of cities with major construction projects rose in both regions between the early 1200s and the first half of the 1300s. After 1350, construction stagnated in Eastern cities and continued to grow in the West, generating a persistent regional divergence.[24]

To investigate the shifts in construction more closely we use regression analysis. We test whether there were regional shifts in the level and trend of construction, and whether

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[23]It may seem natural to presume that construction demand fell after the Black Death. In a recent review article, Jedwab, Johnson, and Koyama (2022, pp. 8-9) suggest, "building stopped" and "demand for new buildings fell in the aftermath of the plague." However, historical evidence indicates that construction continued and even increased after 1348. Lütge (1950, p. 258 – our translation) observes that many important building projects were initiated in the years after 1348 and that, "The construction industry was of particular importance during this period." In addition, the price of building materials rose relative to both wages and grain prices after 1348, in cities where price data are available (Abel 1978, p. 52). Historical evidence thus leads us to expect that construction may have increased, especially in economically dynamic areas.

[24]We focus our main analysis on construction, manufacturing, and political outcomes, all of which are conceptually quantities. We review evidence on prices and incomes in greater detail in Appendix E.

the observed shifts are related to natural endowments, how far towns are from the regional border, and local exposure to the Black Death itself. We estimate models of the form:

$$y_{it} = \beta_1(\text{colonial}_i \times post_t) + \beta_2(\text{colonial}_i \times trend_t) + \beta_3(\text{colonial}_i \times post_t \times trend_t)$$
$$\beta_4(x_i \times post_t) + \beta_5(x_i \times trend_t) + \beta_6(x_i \times post_t \times trend_t) + \alpha_i + \delta_t + \epsilon_{it}$$

(1)

The outcome measures whether major construction projects are observed in a city-period.[25] The parameter β_1 estimates the level shift in construction in the colonial East after 1350. We test for underlying differences in regional trends with β_2 and for divergent regional trends after the Black Death with β_3, measured such that a one-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 for construction, such as geographic endowments, distance from the Elbe-Saale border, and local exposure to plague outbreaks in the Black Death era. The α_i and δ_t are city and time fixed effects. We focus on the comparison between colonial East and historic West, but also find that political fragmentation measured continuously predicts development after 1350 when we analyze all the variation in the data or the variation induced by the border (see Appendix F).

Table 2 reports our estimates. Our baseline finding is that the likelihood of observing a major construction project in a given half-century fell by 8 percent in Eastern cities after 1350 relative to a mean of 27 percent (column 1).[26] This estimate is robust controlling for underlying differences in regional trends before and after 1350 (column 2). It is natural to wonder whether the finding reflects an underlying divergence between cities farther West and farther East: perhaps distance from the border became more salient over time or specifically after 1350? One might similarly ask whether locations' suitability for key agricultural export crops became more salient in the post-period. To assess the first question we consider the time-varying implications of distance from the Elbe-Saale boundary measured as a running variable such that distance is positive for Eastern cities and negative for Western cities. To assess the second, we consider the time-varying implications of potential yields cultivating rye, the leading export crop. Our estimates become stronger controlling for these factors,

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

[26]We estimate standard errors allowing for arbitrary spatial correlation as in Conley (1999). We obtain similar estimates allowing for correlation over different distances or clustering standard errors (Appendix G).

Table 2: Shifts in Urban Construction

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Indicator for Construction Activity					
	All Cities				100 km Border	
Colonial East × Post 1350	-0.08***	-0.10***	-0.17***	-0.17***	-0.19***	-0.20***
	(0.02)	(0.03)	(0.05)	(0.05)	(0.07)	(0.07)
Colonial East × Trend		0.02	0.02	0.02	0.07	0.07
		(0.02)	(0.03)	(0.03)	(0.06)	(0.06)
Colonial East × Post × Trend		-0.02	-0.02	-0.02	-0.01	0.00
		(0.02)	(0.04)	(0.04)	(0.07)	(0.06)
Plague 1348-51 × Post				-0.05	-0.09	-0.07
				(0.05)	(0.13)	(0.13)
Plague 1348-51 × Trend				0.06	0.06	0.06
				(0.05)	(0.10)	(0.10)
Plague 1348-51 × Post × Trend				-0.11**	-0.08	-0.08
				(0.05)	(0.10)	(0.10)
Observations	22500	22500	22500	22500	6850	6850
Mean Outcome	0.27	0.27	0.27	0.27	0.24	0.24
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Time-Varying Controls	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes
Western Cities	1490	1490	1490	1490	342	342
Eastern Cities	760	760	760	760	343	343

This table presents regression estimates examining urban construction. The outcome is a binary variable that takes the value of 1 if a major urban construction project is recorded in the *Deutsches Städetebuch* (Keyser 5 vols. 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 5-6 examine 685 cities within 100 kilometers of the border between "East" and "West." "Colonial East × Post-1350" 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. "Colonial East × Trend" interacts an indicator for Eastern cities with a time trend measured in centuries, such that a 1-unit change is 100 years. "Plague 1348-51" is the number of plague outbreaks in a city 1348-1351. In columns 3-6, we introduce "Time-Varying Controls" that control for the time varying effect of the distance to the Elbe-Saale border as a running variable and rye yield defined as the logarithm of potential yields within 25 kilometers of a city, with similar post period and trend interactions. The "Latitude Cell × Time FE" interact indicators for time periods and indicators for 1/2 degree (55 kilometer) latitude bands. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Conley (1999).
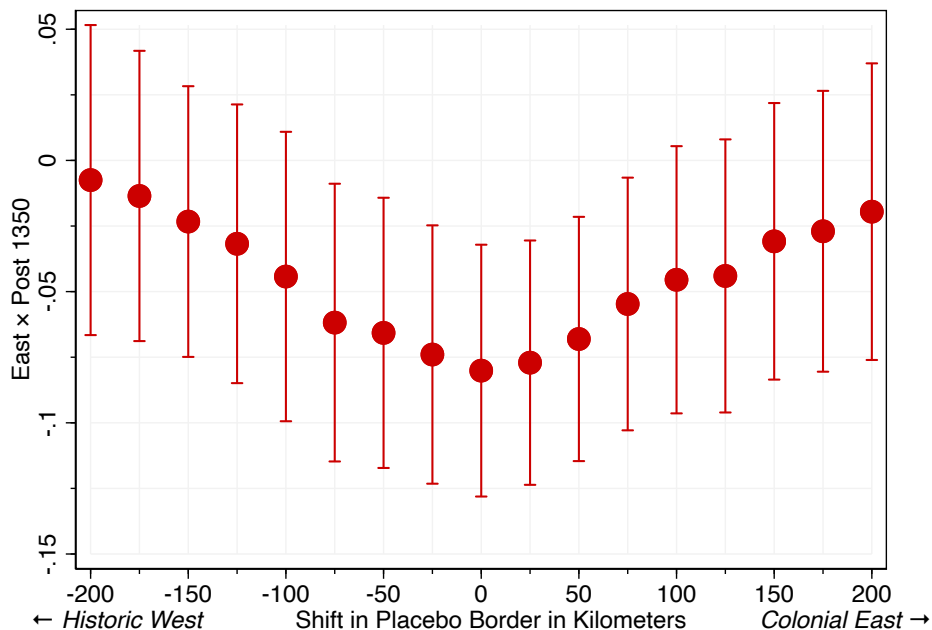
as shown in column 3. The "Colonial East × Post" estimate holds when we account for city-level variation in plague outbreaks during the Black Death (column 4), while city-level variation in plague is itself negatively associated with the trend of construction post-1350.

To address questions about potential omitted variables, we next focus our analysis on cities along the border, which had similar geographic and cultural characteristics. We find similar but in fact slightly stronger results when we examine cities within 100 kilometers of the Elbe-Saale line (column 5). Here we study a subset of evidence at the heart of the historical debate, where cities had similar access to river-borne transport and urban density was similar: 342 Western and 343 Eastern cities lie within 100 kilometers of the border. Our estimates hold virtually unchanged when we compare closely neighboring border cities in the East and West that are located in the same 1/2 degree latitude (55 km) gridcell and control for all common factors that vary at the latitude-gridcell-by-time-period level (column 6). We map the cities along the border and neighboring cities in the same gridcell in Appendix G.

For our estimates to be confounded by omitted factors, the unobserved factors would need to affect neighboring cities along the border in ways that varied regionally in the post period. Any potential confounder would need to cause a time-varying shift across neighboring cities which did not differ in their access to geographic endowments, river-based transport, or urban density. Potential confounders related to the time-varying effects of rye suitability, distance to the border, and city-level differences in plague are already absorbed by our time-varying controls. The potentially time-varying implications of important cultural factors also cannot plausibly explain our results. We show in Appendix C that there were no salient regional differences in aspects of cultural geography such as distance to pre-Christian pagan sites or church and monastery construction, and that potential differences in the age of urban settlements or distance to monasteries do not explain our findings. Appendix B shows that natural disasters and military conflicts did not vary at the border and cannot explain our findings. Below we additionally show that the divergence is significant by 1500, which further rules out an important set of later shocks as potential explanations (Section 5.3).

The salience of the Elbe-Saale boundary can also be understood through placebo tests. To illustrate, we estimate regressions in which we shift the line of the border dividing Eastern and Western cities and present the estimates in Figure 4. We find that the "Colonial East × Post" estimate is largest when the Elbe-Saale line is the border. The estimate decays and

Figure 4: The Effect of Shifting the Border on the "Colonial East × Post 1350" Estimate

This graph shows the estimated Eastern effect on construction in a city after 1350 as one shifts the border dividing Eastern and Western cities. The estimate at 0 uses the Elbe-Saale border and corresponds to the "Colonial East × Post 1350" estimate in Table 2, 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. Graph shows 95% confidence intervals estimated with Conley (1999) standard errors as in Table 2.
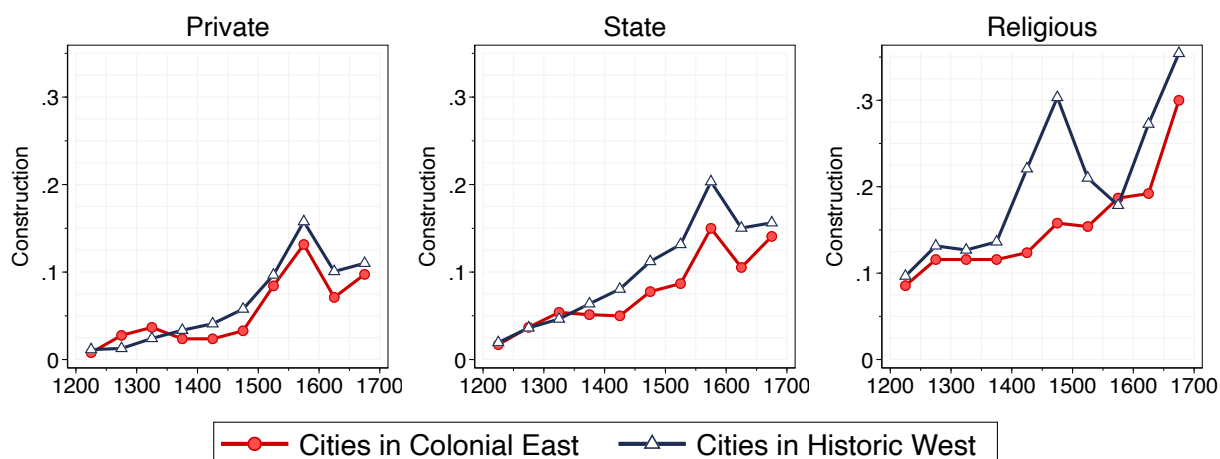
becomes statistically insignificant as we shift the border line to the East or West.

While this evidence points strongly, in our view, to the salience of the Elbe-Saale border, the underlying processes embody additional variation. Historians notably argue that Saxony and Thuringia comprised an intermediate zone in the colonial East with more "Western" political and economic features. We examine this evidence and provide heterogeneity analysis that supports our baseline findings in Section 5.3. We similarly document post-pandemic divergence within territories that span the Elbe, such as Brandenburg, in Appendix I.

The sectoral pattern of construction underlines the broad-based nature of the economic divergence we observe. In related research, Cantoni, Dittmar, and Yuchtman (2018) study the sectoral pattern of construction between 1470 and 1600, and show that the Protestant Reformation drove a shift away from religious and towards secular building in the 1500s, but *not* an overall level or growth effect. In contrast, we find that Black Death led to lasting regional divergence in the level of construction overall and within sectors.

To clarify these dynamics, Figure 5 distinguishes between private, state, and religious

Figure 5: Urban Construction by Sector

This graph shows the share of cities with major construction projects by sector in 50-year periods from 1200 through 1699. Construction projects are recorded in the *Deutsches Städtebuch* and classified as described in the text. Eastern cities are defined as those East of the Elbe River or its tributary the Saale ($n = 760$). Western cities are defined as those West of the Elbe and the Saale ($n = 1{,}490$).

sector construction.[27] We observe a decline in private construction in Eastern cities starting after the pandemic, while private construction in the West follows its pre-Black Death trend between 1350 and 1500. In Eastern cities, growth in state construction ends in the second half of the 1300s and is followed by a decline in the first half of the 1400s. In contrast, state construction in the West continues on its pre-Black Death trend through 1500. Religious construction plateaus in both Eastern and Western cities before the Black Death. Afterwards Western cities embark on a differentially large increase in religious building starting in the early 1400s. We thus see a shift across sectors towards greater construction in the West starting after 1350 and lasting through 1700. This Western advantage persists through the reallocation away from religious construction in the Protestant Reformation.

5.1.2 Manufacturing

Evidence on manufacturing enables us to examine a second dimension of economic activity. Figure 6 summarizes the data and shows that regional trends were broadly similar for 150 years before the pandemic, with possibly faster growth in the East, and then diverged.

We estimate how manufacturing shifted in Eastern cities after the Black Death with regression analysis that parallels our study of construction. Table 3 presents our results. We

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[27]We discuss the data and classification of construction activity in Appendix A.

Figure 6: Manufacturing in German Cities

This graph shows the mean number of manufacturing events in Eastern and Western cities in 50-year periods, measured by manufacturing and craft activities in the *Deutsches Städtebuch*. Eastern cities are East of the Elbe or the Saale Rivers. Western cities are West of the Elbe and the Saale.

observe a weak and statistically insignificant difference for Eastern cities in the post-period before introducing controls (column 1). Conditional on underlying regional trends, we find a significant decline in manufacturing in the East post-1350, equal to approximately 75 percent of the mean (column 2). We also find a negative but imprecisely estimated post-period trend for Eastern cities. Our results hold when we introduce time-varying interactions capturing variation associated with distance to the border, local rye yields, and city-level variation in the plague (column 4). Our results hold, but are less precise when we examine cities within 100 kilometers of the border and when we introduce "Latitude-Cell × Time" fixed effects (columns 5 and 6). In our heterogeneity analysis below (Section 5.3), we show that these muted effects reflect highly significant declines in manufacturing across the colonial East except in Saxony-Thuringia, where political fragmentation approached Western levels.

The dynamics of manufacturing across sectors further clarify the economic process. It has been argued that developments in Eastern textile industries in the 1500s reflected broader German and European trends and thus that commonalities in the pattern of manufacturing across regions deserve emphasis (Hagen 2005). Figure 7 summarizes the dynamics of manufacturing by region and sector.

Our data indeed suggest little if any relative decline in Eastern textiles. In contrast, our
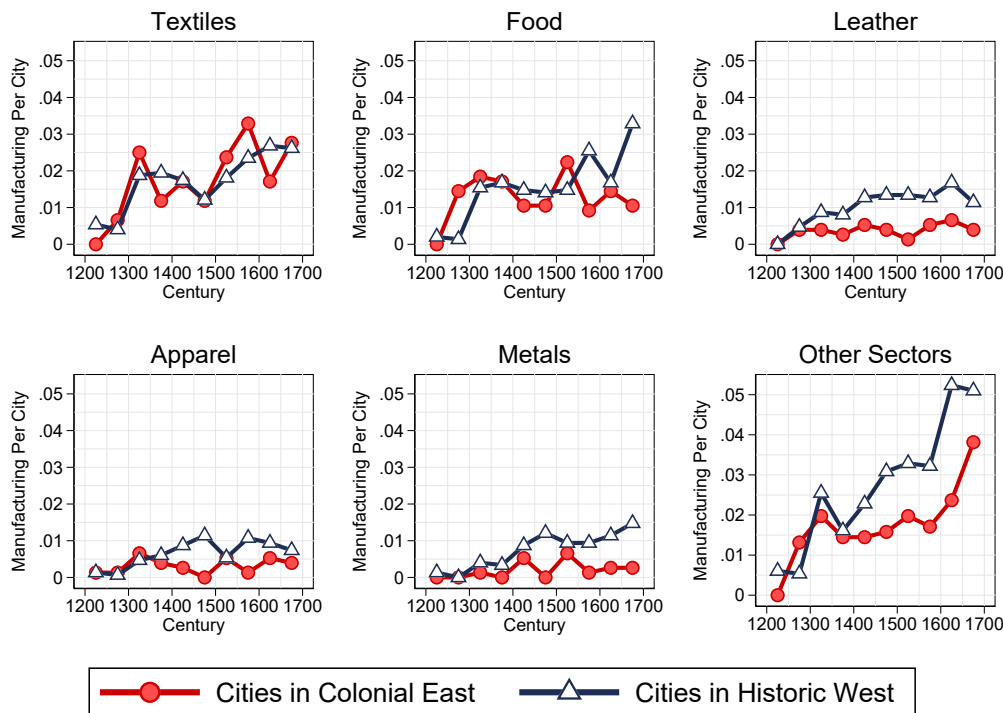
Table 3: Shifts in Manufacturing Activity

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Indicator for Manufacturing Activity					
	All Cities				100 km Border	
Colonial East × Post 1350	-0.01	-0.03**	-0.03*	-0.03*	-0.03	-0.03
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Colonial East × Trend		0.02*	0.02	0.02	0.04**	0.03**
		(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Colonial East × Post × Trend		-0.02	-0.01	-0.01	-0.03	-0.02
		(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Plague 1348-51 × Post				-0.02	-0.02	-0.02
				(0.03)	(0.03)	(0.03)
Plague 1348-51 × Trend				0.03	0.02	0.02
				(0.02)	(0.02)	(0.02)
Plague 1348-51 × Post × Trend				-0.04**	-0.02	-0.02
				(0.02)	(0.03)	(0.03)
Observations	22500	22500	22500	22500	6850	6850
Mean	0.04	0.04	0.04	0.04	0.03	0.03
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Time-Varying Controls	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes
Western Cities	1490	1490	1490	1490	342	342
Eastern Cities	760	760	760	760	343	343

This table presents regression estimates examining urban manufacturing. The outcome is a binary variable that takes the value of 1 if a manufacturing activity is recorded in the *Deutsches Städetebuch* (Keyser 5 vols. 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 5-6 examine 685 cities within 100 kilometers of the border between "East" and "West." "Colonial East × Post-1350" 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. "Colonial East × Trend" interacts an indicator for Eastern cities with a time trend measured in centuries, such that a 1-unit change is 100 years. "Plague 1348-51" is the number of plague outbreaks in a city 1348-1351. In columns 3-6, we introduce "Time-Varying Controls" that control for the time varying effect of the distance to the Elbe-Saale border as a running variable and rye yield defined as the logarithm of potential yields within 25 kilometers of a city, with similar post period and trend interactions. The "Latitude Cell × Time FE" interact indicators for time periods and indicators for 1/2 degree (55 kilometer) latitude bands. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Conley (1999).

data do reveal a Western advantage in apparel starting in the late 1300s and especially in the highly variegated set of fast-growing industries outside the top five sectors after 1400 ("Other Sectors" in the graph).

Figure 7: Manufacturing by Sector

This graph shows the mean number of manufacturing events by sector in Eastern and Western cities in 50-year periods. Data on manufacturing and craft activities are coded from the *Deutsches Städtebuch*. Sectoral classification as described in the text. Eastern cities are those East of the Elbe River or its tributary the Saale. Western cities are those West of the Elbe and the Saale.

5.2 Political and Institutional Change

Narrative evidence suggests that economic divergence was intertwined with a regional divergence in the political and institutional development of self-governing cities. In this section, we investigate the development of major institutions of city government; the rules governing city council selection; the presence and operation of courts; and collective action including conflicts with lords, town alliances, and the pattern of autonomous city legislation. We first present the raw data graphically and then present estimates characterizing how politics changed across regions accounting for other time-varying factors.

Figure 8 illustrates the dynamics of political and institutional change, focusing on the cities along the Elbe-Saale border. We observe a consistent pattern. Eastern and Western cities evolve similarly before the Black Death. Afterward, politics shifts positively towards the development of urban institutions and municipal autonomy in the West.[28]

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[28]We observe broadly similar patterns when we compare all Western and Eastern cities. See Appendix H.

Major Institutions. In Panel A, Figure 8 shows that the appearance of city councils and mayors, and the acquisition of charters, followed similar paths in Eastern and Western cities before 1350 and then diverged. We find greater institutional development in Western cities after the pandemic. A council is the "identifying mark" of city autonomy in medieval Europe (Weber 1978, pp. 1249-50).[29] Its powers included the construction of buildings, supervision of markets, regulation of trade and manufacturing, price and wage setting, maintenance of stockpiles, quality control, 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 lordly officials such as the *Schultheiss* or bailiff (Isenmann 2014, p. 227). Charters also institutionalized important rights, including the right to hold permanent markets, impose taxes, and build fortifications (Hirschmann 2016).

Council. The rules governing council selection also diverged after the pandemic. We observe shifts in the West towards elections and especially co-optation, with smaller shifts towards guilds acquiring voting rights in the West, as shown in Panel B.[30] Medieval elections fostered forms of accountability (Isenmann 2014, pp. 248, 362). More significantly in our view, the data confirm quantitatively an observation in the historical literature: advances in proto-democratic and guild governance were limited; where control of city council appointments passed to cities from external lords this largely took place through co-optation, which represented and entrenched the power of city oligarchies (Isenmann 2014; Weber 1978).
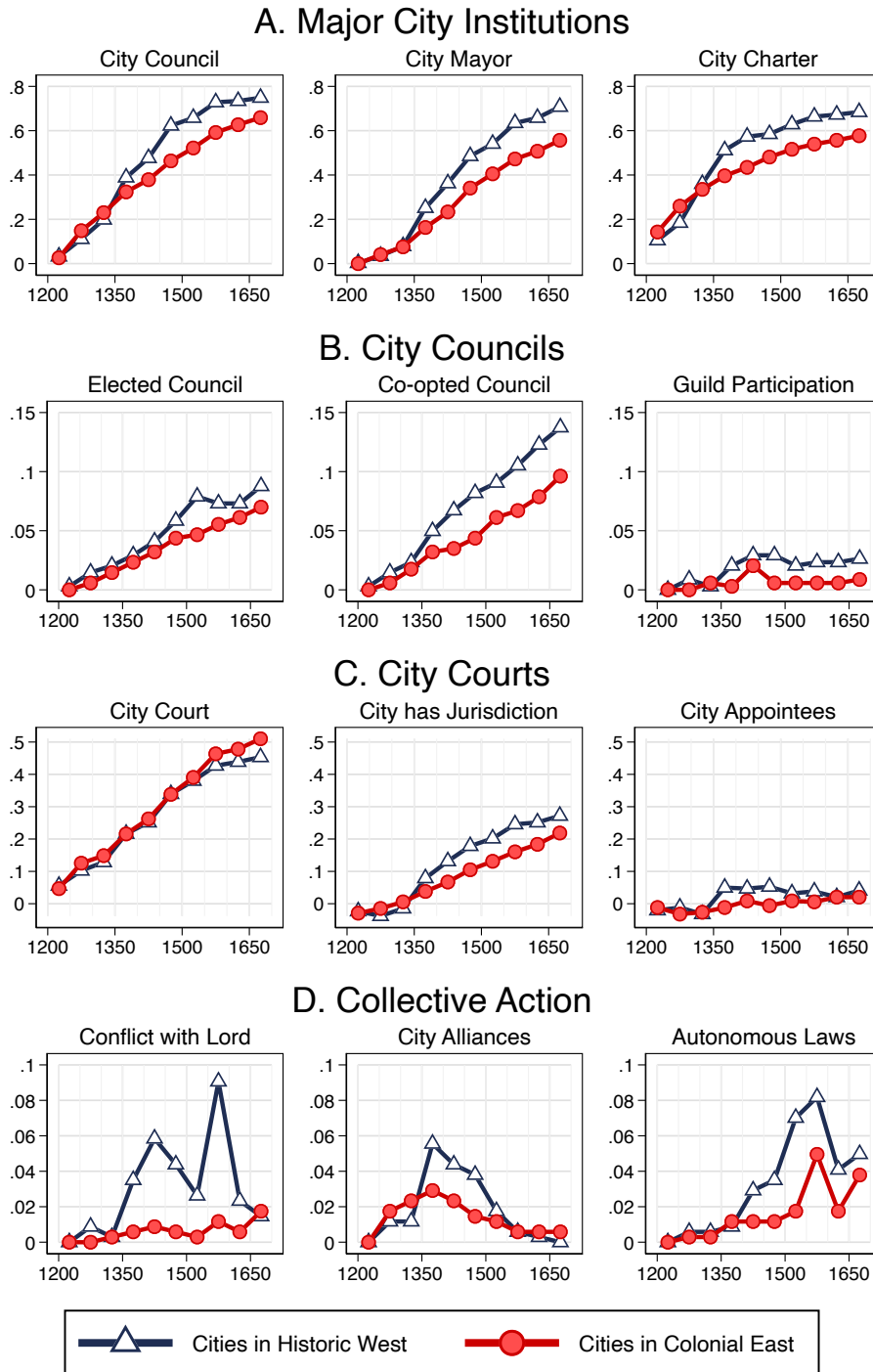
Courts. We observe that Western cities gained more leverage over the legal system. The share of cities with law courts did not diverge, but Western cities differentially acquired jurisdiction over legal disputes previously adjudicated in lords' courts and control over judicial appointments after the pandemic (see Panel C). Such shifts indicate political power and institutions that serve urban as against lordly interests (Isenmann 2014, p. 312).

Collective Action. We observe similar patterns in collective action. After the pandemic we find a differential increase in Western cities forming cross-city alliances, engaging in

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[29]The appearance of a council does not provide direct evidence on the quality or actual operations of city governance Isenmann (2014, p. 216). We emphasize the pattern of political change along multiple margins.

[30]Our evidence relates to recent research by Becker et al. (2020), who focus on the period after 1400 and study how wars between nobles precipitated by dynastic shocks – like the failure to produce an heir – led to changes in the size of city councils, which shifted the representativeness of city institutions. In our data, we observe a trend towards shrinking council sizes after 1350 in the East. However, we focus our analysis on the presence of the core institutions of the self-governing city and a very different political process.

Figure 8: 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: active city councils (*Rat*); mayors (*Buergermeister*); and city charters. Panel B shows the share of cities with: elected city councils; co-opted city councils, i.e. city councils able to appoint members; and city councils with guild participation. Panel C shows the share of cities with courts; the allocation of jurisdiction rights (+1 if the city held jurisdiction rights, -1 if the lord held jurisdiction rights, 0 if unspecified); and the control over judicial appointees (+1 if the city controlled the appointees, -1 if the lord controlled the appointees, 0 if unspecified). Panel D shows the share of towns observed in open conflict with an external lord; the share of cities entering into alliances with other cities; and the share of towns passing autonomous laws.

conflict with lords, and passing autonomous laws (see Panel D). While conflict *per se* is not necessarily an indicator of cities' political power, it suggests greater mobilization. Town alliances were an important instrument for the development of power and urban class interests, and were used to protect trade and safeguard city rights and privileges from potentially predatory lords (Marx 1965, p. 131; Engel 1993, pp. 284-5; Isenmann 2014, p. 315). The shift in the West towards the passage of autonomous town laws also indicates the political economy divergence. These laws were simultaneously legal acts of "anti-lordly revolution" (Ebel 1958, p. 11; Weitzel 2009) and *economic institutions* that reduced transactions costs and improved the business environment (Section 3 above).

Interpretation.   First, our analysis uncovers a divergence driven by political mobilization and institutional change in Western cities following the Black Death. Second, Western cities moved closer to the ideal type model of the autonomous "Western city" which Weber (1978, p. 1226), Pirenne (1956, p. 204), and Marx (1965, p. 131) identify as a key factor in historic economic development.[31] Third, while recent research has looked for and found limited evidence of any growth effects of "participative" institutions (Stasavage 2014; Wahl 2019), core institutional changes were *non-democratic* and supported the class interests of urban oligarchies, as suggested by Weber (1978) and the Marxist literature (Anderson 1974). Fourth, our findings are not simply a reflection of greater urbanization on the extensive margin in the West; we see similar shifts towards greater urban autonomy in the West when we restrict the analysis to cities chartered before 1350 (see Appendix H).

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 index of urban autonomy*. This index reflects the multiple dimensions of politics and institutions summarized in Figure 8 and is constructed using generalized principal components analysis which accommodates binary data (see Appendix A).

Table 4 presents our results. Columns 1-4 present estimates examining all cities; columns 5-6 restrict to cities within 100 kilometers of the border. Consistent with our analysis of the raw data, we find significant negative shifts in politics in the East post-1350. We estimate large and significant reductions in the development of local politics in Eastern cities when

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[31]Our quantitative analysis uncovers local variation already flagged by the classics. Weber (1978, p. 1254) emphasizes that autonomy had multiple dimensions and the frequency of, "cases where the usurpation of civic sovereignty was not completely effective." We discuss the historical literature further in Appendix B.

Table 4: The Political Autonomy of Cities

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Political Index of Urban Autonomy					
	All Cities				100 km Border	
Colonial East × Post 1350	-0.01	-0.03*	-0.11***	-0.11***	-0.10***	-0.11***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Colonial East × Trend		-0.01	-0.01	-0.00	-0.00	-0.01
		(0.02)	(0.03)	(0.03)	(0.04)	(0.03)
Colonial East × Post × Trend		0.03	0.00	-0.00	0.00	0.01
		(0.02)	(0.04)	(0.04)	(0.05)	(0.05)
Plague 1348-51 × Post				-0.06***	-0.05*	-0.04
				(0.01)	(0.03)	(0.03)
Plague 1348-51 × Trend				0.12***	0.12***	0.13***
				(0.01)	(0.01)	(0.01)
Plague 1348-51 × Post × Trend				-0.15***	-0.16***	-0.16***
				(0.02)	(0.01)	(0.01)
Observations	22500	22500	22500	22500	6850	6850
Mean	0.33	0.33	0.33	0.33	0.32	0.32
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Time-Varying Controls	No	No	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes
Western Cities	1490	1490	1490	1490	342	342
Eastern Cities	760	760	760	760	343	343

This table presents regression estimates in which the outcome is a unified political index of urban autonomy, constructed with generalized principal components analysis and taking values in the range of 0 to 1. The index reflects all the political variables in Figure 8 (see Appendix A). 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." "Colonial East × Post-1350" 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. "Colonial East × Trend" interacts an indicator for Eastern cities with a time trend measured in centuries, such that a 1-unit change is 100 years. "Plague 1348-51" is the number of plague outbreaks in a city 1348-1351. In columns 4-6, we introduce "Time-Varying Controls" control for the time varying effect of the distance to the Elbe-Saale border as a running variable and rye yield defined as the logarithm of potential yields within 25 kilometers of a city, with similar post period and trend interactions. The "Latitude Cell × Time FE" interact indicators for time periods and indicators for 1/2 degree (55 kilometer) latitude bands. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Conley (1999).

we compare cities across Germany (columns 3-4) and along the Elbe (columns 5-6).[32]

While the index we study provides a powerful lens for studying political and institutional change, alternative disaggregated measures might be developed. In Appendix H, we confirm

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[32]While our findings are robust to controlling for the time-varying relationship between plague outbreaks and political development, the direct relationships between city-level plague and political dynamics are noteworthy. The fact that city-level plague outbreaks were associated with positive underlying political trends points to the endogeneity of local outbreaks. The fact that local outbreaks were associated with declines in the level and trend of post-1350 political development strongly suggests lasting negative impacts.

our core findings when we study disaggregated indices for the establishment of (A) major city institutions, (B) city council autonomy, (C) city court rights, and (D) collective action.

5.3 Mechanisms and Timing

Evidence on differences in political fragmentation within the colonial East and on the timing of the divergence helps us to address interpretive questions about the causal process. In particular, our findings invite two important questions that relate to the underlying economic history. First, given that political fragmentation varied within the colonial East, were these differences reflected in the pattern of development after the pandemic shock? Second, given that agrarian political economy had the potential to shape urban development, and that historical evidence documents important divergences in the agrarian sector starting around 1500 (detailed in Section 6), was the urban divergence evident before 1500?

These questions relate to an important distinction within the colonial East between the core area where political fragmentation was low and a subregion where political fragmentation was relatively high. The "Eastern core" with low political fragmentation comprises Pomerania, Mecklenburg, Schleswig-Holstein, Brandenburg, and Silesia. The colonial subregion with high fragmentation comprises Saxony and Thuringia.[33] Table 5 summarizes political fragmentation across these areas (see map in Appendix I). Significantly, coercive institutions in agriculture became widespread in the 1500s in the Eastern core but remained limited in Saxony and Thuringia after 1500, as we discuss in Section 6.

The history and our analysis lead us to expect that urban development and politics looked relatively "Western" in Saxony-Thuringia after the pandemic.[34] To test this hypothesis, we extend our baseline analyses to examine shifts in development by subregions within the East. We distinguish post-pandemic shifts for cities in the "Eastern core" and cities in Saxony and Thuringia (Appendix Figure I1 maps these cities). We study the period before 1500, to set the stage for our examination of the timing of major changes in agriculture in Section 6.

Table 6 presents our estimates and shows that negative economic and political shifts after

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[33]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, under the loose umbrella of the Empire, produced new political units, Brandenburg, for example, or the Wettin lands later to coalesce as Saxony."

[34]Scott (2001) suggests Saxony was effectively "western." Cerman's (2012) survey of agriculture and the development of serfdom does not include Saxony or Thuringia in "Eastern Europe."

Table 5: Differences in Political Fragmentation within the East

Region	All Cities	100 km Border
West – West of Elbe-Saale	0.92	0.92
East – Saxony & Thuringia	0.81	0.82
East – Eastern Core	0.66	0.77

This table presents mean city-level political fragmentation by sub-regions c. 1348. Political fragmentation is calculated as $1 - HHI$, where HHI is the Herfindahl index of ruler concentration within 100 kilometers, as in Figure 2. "Eastern Core" comprises all cities East of the Elbe or Saale not in Saxony and Thuringia.

1350 and before 1500 are concentrated in the less fragmented Eastern core. We find that declines in construction were larger in the Eastern core than in Saxony-Thuringia and that these differences are significant when we study all cities (columns 1-3), but less precisely estimated along the border (columns 4-5). We find that manufacturing fell post-1350 in the Eastern core, but not in Saxony-Thuringia. The difference in political outcomes broadly follows a similar pattern, in which city-level political development is more depressed in the Eastern core than in Saxony-Thuringia.

To interpret our findings, it is important to understand the time-varying relationship between political fragmentation and resource endowments within the colonial East. Natural resource endowments contributed to the relatively high level of political fragmentation observed in Saxony-Thuringia. Major silver discoveries in Saxony in the late 1100s shaped the colonial process and promoted a pattern of political fragmentation that persisted.

However, the endowments that promoted political fragmentation within the East ceased to directly shape development in the period we study. By the late 1200s, surface deposits were exhausted and deeper mines were unprofitable, given the available pumping technology (Ermisch 1887, p. CXXIX, Henning 2020, p. 239, Schwabenicky 2016). Most former mining areas were deserted by the second half of the 1300s (Ermisch 1887, p. CXXIX; Derner, Hrubý, and Schubert 2016, p. 223; Schwabenicky 2009; Hoffmann and Richter 2013, p. 149; Hemker and Schubert 2018, p. 13). Mining only returned as a major activity in Saxony at the end of the 1400s, when new discoveries and endogenous improvements in pumping technology made extractive activities profitable again. When the Black Death hit, Saxony-Thuringia thus had an inheritance of political fragmentation built on historic but exhausted resource endowments. Therefore, when we compare development in Saxony-Thuringia and in the Eastern core before 1500, we are examining relationships that reflect differences in

Table 6: Development Within the Colonial East Before 1500

	(1)	(2)	(3)	(4)	(5)
	All Cities			100 km Border	
A. Outcome: Construction					
Eastern Core × Post	-0.06**	-0.17***	-0.17***	-0.11	-0.08
	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)
Saxony-Thuringia × Post	-0.01	-0.09**	-0.10**	-0.03	-0.07
	(0.02)	(0.04)	(0.04)	(0.09)	(0.09)
p-value of Difference	0.05	0.01	0.02	0.14	0.88
B. Outcome: Manufacturing					
Eastern Core × Post	-0.04**	-0.04*	-0.04*	-0.02	-0.03
	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)
Saxony-Thuringia × Post	-0.00	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
p-value of Difference	0.02	0.03	0.03	0.88	0.75
C. Outcome: Index of City Politics					
Eastern Core × Post	-0.03**	-0.11***	-0.11***	-0.07**	-0.07**
	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)
Saxony-Thuringia × Post	0.01	-0.05***	-0.06***	-0.05**	-0.07***
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
p-value of Difference	0.00	0.00	0.00	0.16	0.80
Observations	13500	13500	13500	4110	4110
City and Time FE	Yes	Yes	Yes	Yes	Yes
Subregion Pre and Post Trends	Yes	Yes	Yes	Yes	Yes
Distance & Rye Yield Interactions	No	Yes	Yes	Yes	Yes
Plague Interactions	No	No	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	Yes

This table presents regression estimates examining city construction, manufacturing, and political outcomes as defined in Tables 2, 3, and 4. The unit of analysis is the city-half-century from 1200 through 1499. Columns 1-3 examine 2,250 German-speaking cities. Columns 4-5 examine 685 cities within 100 kilometers of the border between "East" and "West." "Eastern Core × Post" interacts an indicator for "Eastern core" cities, defined as cities located East of the Elbe or Saale Rivers outside Saxony and Thuringia, and an indicator for periods from 1350 forwards. "Saxony and Thuringia × Post" interacts an indicator for Eastern cities in Saxony and Thuringia and an indicator for periods from 1350 forwards. All models control for subregional trends and post-1350 trends. "Distance & Rye Yield Interactions" are the complete set of distance and rye yield interactions as in Table 2. "Plague Interactions" are similarly as in Table 2. The "Latitude Cell × Time FE" interact indicators for time periods and indicators for 1/2 degree (55 kilometer) latitude bands. Standard errors in parentheses allowing for arbitrary spatial correlation within 50 kilometers in Columns 1-3, and within 25 kilometers in Columns 4-5, following the methodology of Conley (1999).

political fragmentation but not the direct effects of active mining and mineral extraction.

Additional and more local evidence also supports our interpretation. Within historic Brandenburg, which straddles the Elbe River, cities in the original Western province (Altmark, located West of the Elbe) exhibit a "Western" development pattern after the

Black Death, whereas cities in the colonial provinces East of the Elbe exhibit "Eastern" declines in construction and institutional development. In the 1500s, agrarian development became more coercive in Eastern Brandenburg. More globally along the Elbe border, the Eastern declines in urban construction and in the development of major city institutions after the pandemic are most pronounced across cities in territories that do not span the river. We present these analyses and examine local heterogeneity in Appendix I.

6 The Agrarian Sector and Larger Political Economy

Our findings should be interpreted in light of dynamics in the agrarian sector, as this juxtaposition both rules out an important alternative candidate explanation for the facts we document and clarifies the mechanisms behind trajectories of economic development.

The divergence between Eastern and Western Europe in the late middle ages is famously observed not just in the urban sector but also in agriculture on either side of the Elbe border (Knapp 1887; Perkins 1986; Ogilvie 2014). Brenner (1976) argues that the balance of political power in the agrarian sector directed the impact of the pandemic and resulted in the introduction of coercion in agriculture East of the Elbe, which in turn depressed urban growth in the East. This argument provides an important hypothesis for economics (Acemoglu, Johnson, and Robinson 2005; Acemoglu 2008; Acemoglu and Wolitzky 2011; Acemoglu and Robinson 2012; 2019). In contrast, Anderson (1974) argues that the suppression of cities in the East was a prerequisite for the subsequent introduction of coercion in agriculture.

To investigate the potential role and direction of cross-sector influences, we examine the timing of key changes in the agrarian sector. We focus on two dimensions of change that historical research indicates were particularly important. First, the reallocation of land from independent peasant farms to nobles' estates in the East. Second, the introduction of legal institutions restricting the mobility of agricultural labor. To preview, shifts in these core dimensions of agrarian economic and political activity appear at least 100 years after we observe divergence in urban development.[35]

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[35]Evidence on other features of agrarian life and politics follows a consistent pattern. A large literature considers the number of days tenant farmers (serfs) were required to work on noble estates: these labor commitments increased East of the Elbe in the 1500s (Ogilvie 2014; Cerman 2012). A related literature examines the pattern of peasant revolts and shows that there were few revolts before 1500 and all of these were located away from the core sections of the Elbe border, as we detail below and in Appendix B.

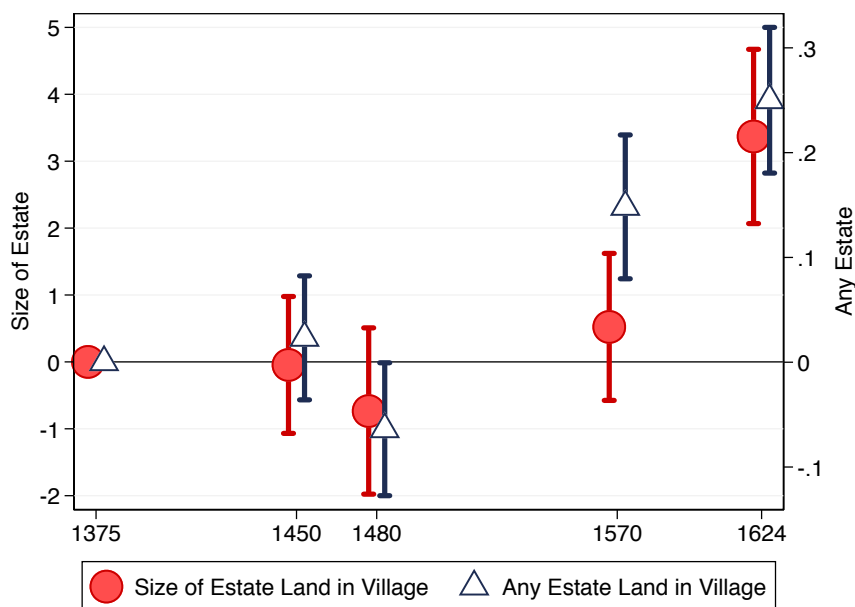## 6.1   The Rise of Agriculture on Estates Owned by the Nobility

The growth of agriculture on estates controlled by the landowning nobility is an important indicator of changes in agrarian political economy as these estates employed coercion. Narrative evidence indicates that agricultural production on noble estates expanded East of the Elbe with a lag of at least 100 years after the Black Death, and thus after the divergence in the political economy of cities. The leading explanation is that the pandemic shifted the terms of trade against grain agriculture and that incentives for Eastern nobles to expand estate production for export remained low until grain prices rose in the 1500s (Abel 1978). Thus Hagen (1985, p. 89) observes that in the core Eastern territory of Brandenburg: "By 1375 the economic appeal of noble demesne [i.e. estate] farming was waning. In the period 1375-1450, the land devoted to it…shrank…arable farming had grown unprofitable."

To assess this development quantitatively, 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 these 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.[36] We estimate regressions: $y_{it} = \alpha_i + \delta_t + \epsilon_{it}$. The outcome is either 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 9 presents our estimates. We find that the amount of village land allocated to 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, our richest evidence indicates that estate agriculture developed 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, agricultural organization

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[36]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.

Figure 9: 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 clustered by village used to construct 95% confidence intervals

did change on other margins. Landownership became more concentrated within the nobility between 1350 and 1500 in Brandenburg (Enders 2008, pp. 132-4). Third, 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.[37] Fourth, within Brandenburg, estate agriculture developed most post-1500 where urban development declines were largest 1350-1500 (see Appendix I).

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[37]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.

6.2 Institutions Restricting Labor Mobility in Agriculture

Laws restricting the mobility of tenant farmers are widely viewed as key political indicators and as factors shaping economic life East of the Elbe (Cerman 2012). Table 7 summarizes the major legal changes restricting labor mobility in colonial Eastern territories. These laws appear starting in the mid-1400s and principally in the 1500s. Historical studies confirm this chronological pattern. For example, Carsten (1954, pp. 80-1) observes that the "position of Brandenburg peasants...remained very favourable during the fourteenth and fifteenth centuries. Their dues and services could not be altered, their legal position remained the same...if they disliked the conditions in their village they could move."

Table 7: Laws Restricting Labor Mobility

Territory	Date of Legislation
Brandenburg	1536
Mecklenburg	1516, 1572
Schleswig	1461, 1614
Holstein	1524
Upper Lusatia	1551
Pomerania	1616
Silesia	1505, 1512, 1528

This table summarizes laws in regions we study, using evidence from Cerman (2012).

The timing of these institutional changes is suggestive. Historians argue 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). The adoption of coercive agrarian institutions could also be influenced by the political power of the peasantry, which Brenner (1976) suggests can be indexed by peasant revolts. However, there was a limited number of relatively small-scale peasant revolts in Germany before 1500, and almost none along the Elbe border between the West and the Eastern core, as we discuss in Appendix B.[38] Thus a significant regional divergence in urban development was established before developments in agrarian politics that are frequently emphasized.

These developments arguably reflect a deeper dynamic. Fiscal pressure induced rulers to clamp down on cities. Where rulers were successful, as in the East, their victory increased

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[38] Almost all revolts before 1500 were in far Western Germany and Switzerland. Before the 1470s, the only known peasant revolt near the Elbe is in the West of Saxony, where the divergence is most muted.

their political and economic dependence on the landowning, lower nobility. The empowered nobility subsequently secured institutions that shifted income and power in their direction.

7 Conclusion

Economic shocks can induce political conflicts that shape the path of development. The Black Death pandemic generated one of the most pivotal examples of this general phenomenon. The pandemic led to a major divergence in development that reflected prior differences in political institutions within Europe.

Political competition is often viewed as a key causal factor that explains why Europe embarked on a unique path to freedom and growth not replicated in other regions of the world. We document that there were sharp, long-standing differences in political competition within Europe. These core differences reflected the fragmentation of the political geography, but were not associated with differences in urban development in the equilibrium before the economic shock.

Differences in political fragmentation across regions became a core determinant of economic change after the pandemic shocked relative prices and induced political conflict over rents. Following the shock, cities in the West secured autonomous institutions that promoted economic activity, often through extra-legal action. In the East, rulers succeeded in restricting city autonomy and urban activity was depressed for several hundred years. The resulting divergence in urban political economy shaped bargaining power in the agrarian sector and foreshadows a subsequent cleavage in which coercion was institutionalized in Eastern European agriculture.

While the historical 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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Appendices – For Online Publication

A   Data

A.1   Summary Statistics

This table presents summary statistics on city-level and regional-level variables. Columns 1 and 2 present summary statistics for all cities. Columns 3 and 4 present summary statistics for cities within 100km distance to the Elbe-Saale border.

Table A1: Summary Statistics

	All Cities		Within 100 KM of Border	
	(1)	(2)	(3)	(4)
	Mean	SD	Mean	SD
City Council	0.402	(0.490)	0.433	(0.496)
City Mayor	0.330	(0.470)	0.328	(0.469)
City Charter	0.538	(0.499)	0.460	(0.498)
Elected Council	0.062	(0.241)	0.042	(0.200)
Co-opted Council	0.051	(0.221)	0.057	(0.231)
Guild Participation	0.017	(0.130)	0.012	(0.110)
City Court	0.288	(0.453)	0.289	(0.453)
City holds Jurisdiction	0.111	(0.521)	0.107	(0.520)
City Court Appointees	-0.001	(0.279)	0.010	(0.294)
Conflict with Lord	0.018	(0.132)	0.016	(0.127)
City Alliances	0.030	(0.171)	0.016	(0.126)
Autonomous Laws	0.015	(0.120)	0.021	(0.143)
Political Index of Urban Autonomy	0.329	(0.299)	0.321	(0.306)
Construction Activity	0.268	(0.443)	0.243	(0.429)
Manufacturing Activity	0.041	(0.198)	0.030	(0.170)
Political Fragmentation	0.846	(0.155)	0.855	(0.088)
City Charter Fragmentation	0.806	(0.146)	0.764	(0.176)
Plague 1348-51	0.094	(0.292)	0.082	(0.274)
Urban Density (Neighbors 50km)	49.360	(23.686)	52.834	(23.808)
Rye Yields (Log)	8.353	(0.116)	8.368	(0.130)
Observations	22500	22500	6850	6850

This table presents summary statistics on city-level and regional-level variables. Columns 1 and 2 present summary statistics for all cities. Columns 3 and 4 present summary statistics for cities within 100 kilometers distance to the Elbe-Saale border.

A.2   Variable Definitions

We construct our main dataset covering cities listed in the *Deutsches Städtebuch*. Our unit of analysis is the city time period of fifty years 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 variables in our analysis are defined and constructed as follows.

We construct measures of politics and institutions relying principally on sections 9 and 10 of each city's entry in the *Deutsches Städtebuch*. For each city, sections 9 and 10 contain information on the structure of city institutions; the nature and structure of city elections; the allocation of jurisdiction rights and judicial appointments; and proxies measuring whether cities acted independently from the influence of territorial authorities (lords) including whether cities were engaged in an open conflict with a lord, whether they formed strategic alliances with other cities, and whether they passed autonomous city laws. Some additional information, for example on conflicts, is gathered from section 11. Further, we construct data on manufacturing from the *Deutsches Städtebuch*. Additionally, we use data on territorial rulers, city charters, and construction from Cantoni (2020). Lastly, we use data on potential rye yields from GAEZ (Fischer et al. 2021).

City Council is a binary 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 takes on the value 0 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 5 vols. 1939-1974, Band 3 Teil 1, p. 139) In our translation: "The council appears in 1329 for the first time."

City Mayor is a binary 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 takes on the value 0 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: "Ratsverfassung erstmalig 1407 durch das Vorkommen von BGM [Bürgermeister] u. 6 Ratsgeschworenen bezeugt" (Keyser 5 vols. 1939-1974, Band 2 Teil 1, p. 19). In our translation: "Council constitution documented for the first time in 1407 by the presence of 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 the charter was acquired.

Elected Council is a binary 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 council is Grimma in Saxony in the first half of the 15th century. The *Deutsches Städtebuch* indicates: "Wahl von Ratsmitgliedern durch die Bürgerschaft nur bis 1520, seitdem ergänzt er sich wieder durch Zuwahl bis 1833." (Keyser 5 vols. 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." When elections are mentioned and *Deutsches Städtebuch* does not specify further information on the precise selection procedure, we record this as an elected council.

Co-opted Council is a binary indicator for cities where co-optation was used to appoint council members. 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 5 vols. 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."

Guild Participation is a binary indicator for city time periods in which guilds held active or passive rights on the city council. An example of an observation recording the presence of guilds on the council is Korbach in Hesse in 1377. The *Deutsches Städtebuch* indicates: "1377 rissen die Gilden die Herrschaft an sich und erzwangen die Vereinigung beider Städte. Bgm. und Rat wurden von nun an jährlich durch die Gildenvertreter gewählt." (Keyser 5 vols. 1939-1974, Band 4 Teil 3, p. 299) In our translation: "In 1377 the guilds seized power and forced the union of the two towns. The mayor and the council were from then on elected annually by the guild representatives."

City Court is a binary indicator for the general existence of a city court. An example

of an observation recording the presence of a city court is in 1338 Westerburg in Rhineland-Palatinate. The *Deutsches Städtebuch* indicates: "Ortsgericht mit Schultheiß (erw. 1338)." (Keyser 5 vols. 1939-1974, Band 4 Teil 3, p. 445) In our translation: "Local court with Schultheiss (mentioned 1338)." Note that the variable records the existence of a court regardless of whether the city or the lord held jurisdiction rights.

City Jurisdiction is a variable equal to one when the city held lower or higher jurisdiction rights, equal to minus one if we observe a lord holding jurisdiction rights, and set to zero where information is not reported. The variable retains its value in all periods after the jurisdiction rights were specified and changes when the court was removed or the nature of jurisdiction rights changed. An example of an observation recording that the city held jurisdiction rights is Grimma in Saxony in 1391. The *Deutsches Städtebuch* indicates: "Der Rat erlangt die niedere Gerichtsbarkeit 1391." (Keyser 5 vols. 1939-1974, Band 2 Teil 1, p. 92) In our translation: "The council acquired lower jurisdiction rights in 1391." Conversely, an example of an observation recording that the lord held jurisdiction rights is Auerbach in Saxony in 1407. The *Deutsches Städtebuch* indicates: "Gerichte urspr. allesamt in Händen der Besitzer von Schloss und Herrschaft." (Keyser 5 vols. 1939-1974, Band 2 Teil 1, p. 19) In our translation: "Courts originally all in hands of owners of castle and manor." Note that our measure of jurisdiction rights does not distinguish between higher and lower jurisdiction rights.[39]

Judicial Appointment is a variable equal to one when the city appointed jurists (judges) to the court, equal to minus one if we observe a lord making court appointments. and zero otherwise. An example of an observation recording that first the city and then the lord-selected court appointees is Obermarsberg in Westfalia. The *Deutsches Städtebuch* indicates: "Selbständige städt. Gerichtsbarkeit und Recht der Anstellung des Richters von Anfang 14. Jh. bis 1539, dann nur noch auf Vorschlag des landesherrlichen Landdrosten." (Keyser 5 vols. 1939-1974, Band 3 Teil 2, p. 272) In our translation: "Independent municipal jurisdiction and the right to appoint a judge from the beginning of the 14th century until 1539, afterwards only upon the proposal of the lordly bailiff."

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[39]Generally, there were two types of jurisdiction rights. Lower jurisdiction usually dealt with the settlement of market conflicts, debt suits, property disputes, or minor crimes that were punishable by fines or lighter corporal punishments such as the pillory. Higher jurisdiction, in contrast, often included the right to punish with corporal punishment such as mutilation or death. Engel (1993, p. 76)

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 5 vols. 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 alliances with other cities. An example of a town-alliance between cities is the alliance in Nürnberg in Franken. The *Deutsches Städtebuch* indicates: "1344 schließt N[ürnberg] einen Bund mit den Städten Würzburg, Weißenburg und Windsheim." (Keyser 5 vols. 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.*[40] 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 5 vols. 1939-1974, Band 2 Teil 3, p. 483) In our translation: "Burghers living outside city walls were permitted in the council 1319." To clarify, the "Pfahl" were palisades 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. In Table A2, we provide further references and brief descriptions of the types of autonomous laws we consider in our analysis.

Political Index of Urban Autonomy is a unified index of urban political autonomy which we construct with generalized principal components analysis, which accommodates binary data, of all city-level political variables shown in Figure 8 and described above. The index can take values in the range of 0 to 1.

Construction is a binary variable that takes the value of 1 if a major urban construction project is recorded in the *Deutsches Städetebuch* (Keyser 5 vols. 1939-1974) as coded in

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[40]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).

Cantoni (2020). In Figure 5 in the main body of the text, we present a high-level sectoral classification of construction activities, some of which arguably shade between or span categories. For a more detailed discussion of the data and the classification see Cantoni (2020) and Cantoni, Dittmar, and Yuchtman (2018).

Manufacturing is a binary variable that takes the value of 1 if a manufacturing activity is recorded in the *Deutsches Städetebuch* (Keyser 5 vols. 1939-1974). Our data record the *presence* of specific activities, but not employment, output, or the number of establishments. An example of a manufacturing activity is in 1387 in Pfreimd in Bavaria. The *Deutsches Städtebuch* indicates: "In der Freiung bestand ein bereits 1387 nachgewiesenes Eisenhammerwerk." (Keyser 5 vols. 1939-1974, Band 5 Teil 2, p. 554) In our translation: "In the liberties [*Freiung*] there was an iron hammer works, which was already documented in 1387." In our data, the iron hammering works (*Eisenhammerwerk*) is recorded as a metals sector activity. Note that *Freiung* designates a free area in which city "liberties" held, often an extra-mural or faubourg area.

Political Fragmentation records political fragmentation at the city level. Political fragmentation is calculated as follows. First, we assign each city its respective territorial lord or ruler in any given period using data from Cantoni (2020), data kindly shared by Davide Cantoni, and our review of the *Deutsches Städtebuch*. Second, we compute a Herfindahl index (HHI) of political concentration for each city using all neighboring cities in the same region within a 100km radius. Third, we define:

$$\text{Political Fragmentation} = 1 - HHI$$

for all cities as of 1348. We provide an illustration in Figure A1 below.

City Charter Fragmentation records city charter fragmentation at the city level. City charter fragmentation is calculated as follows. First, we assign each city its respective city charter family in any given period using data from Cantoni (2020), where the "families" are types of city law such as Lübeck Law and Madgeburg Law. Second, we compute a Herfindahl index (HHI) of city charter concentration for each city using all neighboring cities in the same region within a 100km radius. Third, we define:

$$\text{City Charter Fragmentation} = 1 - HHI$$

for all cities as of 1348.

Plague 1348-51 records the number of plague outbreaks in a city 1348 through 1351 as recorded in the _Deutsches Städetebuch_ (Keyser 5 vols. 1939-1974), focussing on outbreaks recorded as "_Pest_" and the Black Death (_Schwarze Tod_). For example in the entry for Bad Reichenhall in Bavaria, the _Deutsches Städtebuch_ indicates: "Pest 1349." (Keyser 5 vols. 1939-1974, Band 5 Teil 2, p. 89) In our translation: "Plague in 1349."

Urban Density measures the number of neighboring cities within 50 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).
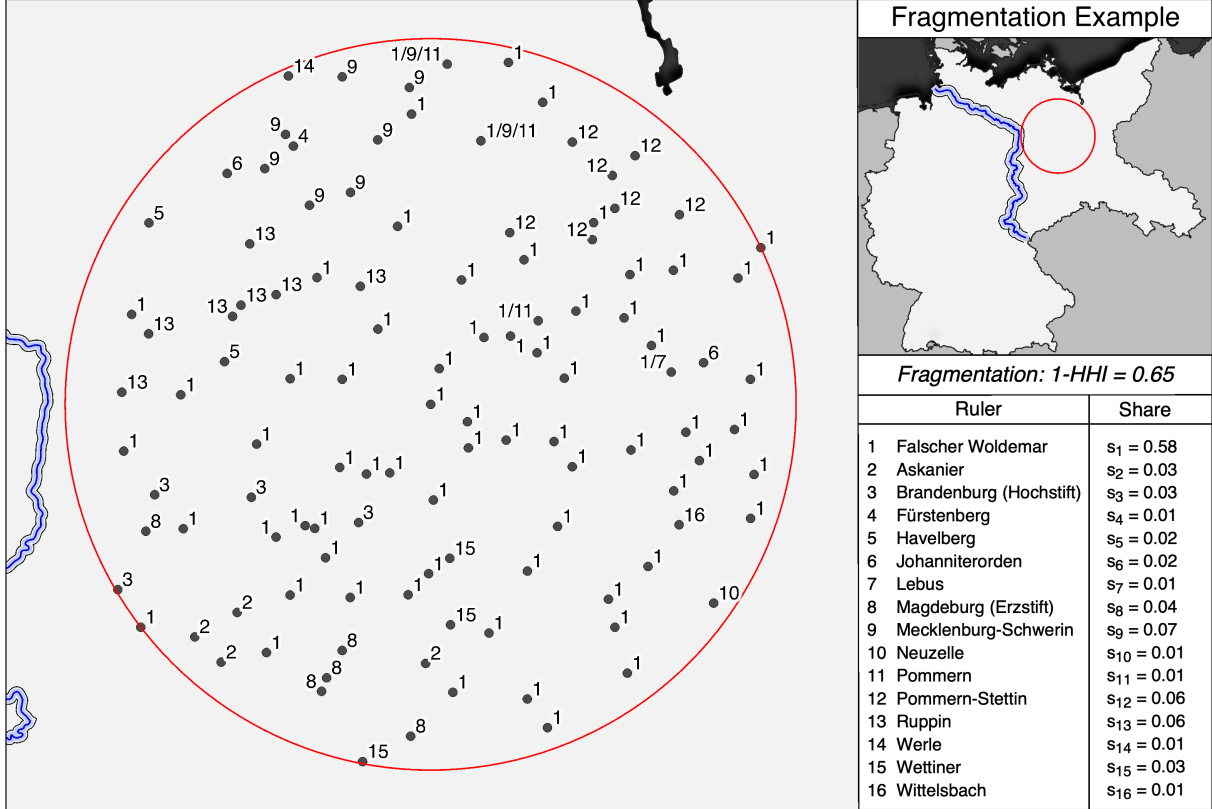
Table A2: Description of Autonomous Laws

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)

Political and City Charter Fragmentation

To clarify how the political fragmentation and city charter fragmentation indices are constructed, we visualize the underlying variation for a selected city.

Figure A1: Construction of the Political Fragmentation Index

This figure displays territorial rulers for cities within a 100km radius of a representative city. Each dot corresponds to a city and each number corresponds to a ruler. For each ruler, we calculate the share of cities under their jurisdiction. We measure fragmentation by 1 less the sum of squared ruler shares of cities. In this illustration, we indicate cities with multiple rulers are indicated with a "/" separating rulers' ID numbers.

Figure A1 illustrates how we measure political fragmentation for a representative city. 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 i, and N is the total number of rulers.[41] We compute a Herfindahl index (HHI) of political concentration at the city level: $HHI = \sum_{i=1}^{N} s_r^2$. We define: Political Fragmentation $= 1 - HHI$. Our baseline finding, that there was greater political fragmentation in the West, is robust to other aggregations of the data. We proceed analogously to measure city charter family fragmentation.

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[41] In cases where a city was ruled by multiple lords, we assign rulers their corresponding share. Thus, if two lords rule over one city we count this as if each lord ruled over half a city.

B   History

This appendix provides supporting evidence and discussion on: (1) city institutions and urban development, (2) the colonization of Eastern Germany, (3) the equilibrium before the Black Death, (4) feudal institutions, (5) agrarian politics and development, (6) the urban-rural nexus, and (7) major shocks in the late medieval period.

B.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. During this period, an enduring structure of urban locations was established in central Europe. Figure B1 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.[42]
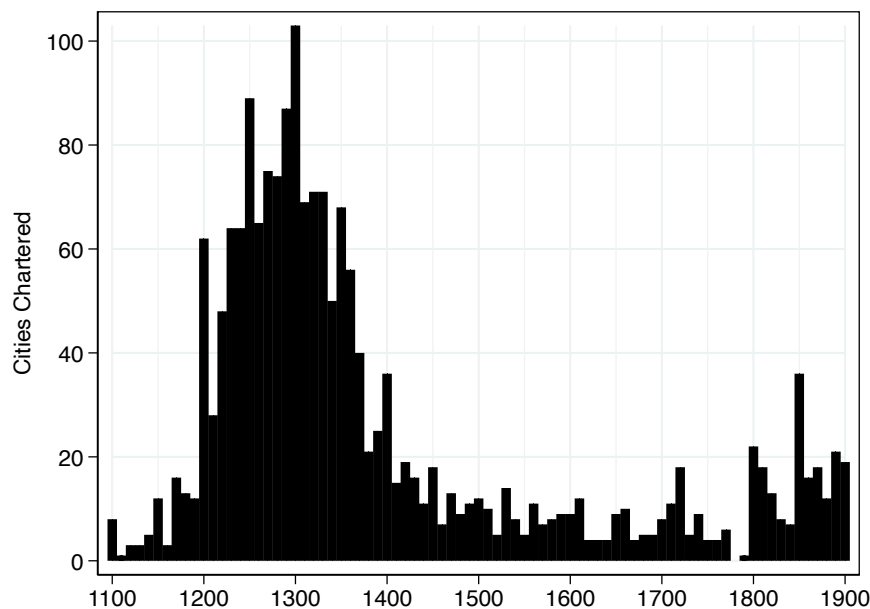
Research on cities emphasizes key dimensions of political and economic development that define types or models of urban development in Europe.[43] There is broad agreement that the core dimensions of urban autonomy include: (i) commercial activity, (ii) institutions of self-government with independent selection procedures that were capable of producing acts of political autonomy, (iii) judicial independence, and (iv) a fortification. Our analysis examines all of these dimensions, with the exception of fortification. Thus, 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

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[42]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).

[43]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.

Figure B1: 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). The figure is inspired by Stoob (1956, p. 28) who provides an important early example of the quantitative analysis of the evidence in the *Deutsches Städtebuch*.

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."[44] (Weber 1978, p. 1226)

Henri Pirenne similarly 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

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[44]It is noteworthy that scholars have viewed the citizen's oath (i.e. *coniuratio* or related forms of association) as a decisive moment in the formation of city autonomy. This element of voluntary association is found across various dimensions of the data we collect. For example, it is visible in our evidence when burghers voluntarily agree to legally binding, self-imposed rules (e.g. in the production and enforcement of autonomous laws). It is also reflected in the role of guilds in city politics, as guilds relied on oaths for their internal organization. In addition, oaths functioned as tools to regulate external relations, as in the case of alliances between towns. Von Gierke (1873) maintains that voluntary oaths created legal proto-citizens, which later became a basis and model for the development of the modern state. We note, however, that when towns were subjugated, town representatives were forced to swear allegiance to feudal rulers, and a different model of politics.

immunities that did not exist in the surrounding countryside." (Pirenne 1956, p. 204)

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). Cities gradually assembled constitutional documents securing their liberties, often through protracted struggles with lords (Kuhn 1975, pp. 283f; Stoob 1956, p. 40; Engel 1993, p. 34). Max Weber emphasizes demand from below: a rising class of urban merchants and craftsmen mobilized and took power from feudal rulers. However, demand for institutions securing urban autonomy could also come from above, as was the case in cities East of the Elbe River, which were established and granted governance institutions by colonial rulers.

B.2   The Colonization of Eastern Territories

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 1100s, 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). While military campaigns began expanding and consolidating territories beyond the Elbe after the fall of the Carolingian Empire in the 9th century, it was not until the end of the 1000s that mass migration into the East by German, Dutch, and Flemish settlers was set in motion (Higounet 1986, p. 85).

Motivated by the returns to economic development in their territories, Eastern lords organized the migration process from above (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

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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). Into the early 1300s, labor was the scarce factor of production, and rents in territories East of the Elbe remained far lower than in the West Bartlett (1995, pp. 125-8 – see below for details)

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).

The colonization process required capital and organizational resources to attract migrants, finance moves, and set up infrastructure. Short of capital and administrative capacity, territorial lords hired entrepreneurs (*locators*) who assembled start-up capital and planned and executed the founding of cities and villages. In return, these entrepreneurs received monopoly rights, land holdings, and positions in the communal government (Kuhn 1959, pp. 180-81).

The *locator* system fostered a distinctive relationship between cities, city officials, and territorial sovereigns in Eastern territories (Kuhn 1975, pp. 238-9). In particular, urbanization in the East did not imply a loosening of territorial cohesion — as it did in the West — but on the contrary was a sign of a strengthening of sovereign power (Kuhn 1975, pp. 238-9; Stoob 1956, p. 40).

The fact that Eastern German cities were typically planned from the outset, distinguishes them from cities in the West and was a consequence of greater territorial concentration in the East (Kuhn 1956, p. 78; Kuhn 2016, p. 115). The Eastern city was "created and privileged as a whole," so that, "what the Western city acquired in contested battles is thus conferred on [the Eastern city] from the beginning" (Stoob 1956, p. 40 – in our translation).

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 the sovereign-led, top-down process through which urbanization developed in the East (Kuhn 1956, p. 85).

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 gradually and 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 under unified lordly rule and exhibit greater homogeneity in their legal institutions (Schulze 1966, pp. 349-50; Menzel 1975, pp. 134-5).

Despite the fact that charters in the Colonial East often conferred the same privileges as charters found in the West (Wunder 1978), the variation across urban legal institutions was evident in the textual complexity of charters (Schulze 1977, p. 458). The older, Western legal documents are in general more heterogeneous and varied. In the course of the Eastern expansion, constitutional and related legal documents became more schematic. At times, charters in the East were quite short and only included a reference to the corresponding "mother" city charter (e.g. Magdeburg Law or Lübeck Law). This contrasts with the institutional landscape in the West, where charters were less schematic, more locality-specific, and evolved more gradually.

Higounet (1986, p. 296) suggests that the fact that "all these foundation acts and freedoms are formulaic" left open the possibility – and implicitly lowered the price – of subsequent lordly intervention. The history suggests that altering a complex set of interdependent constitutions was more costly than retracting a single legal document from the lord's perspective. In the vocabulary of North (1981) the "prices" in politics varied, reflecting the initial institutions.

While city charters in the East developed as an instrument of princely power politics (Schulze 1966, p. 364), their introduction also "contributed to [the city's] convergence to the

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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).

B.3   The Equilibrium Before the Black Death

We frame the period before the Black Death as an equilibrium in the main text. However, there is a debate over whether the European economy and the regions we study were near their demographic limits and potentially even out of equilibrium, given resource constraints and the historical pattern of institutions and technological development.

One set of historical arguments suggests European societies were running up against resource limits prior to the Black Death, in a dynamic that is variously interpreted as a Malthusian crisis or a crisis in feudalism. The outbreak of famine across Europe in 1315-1317 is often taken as evidence that European society was operating at or near resource limits. Some historians interpret the narrative record as indicating that growth was slowing down before the Black Death; and others argue that the effects of the Black Death reflected how the pandemic interacted with these underlying dynamics (Vasold 2003, p. 287; Epstein 2000; Genicot 1966). The extent to which economic changes that followed the Black Death reflected pre-existing economic trends is subject to debate (Rösener 2012; Pitz 1965).[45]

A second set of arguments suggests that key aspects of and trends in development were not changing before the Black Death and in particular that resource constraints were not binding in areas we study, the famine of the early 1300s notwithstanding. For example, Epstein (2000, p. 41) observes that there is no clear evidence that grain yields were declining or that demographic growth was slowing pre-1348. Moreover, there is considerable narrative evidence that migration from West to East may have been driven by pull factors rather than overpopulation and resource constraints in Western areas of German-speaking Europe

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[45]Reflecting this debate, the Black Death shock has been framed as a "partially exogenous factor" (Kriedte 1981, p. 60 – our translation) insofar as it shifted economic development through its interaction with more endogenous factors. Our analysis pursues a line of inquiry somewhat in this spirit.

(Bartlett 1995; Berend 2016; Epperlein 1960; Zernack 1975).

Significantly, the historical evidence strongly indicates that land was abundant East of the Elbe into the 1300s. First, the share of output Eastern peasants paid as rent was low. Around 1300, peasants in Brandenburg paid rents equal to approximately 1/5 of their output, whereas peasants in England and Northeastern France paid close to 1/2 of their output. Second, per acre rents were relatively low in the East. In the early 1300s, silver (money) rents were about twice as high in England as in Silesia. Third, peasants had much larger farms East of the Elbe. Fourth, labor obligations in the East were relatively light and lords remained ready to offer extensive concessions to attract settlers into the 1300s. See Bartlett (1995, pp. 125-8) for a discussion of these points.

While the narrative record is ambiguous, the quantitative evidence we collect reveals a regional divergence, driven by shifts in development *after* the Black Death, and that economic and political trends were steady up until 1350 (Figures 1 and 8 in the main text).

B.4 Feudalism

Our analysis frames territorial rulers and the larger institutional framework of historical, German-speaking Europe as *feudal* over the period we study. In this usage, we follow a large body of research in history, including the analysis in Wunder and Hauptmeyer (1991), Wickham (2008), Epstein (2000), Brenner (1991), and Barraclough (1957). The literature indicates that European feudalism has both a narrow legal definition, focused on legal relationships between lords and vassals, and a larger definition as a social formation (or *Gesellschaftsformation*) which spanned the long epoch between the decline of the Roman Empire and the advent of modern economic growth (Wunder and Hauptmeyer 1991).

Several considerations are relevant given our analysis of cities within the larger economic system. Feudalism is frequently discussed in terms of decentralized and partitioned sovereignty. For example, Brenner (1991, p. 23) observes that "Feudal rule was first constituted through the formation of highly localized lordly political groups, initially organized around a castle and led by the castellan." However, these germinal political-economic relationships elicited, interacted with, and were activated by the development of urban activity and the commercial penetration of rural areas (Wickham 2008; Wunder

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and Hauptmeyer 1991, p. 96). Further, within the feudal order, rulers worked to develop state structures: "to subordinate to the purposes of government the inchoate [decentralized] feudalism which had sprung up in Germany between 1076 and 1152 and to create an organized and integrated feudal state" (Barraclough 1957, p. 168). Significantly, feudal incomes were obtained "as much through tax and tribute as through labor services and economic rent" (Epstein 2000, p. 49).[46] Cities were an important source of taxes and labor services, including military labor. Cities also shaped lords' ability to secure taxes and labor services from the agricultural sector, through their role in the larger political economy and insofar as cities provided outside options in the labor market (Anderson 1974).

B.5   Agrarian Politics and Development

Our discussion of agricultural politics and development focuses on laws restricting labor mobility and the allocation of land to noble estates. On these dimensions, there was little change in Eastern Germany before 1500 and pronounced change afterwards (Section 6). Influential historians suggest that these changes reflected the balance of power between the landowning nobility and tenant farmers (Brenner 1976) and that peasant revolts indicate the power of tenant farmers (Blickle 1988; Brenner 1976; Bierbrauer 1980). It is thus natural to consider also peasant revolts as a source of evidence on agrarian rural politics.

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).[47] 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

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[46]For this reason, Epstein (2000) refers to a "feudal-tributary" mode of production, following Haldon (1993). Similarly, Wickham (2008) suggests "feudal" and "tributary" can be used virtually interchangeably to describe tax-based and landlord-based revenue (exploitation) systems.

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

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. 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 city-level politics we uncover in our quantitative analysis.

B.6   The Urban-Rural Nexus

Cities shaped outside options of peasants and held valuable economic rights and monopoly concessions that became contested after the Black Death. In this section, we frame our discussion in terms of rulers' incentives to suppress cities, how these incentives differed across regions, and how conflicts between cities and rulers could have military dimensions or run through territorial political assemblies (diets).

A large literature documents the importance of cities as locations offering outside options for labor in agricultural labor markets. Migration to cities by agricultural laborers created pressure on lords to offer competitive terms and conditions (von Inama-Sternegg 1899; Lamprecht 1886; Epperlein 1989). The threat of losing labor to cities induced the landowning nobility to accept "a general relaxation of servile subjection," including increasing rights to land, fewer labor dues, lower rents, and the conversion of labor rents into monetary rents (Anderson 1974, p. 206). The development of cities as centers of demand for agricultural output tended also to increase peasant resistance to servile burdens (Epperlein 1989, p. 325).

The outside options cities offered were a function of their economic dynamism. Urban dynamism reflected the legal privileges and monopoly rights enjoyed by cities. These privileges and monopolies conferred market power and secured rents and included: exclusive rights to market products, including agricultural products; monopolies on milling services; and the right to brew beer and engage in specific crafts activities, often stretching to a formal local monopoly in these activities (Isenmann 2014; Epstein 2000).

The Black Death shifted the supply of labor, generating upward pressure on real wages and downward pressure on feudal rents. Lords responded by attempting to reduce the value

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of cities as an outside option for their laborers and by attempting to claw back economic privileges enjoyed by cities. Broadly speaking, lords moved to depress wages in both the countryside and cities (Anderson 1974, p. 201). The evidence parallels a classic observation made by Lewis (1954, p. 149) on the political incentives facing capitalists in economies with a subsistence sector: "The fact that the wage level in the capitalist sector depends on earnings in the subsistence sector is sometimes of immense political importance since its effect is that capitalists have a direct interest in holding down the productivity of subsistence workers."

After the pandemic, lords moved to erode or abolish privileges and monopolies that sustained city incomes (Hoffmann 1958, p. 125). Eastern lords acted systematically to roll back urban trade privileges and monopoly rights. For example, in the early 1400s in the Neumark region, the Teutonic Order began forcibly to reclaim milling rights previously acquired by cities (Heidenreich 1932, p. 74). In Berlin, after a failed uprising in 1448, lords prohibited the city's membership in the Hanseatic League and moved to eliminate urban economic privileges in brewing and the grain trade, specifically opening these sectors to the nobility (Schultze 1939, p. 468). The erosion of urban grain trade privileges by the gentry also advanced in the city of Königsberg in the Neumark: by the 1400s, nobles were allowed to circumvent cities and ship their grain directly to the Baltic ports; by the early 1500s, merchants from Königsberg were no longer allowed to conduct business with the trading house in Stettin (Neitmann 2015, p. 22). We also observe rulers revoking urban brewing rights and moving to redirect demand for beer towards noble producers (Hoffmann 1958, p. 128). Lords gained access to further the revenue streams by directly seizing urban government functions which involved fees and charges, and often cemented their power by constructing castles inside cities (Hoffmann 1958, p. 125).

Lords also moved to directly limit labor mobility. Under customary norms, a period of residence in a city secured legal freedom for laborers, memorialized in the aphorism *Stadtluft macht frei* (town air makes one free). However, this norm was contested. Where cities were weak, lords were ultimately able to prohibit towns from accepting runaway serfs, lowering the value of urban sector as an outside option (Epperlein 1989, p. 325). Laws limiting labor mobility, which we discuss in the main text, institutionalized such restrictions in the 1500s.

Our quantitative analysis indicates that differences in *ex-ante* political competition among lords shaped the outcome of these conflicts. In the East, low political fragmentation

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characterized a region in which cities were exposed to lordly intervention. In the West, political fragmentation sheltered cities from lordly suppression and we observe stronger urban development. Strong autonomous cities, in turn, fragmented the territorial reach of lords and held the power of the landed nobility in check (Kaak 2007, p. 134). Where cities were weak and territories were more consolidated, the bargaining power of agricultural labor was lower. An important institution through which lords rolled back urban privileges and suppressed peasant rights were political assemblies (diets) (Ogilvie and Carus 2014; Harnisch 2015). Genicot (1966, p. 708) notes that in many Eastern regions the gentry "dominated the Diets" and "imposed their will on the towns." The diets transformed public labor services into private labor dues, introduced mobility restrictions, and forced cities to return fugitives. "Thus, not without trouble, they acquired the labor they needed" (Genicot 1966, p. 708).

Our quantitative findings are thus consistent with the historical analysis in Anderson (1974, p. 205), which concludes: "It was above all the urban sector, structurally sheltered by the parallelization of sovereignty in the medieval polity, that had now developed to a point where it could decisively alter the outcome of the class struggle in the rural sector."

B.7 Major Shocks in the Late Medieval Period

The Black Death of the 1300s constituted the deadliest pandemic in human history and killed approximately one-third of Europe's population (Noymer 2007; Benedictow 2004; Gottfried 1983). However, aside from the Black Death, the late medieval period was marked by a series of other demographic and military shocks. While the Black Death sharply coincides with a regional divergence in development, this invites questions about the possible role of other major shocks. In this section, we review quantitative and historical evidence on major military conflicts and natural disasters.

Military conflict. We examine data on exposure to military conflicts that potentially affected the development of cities through destruction or the loss of financial capital. In Table B1, we test for and find no differences across regions in city-level military destruction before the Black Death, using data from Cantoni (2020). Similarly, we do not find significant differences in the exposure to military destruction in the 150 year period after the Black Death. These results hold when we compare all cities across regions and when we focus

Table B1: Military Destruction Across Regions When Pandemic Struck

| | (1) | (2) | (3) | (4) | (5) | (6) |
| | All Cities | | | Within 100 km of Border | | |
	β: Diff.	SE	Mean	β: Diff.	SE	Mean
Military Destruction 1200-1349	0.00	(0.02)	0.07	-0.00	(0.02)	0.05
Military Destruction 1350-1499	0.06	(0.04)	0.20	-0.04	(0.07)	0.14

This table presents regression estimates examining differences in exposure to military conflict between Colonial Eastern and Historic Western cities in the mid-1300s from models: $y_i = \alpha + \beta colonial_i + \epsilon_i$, where *colonial* is an indicator for cities in the Colonial East. Columns 1-3 examine all cities ($n = 2,250$). Columns 4-6 examine cities within 100-kilometers of the Elbe-Saale boundary ($n = 685$). Columns 1 and 4 show the estimates $\hat{\beta}$. Columns 2 and 5 display standard errors. Columns 3 and 6 provide the mean of the dependent variable. "Military Destruction" is defined as the number of large-scale military conflicts that incurred destruction of capital and financial losses over the period from 1200 to 1350. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers following Conley (1999).

on cities along the Elbe boundary. This finding indicates that direct exposure to military conflict does not appear to have been a key driver of the observed divergence.

Although there are no observable differences in the frequency of military conflicts, differences in the intensity of large-scale wars could be imagined to have shaped the outcomes we trace. Below, we discuss the two most significant wars and likely candidates during the period of our study: the Hussite Wars and the Polish–Lithuanian–Teutonic War. However, the exact timing and location of these conflicts rules them out as potential causal factors.

Military conflict between adherents to Hussite Christianity and royal-catholic troops broke out in the 1420s. The conflict was concentrated in Southern Bohemia and around Prague but spread to neighboring regions in both Eastern and Western Germany. It is natural to wonder whether differences in the intensity of conflict across the border could have contributed to the regional divergence that we document.

To clarify why the Hussite wars are not plausible confounders in our analysis, the timing and location of the conflict are instructive. In terms of timing, the major battles were in Bavaria, Franconia, Saxony, and Silesia towards the end of the 1420s, whereas we document an economic divergence dating to the mid-1300s using granular data on urban construction (Figure 1). In terms of location, the Hussite wars enter our study area mainly in: Saxony, where we do not observe a divergence (Section I); in Bavaria and Franconia, which are located

West of the border; and in Silesia, in the far East, outside the 100 km border.

The Polish–Lithuanian–Teutonic War of the early 1400s was the result of a sequence of territorial disputes between the Teutonic Order and the Polish-Lithuanian alliance. The conflict culminated in the defeat of the Teutonic Order in the Battle of Tannenberg in 1410. Extensive destruction, war expenses, and reparation payments led to a fiscal crisis for the Order and protracted economic crisis in its territories (Henning 1964, p. 41). Unable to secure urban trade routes, merchants in Order's territories were repeatedly exposed to predatory raids by Pomeranian nobles (Neitmann 2015, p. 254).

To assess whether the Polish–Lithuanian–Teutonic War could have influenced our estimates, it is again important to consider the timing and the spatial distribution of the conflict. The main conflict played out in the core territories of the Teutonic Order in East Prussia, beyond and outside our study area. The region of Neumark, which we do study, borders the territory of the Teutonic Order, and arguably was affected via spillovers. However, our findings do not depend on the inclusion of data from this region. Further, the military confrontation starts only in 1409, approximately half a century after we first document a divergence.

Famine and Disease. Major famines struck Northwestern 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 we document, it would be necessary that either (1) the direct impact of the famines varied regionally or (2) these famines had regionally varying implications reflecting other underlying differences across regions. Historical research indicates that the famine and disease-related shocks of the early 1300s did mark an apparently uniform shock across regions (Campbell 2016) and affected "East and West Germany in the same way" (Henning 2020, p. 412 — our translation). On the second point, our evidence shows that initial economic and political development was similar at the city level, including for border cities which shared similar natural endowments, in this pre-1350 period. We also find that there is no observable decline in the level or trend of economic activity associated with the famines in the early 1300s.

More generally, the famines of the early 1300s had implications for prices, and thus for

political economy, unlike the Black Death. The famines led to increases in grain prices and lower real wages for labor, unlike the Black Death; in addition, 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. 12, 108, 166).
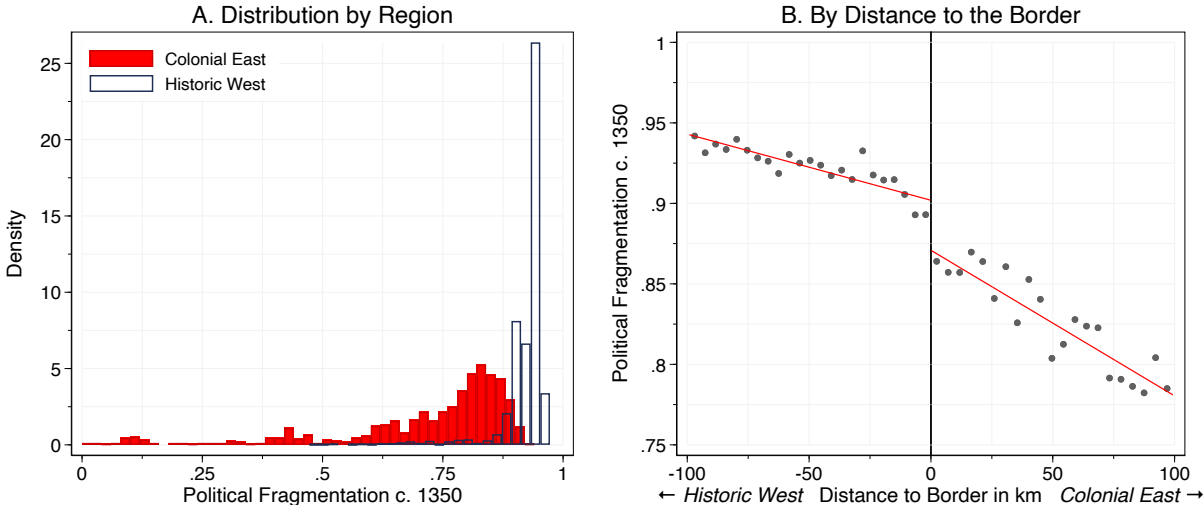
C Political Differences Before the Pandemic

In this section, we provide additional evidence on political fragmentation and consider the the extent and potential roles of additional cultural and institutional factors.

C.1 Political Fragmentation

Our baseline analysis examines the fragmentation of political authority and of city law families (types of city law) measured at the city level and across neighboring cities defined to be cities in the same region. Our finding that political fragmentation shifted at the Elbe border holds when we measure political fragmentation under an alternative definition that includes cities on both sides of the border as potential neighbors, for cities close enough to have neighbors on the other side. Figure C1 shows that when we do not condition on the border when we define the set of relevant neighbors, we still find sharp and distinctive decline in political fragmentation at the border itself.
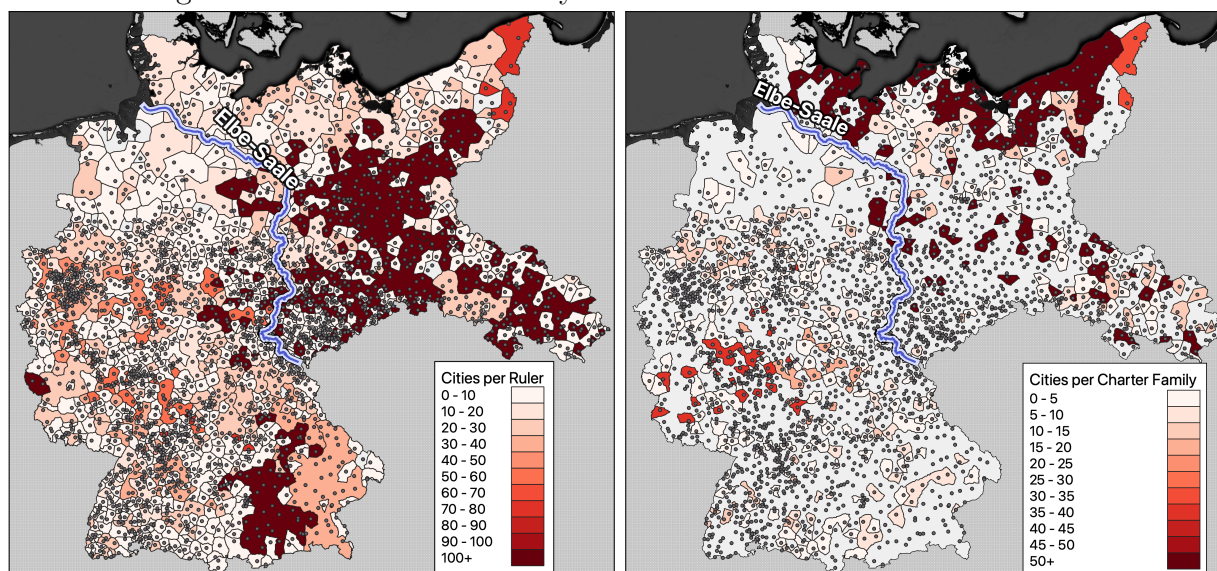
Figure C1: Alternative Measure of Political Fragmentation

This figure plots the distribution of city-level political fragmentation in the Colonial East and Historic West. For each underlying city i, city-level political fragmentation is measured by: $1 - HHI$, a Herfindahl index of the concentration of feudal rule (rulers' sovereignty claims) across all cities within a 100 kilometer radius. We display the distribution of political fragmentation across all cities in Panel A. Panel B. presents a binned scatter plot of the distribution across neighboring cities within 100 kilometers distance along the border and fits a first-order polynomial on both sides.

The pattern of regional differences in fragmentation that we document is robust to using further alternate measures, such as the share of a city's neighbors subject to a different ruler,

Figure C2: Territorial and City Charter Concentration Around 1350

The lefthand panel shades territories by the number of cities under the jurisdiction of the lord (or lords) of the cities in that territory. Darker colors indicate cities subject to lords who control larger numbers of cities. The lefthand panel shades areas around cities to reflect the number of total cities with the same family of city law.

other definitions of neighbors, and calculations of political fragmentation at the gridcell level.

While political fragmentation was higher in the West, the underlying political patterns varied. Thus, while quantitative and narrative evidence indicates that the Elbe traced an important boundary, we are *not* dealing with a strict or literal spatial discontinuity. To clarify the nature of the historical political arrangements, it is useful to consider additional evidence on the geographic variation in political arrangements. Figure C2 provides information on the concentration of lords' political jurisdiction over cities and on the concentration in the type of city law. The lefthand map shades local regions to reflect the number of cities under the jurisdiction of the local lord. For example, the Margrave of Brandenburg held jurisdictional claims over more than 100 cities. This places his jurisdiction in the largest bin ("100+"). The map reflects this by shading all cities subject to the Margrave of Brandenburg the darkest color. The map also shows some apparently small and isolated territories fall within the jurisdiction of large lordships. These were exclaves, separated from larger territorial bodies. The righthand map shades regions to reflect the number of cities under common families of city charter law, such as Lübeck law and Magdeburg law. As the map indicates, city law was more concentrated (least fragmented) near the Baltic, where Lübeck law was prominent, and stretching from Saxony into Silesia, where Magdeburg law was prominent.

C.2 Cultural and Religious Differences Across Regions

Alongside politics, culture and religion have been suggested as key factors in 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* the period we study (Section 2). The fact that Western settlers populated the Colonial East, makes it unlikely that initial individual-level cultural differences were key factors driving the observed divergence in economic and political development. However, it is conceivable that the influence of, for example, Christianity might have varied on the margin across regions.

Table C1 examines potential cross-sectional regional differences in several proxies for cultural factors: religious construction, distance to monasteries, distance to pagan sites of worship, and the age of urban settlements themselves. We observe no significant regional differences in the construction of churches and monasteries, and no differences in proximity to pagan worship sites, prior to the Black Death. This finding also holds when comparing neighboring cities across the border. While we find differences in the age of settlements across all German cities, but these differences are attenuated when we focus on cities along the border. In additional quantitative analysis, not reported in detail here, we find no significant relationship between distance to monasteries and the age of settlement as potentially time-varying factors and economic and political development outcomes after the pandemic. In contrast, we find that differences in political fragmentation both between the East and West and within the colonial East are predictive of differences in development after the Black Death shock to political economy.

Taken together, the evidence suggests limits on the role of cultural and in particular of religious differences in the process we study. If anything, the developmental differences observed after the Black Death may have played a significant role in shaping cultural evolution across societies. As Szűcs (1983) discusses, the Eastern regions were part of a larger Western European economic and cultural space before the Black Death and *became* an "Eastern" other in precisely the period we study.

Table C1: Religion in the Colonial East When Pandemic Struck

	(1)	(2)	(3)	(4)	(5)	(6)
	All Cities			Within 100 km of Border		
	β: Diff.	SE	Mean	β: Diff.	SE	Mean
Religion and Culture						
Pagan Worship Site	0.00	(0.05)	0.27	-0.06	(0.07)	0.28
Church Construction 1200-1349	-0.01	(0.03)	0.30	0.01	(0.06)	0.28
Monastery Construction 1200-1349	0.01	(0.01)	0.04	0.01	(0.01)	0.03
Age of Settlement	-1.99***	(0.34)	3.19	-0.77	(0.57)	2.68

This table presents regression estimates of differences between colonial Eastern and historic Western cities in the mid-1300s from models: $y_i = \alpha + \beta colonial_i + \epsilon_i$, where *colonial* indicates cities in the colonial East. Columns 1-3 examine all cities ($n = 2,250$). Columns 4-6 examine cities within 100 kilometers of the Elbe-Saale boundary ($n = 685$). Columns 1 and 4 show the estimates $\hat{\beta}$. Columns 2 and 5 display standard errors. Columns 3 and 6 provide the mean of the dependent variable. 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. These measures are constructed from the *Städtebuch*. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers following Conley (1999).

C.3   City-Level Institutions

We focus our analysis of city-level political institutions on the core institutional features of the self-governing European city, as defined by Weber and Pirenne. However, going beyond these features, the colonial process in the less fragmented East resulted in more homogeneous and more "rationalized" city-level institutions. The colonial process generated a political environment "organised on rational territorial principles" (Barraclough 1957, pp. 251, 279).

As a result of the colonial process, city charters in the East contained institutional provisions that appear piecemeal and unbundled in Western cities. This has implications for how historical records appear, if not for the substantive institutional infrastructure of cities.

An interesting example is found in formal *market rights*, which Cantoni and Yuchtman (2014) study as a source of evidence on economic development. The way market rights were granted changed over time. Market rights were originally stand alone institutions, granted independently of other legal rights, but increasingly were incorporated into and replaced by city charters. Rietschel (1897, p. 109 – our translation) observes that: "[t]he 10th and 11th century is the time of market privileges... In the 12th century market privileges which simply

confer the market right. . . disappear. . . replaced on the one hand by annual fair privileges, on the other hand by city charters."

In the colonial East the pattern was distinctive and approximates the observations that "[a]ll cities are markets" (Rathgen 1881, p. 68 – our translation) and that increasingly "the right to hold a market is always connected with the city charter" (Leidig 1891, p. 17 – our translation). In the East, city charters disproportionately were granted in "families" of city law, such as Magdeburg Law and Lübeck Law. Market rights embedded in these charters were often conferred by reference to the law of the *mother city* in the charter family: "City privileges of the 12th [century]. . . often confer charters of a city already known and developed legally on a new foundation. This practice can also be used to include references of the market right bestowals to the market and merchant rights of older towns. Such legal bestowals are increasingly part of the 'basic equipment' of a new foundation" (Bader and Dilcher 1999, pp. 620ff – our translation). This was pattern particularly the prevalent in the East.

Eastern cities without stand alone market rights frequently had market rights conferred by their charters. Thus Schlesinger (1961, p. 301 – our translation) observes that the number of markets in the East was larger than recorded: "in the area of the German Eastern Settlement, in reality, many more such market places, *villae fori* or whatever they are called, must have been established." We confirm this in our data. We observe 303 Eastern cities with a city charter prior to 1350 that do not have stand alone market rights documented in Cantoni (2020). The cities without stand alone market rights include many for which historical evidence clearly indicates that markets were established prior to 1350, including Lübeck, Leipzig (Bader and Dilcher 1999), Stralsund, Rostock (Möller 2004), Berlin, Brandenburg, Frankfurt an der Oder (Schich 2018), Glogau (Weltzel 1866), Königsberg in der Neumark (Escher 2015) and Güstrow (Schlesinger 1973). Indeed, of these 303 cities, 104 had charters of either Magdeburg or Lübeck law, which would confer market rights (Schlesinger 1961).

These observations matter for several reasons. First, pre-1350 differences in market rights reflected the underlying regional political environment. Second, these differences were formal but not substantive, as market rights conferred via stand alone grants or via city charters delivered the same immediate institutional support for exchange. For this reason, East-West regional differences in stand alone market rights do not, in our view, indicate differences in economic development. Additional quantitative analyses support this conclusion.

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D The Plague

D.1 Variation in Black Death Mortality

An important question for our analysis is whether there were differences in the Black Death shock across regions. Our main analysis shows that there were limited if any regional differences in the number of city-level plague outbreaks along the border and controls for these differences. However, it is natural to wonder whether there was any additional regional variation in the intensity of the shock, including in mortality.

In this section, we test for regional variation in the intensive margin of the plague shock. Table D1 investigates the intensive margin of plague exposure by examining differences in mortality and household (home) desertion rates in the wake of the Black Death (1348-1351) between Eastern and Western cities. In Panel A, we study the data from Christakos et al. (2006), following Jedwab, Johnson, and Koyama (2019), who examine the relationship between city-level variation in mortality during the Black Death and subsequent patterns of recovery and development in city populations across Europe. In Panel B, we augment the city-level data with evidence on mortality rates at the regional level. In Panel C, we further augment the analysis with additional 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. In Panel D, we consider data on household desertion rates, which provide another measure of the intensity of the Black Death. We similarly find no large or significant differences in desertion rates across regions.

The evidence accords with a long line of research indicating that the impact of the shocks was similar across regions in the Holy Roman Empire, local variation notwithstanding (Lütge 1950; Vasold 2003; Brenner 1976; Acemoglu and Robinson 2012).

D.2 Black Death Shocks and Development at the City-Level

Our key findings concerning regional divergence hold when we include local plague outbreaks during the Black Death as potential covariates of economic and political change, and when we study the Elbe border area where regional differences in plague and other factors were limited. We emphasize this in the main text and appendix analyses (see Tables 2, 3, and 4).

Table D1: Mortality and Desertion Rates Across Regions 1348-1351

	(1)	(2)	(3)	(4)
	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).

However, our results also provide evidence on the relationship between *city-level* variation in plague outbreaks during the Black Death and subsequent city-level development trends which is itself important for the interpretation of the process we study.

Construction. In our quantitative analysis, we find that city-level outbreaks during the Black Death were associated with a significant decline in the trend of city construction after the pandemic (Table 2, p. 20). These differences are highly significant when we study all the variation in the data (column 4) and smaller and statistically insignificant when we compare cities along the border (columns 5 and 6). We find that cities with outbreaks during the Black Death had positive underlying trends, but that this is imprecisely estimated.

Manufacturing. We similarly find that city-level plague outbreaks during the Black Death were associated with a significant decline in the post-pandemic trend of manufacturing when we study all the variation, but with a small and statistically insignificant reduction

when we compare cities along the Elbe-Saale border (Table 3, columns 3-6, p. 24).

Politics. We observe stronger relationships between the outbreaks during the Black Death and political outcomes. These come out especially clearly when we study our political index of urban autonomy at the city level in Table 4. We find that city-level Black Death outbreaks were associated with: (1) underlying and highly significant positive trends in political development, pointing to the endogeneity of the plague with respect to political factors; (2) level declines in political development after the pandemic; and (3) declines in the trend of political development after the pandemic large enough to entirely offset the underlying positive trend observed in cities with Black Death outbreaks.

Interpretation. Our finding that Black Death outbreaks *negatively* predict subsequent political and economic trends at the local level is interpretively significant.

First, this finding calls into question the possible notion that the reason Western regions experienced greater "political development" is because they were actually exposed to worse shocks. This notion is advanced as a claim by Gingerich and Vogler (2021), who effectively argue that the North and Thomas (1973) analytic narrative about the Black Death, factor prices, and institutional change holds where – and only where – the shocks were sufficiently large. 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 – and undermining the coercive power of the landowning nobility – were in fact retarded.

Second, the *negative* city-level relationship between Black Death shocks and subsequent political economy trends indicates how the Black Death shaped development through historically specific channels. These channels involved the developing politics and institutions of the self-governing city. The dynamics were notably 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. In the early 1500s, the conjuncture was different: the introduction of competition in the market for religion dramatically reoriented politics; plague was not so generalized; and local outbreaks promoted the adoption of new designs for municipal public goods provision that fostered human capital accumulation and ultimately city growth.

E   Evidence on Incomes and Prices

Evidence on incomes and prices frames our main analyses, which focus on quantities.

E.1   Labor incomes

Our investigation is motivated in part by the limited nature of the existing data on incomes in historic Germany, which do not permit the temporal and spatial comparisons at the heart of key economic debates and our quantitative analysis.
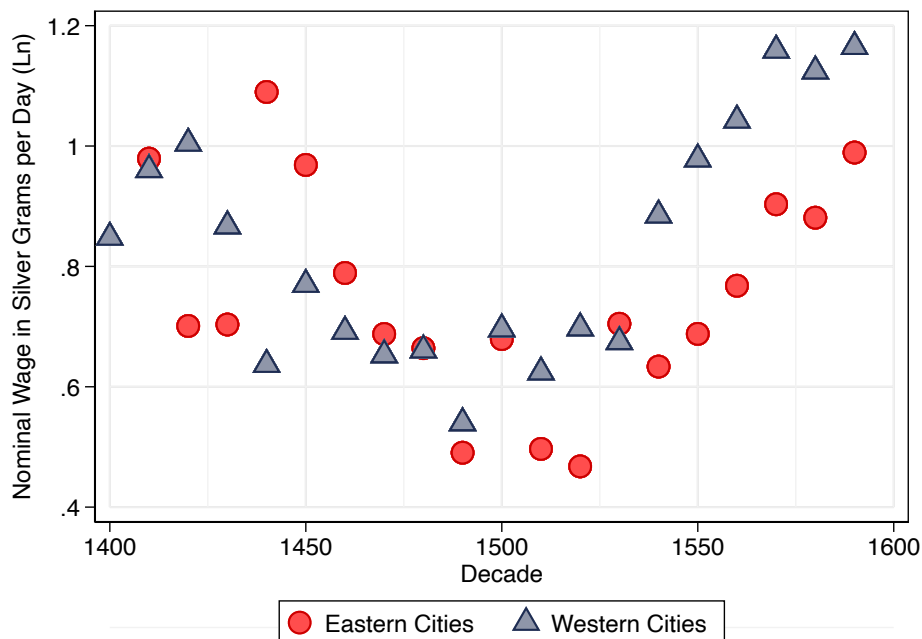
Historical research indicates that the Black Death led to higher real wages, and that wage movements were initially similar in the East and West. Rich and suggestive but fragmentary evidence on real wage movements is provided by Abel (1978), Achilles (1991, p. 3), Isenmann (2014, p. 86), Kullak-Ublick (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). Maximum wages were introduced in several regions, but their effectiveness is questioned by Abel (1953, p. 394) and Cerman (2012).[48]

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.

Figure E1 plots evidence on nominal wages in 4 Eastern and 7 Western cities by decade. Nominal wages fell over the 15th century and rose over the 16th century. While there was no discernible wage difference between Eastern and Western cities at the beginning of the 1400s, wages diverged around 1500. We emphasize, however, that the data are available for a small number of selected cities. For example, in the East, Hamburg, Gdansk, and Rostock are all Baltic port cities. Moreover, systematic quantitative information on consumer prices and the cost of living across cities is very limited (Allen 2010; Pfister 2017).

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[48]Maximum wages were established in Wuerttemberg 1425, Westfalia 1423; the state of the Teutonic Order in 1406, 1407, and 1420; and Saxony 1466 and 1482 (Kelter 1953 p. 168; Abel 1953, p. 393; Carsten 1954, pp. 103-104).

Figure E1: Nominal Wages

This figure plots nominal wages by decade from Abel (1978), Allen (2010), and Pfister (2017). Wages are measured in grams of silver per day (ln). The eastern cities are: Gdansk, Hamburg, Leipzig, and Rostock. The Western cities are: Augsburg, Frankfurt am Main, Göttingen, Munich, Speyer, Wüerzburg, and Xanten.
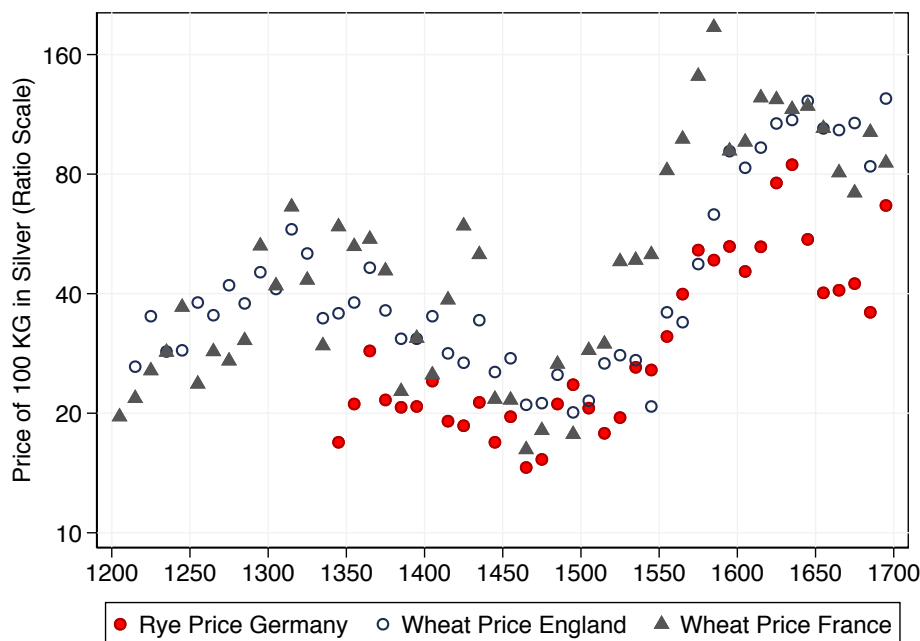
E.2   Product prices

Product prices also provide information on the timing and nature of economic changes over the period we study. Grain prices fell from the mid-1300s through the mid-1400s; then rose in the late 1400s and the 1500s. Figure E2 provides summary evidence on grain prices in Germany, France, and England and indicates that price trends were broadly similar across European markets.

Considerable evidence indicates that the terms of trade followed the grain price: shifting against agriculture from the Black Death through the late 1400s, and back towards agriculture in the 1500s (Topolski 1974). 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 late 1400s, when prices rose (Izdebski et al. 2016).

The available evidence suggests that after 1350 the price of grain fell relative to the price of manufactures and, specifically, the price of construction materials. Abel (1978, p. 52) shows that the relative price of metal and building materials rose relative to wages and relative

Figure E2: Grain Prices

This figure plots grain prices from Abel (1978). Prices are measured in silver grams per 100 kilograms of grain. The "German" price is the mean across thirteen German-speaking cities.

to grain in Frankfurt am Main, Krakow, France, and England. While this evidence should be interpreted with some caution, it is suggestive that the relative prices of construction materials and metal rose more than wages, grain prices, or any product prices considered by Abel (1978). This shift is consistent with our more detailed evidence showing considerable dynamism in the construction sector after the Black Death and, more broadly, supports our investigation of urban development in this period.

E.3   Returns to different factors of production

Narrative evidence 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.

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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 E3 summarizes data on interest rates on heritable and lifetime annuities issued by Eastern and Western cities and collected by 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 shortly after the Black Death.

Figure E3: Interest Rates for City Governments

This figure plots mean interest rates by region-decade for urban governments borrowing across 35 cities. The eastern locations are: Berlin, Breslau, Gdansk, Erfurt, Halle, Hamburg, Leipzig, Lübeck, Mölln, Prussian Cities, and Wismar. The Western locations are: Aachen, Augsburg, Bonn, Breisgau, Bremen, Cologne, Frankfurt am Main, Freiburg, Göttingen, Hannover, Hildesheim, Koblenz, Lüneburg, Mainz, Memmingen, Münster, Munich, Nuremberg, Osnabrück, Speyer, Soest, Wesel, Worms, and Wüerzburg. Data are from Chilosi, Schulze, and Volckart (2018) and Neumann (1865). We include both heritable and lifetime annuities.

F   Political Fragmentation and Development

In the following section, we study the relationship between political fragmentation and city development in more detail. We (1) study variation in political fragmentation measured continuously, and (2) explore heterogeneity in the response to different levels of political fragmentation.

F.1   Variation in Political Fragmentation

In our main analysis, we study the relationship between political fragmentation and city development using variation across colonial Eastern and historic Western cities. Here we study the relationship between city development and political fragmentation measured continuously. We study all the variation in the data and the variation induced by the border. We use regression models that mirror our geographic comparison of Eastern and Western cities. We test how initial political fragmentation before the Black Death explains post-1350 shifts, using a continuous measure of political fragmentation.[49] We estimate models:

$$
\begin{aligned}
y_{it} = {} & \beta_1(frag_i \times post_t) + \beta_2(frag_i \times trend_t) + \beta_3(frag_i \times post_t \times trend_t) \\
& \beta_4(x_i \times post_t) + \beta_5(x_i \times trend_t) + \beta_6(x_i \times post_t \times trend_t) + \alpha_i + \delta_t + \epsilon_{it}
\end{aligned}
\tag{2}
$$

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 (2) using OLS and an instrumental variable strategy, which examines variation in political fragmentation induced by a geographic location East of the Elbe-Saale line. We instrument for political fragmentation with our geographic measure of Eastern location and include instruments for each political fragmentation interaction in our IV analysis. Our estimates control for the time-varying implications of distance from the border measured as a running variable, rye yields, and city plague shocks (the x_i), as well as city and time fixed effects (α_i and δ_t).

Table F1 reports our results examining our main measures of city-level economic and

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[49]Political fragmentation is measured at the city level by $1 - HHI$, where HHI is the Herfindahl index for ruler concentration in a neighborhood of 100 kilometers. This is measured as illustrated in Figure 2.

political development.[50] We find that political fragmentation strongly predicts post-1350 construction and politics when we study all the variation (column 1-2) and when we examine cities along the border (column 3-4). These results hold when we control for other factors that may have had time-varying implications such as geographic endowments, distance from the Elbe-Saale border, and local exposure to plague outbreaks in the Black Death era. The fact that our results hold when comparing incremental changes in political fragmentation support a causal interpretation of the effect.

The instrumental variable estimates reveal that differences in political fragmentation induced by geography strongly and positively predict shifts in construction and political development after the Black Death. These shifts are observed across all cities (column 5-6) and when the analysis is restricted to cities along the Elbe-Saale border (column 7-8).

To interpret these results several observations are important. First, Eastern and Western cities along the Elbe had similar cultural characteristics and natural endowments, and exhibited almost identical developments in their major city-level institutions before the Black Death, as we show above.[51] Second, historical research indicates that the colonial process in the East generated a distinctive political structure, with larger, more consolidated states and an associated distribution of power favoring feudal rulers as against cities. Third, political fragmentation is a fundamental, observable measure of these differences in what North (1990) would recognize as the political and the institutional "matrix."

Our interpretation of the IV estimates reflects these observations. The identifying assumptions for a causal interpretation are that the post-1350 variation in Eastern location (the IV) is conditionally exogenous and shaped development only through its influence on the political and institutional 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, but does not interpret the exclusion restriction as narrowly requiring that only political fragmentation mattered.[52]

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[50]We focus on our main measures of economic and political development, construction activity and the index of political autonomy, respectively. We find a weak and more diffuse relationship between political

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Table F1: Political Fragmentation and Development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. OLS and IV Estimates		OLS				IV		
	All Cities		Border Cities		All Cities		Border Cities	
Outcome: Construction								
Political Fragmentation $\times$ Post	0.20***	0.17	0.78***	0.75**	0.36***	1.34***	0.50*	1.62***
	(0.07)	(0.11)	(0.23)	(0.32)	(0.08)	(0.27)	(0.26)	(0.58)
Outcome: Political Index of Urban Autonomy								
Political Fragmentation $\times$ Post	0.06**	0.16***	0.51***	0.37***	0.10**	0.72***	0.29**	0.58***
	(0.03)	(0.04)	(0.08)	(0.10)	(0.04)	(0.10)	(0.13)	(0.18)
B. IV First Stage: Fragmentation $\times$ Post								
Colonial East $\times$ Post					-0.27***	-0.15***	-0.15***	-0.12***
					(0.01)	(0.01)	(0.01)	(0.01)
F-Statistic					285.57	194.46	83.06	38.82
Observations	22500	22500	6850	6850	22500	22500	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional Trend Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-Varying Controls	No	Yes	No	Yes	No	Yes	No	Yes

This table presents regression estimates examining the effect of political fragmentation on economic and political outcomes. "Construction" and "Manufacturing" are measured with a binary variable that takes the value of 1 if we observe a major urban construction project or manufacturing activity in a city period. The "Political Index of Urban Autonomy" is the principal components index (see Table 4). "Political Fragmentation $\times$ Post" interacts political fragmentation and an indicator for the post-1350 period. The unit of analysis is the city half-century from 1200 through 1699. Columns 1-2 and 5-6 examine 2,250 German-speaking cities. Columns 3-4 and 7-8 examine 685 cities along the Elbe boundary. Columns 2, 4, 6 and 8 include time-varying interactions for distance to the border, rye yields, and plague shocks, as in Table 2, Column 4. Panel A estimates include interactions "Fragmentation $\times$ Trend" and "Fragmentation $\times$ Post $\times$ Trend." We instrument political fragmentation using an indicator for "Colonial East", defined as cities located East of the Elbe-Salle river. Panel B estimates include "Colonial East $\times$ Trend" and "Colonial East $\times$ Post $\times$ Trend." The first stage F-statistic estimated using the complete set of "Colonial East" interactions as instruments. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Conley (1999).

F.2 Variation Related to the Level of Political Fragmentation

A question that our analysis invites is whether the relationship between political fragmentation and development varied with the level of political fragmentation itself. To address this question, we examine the relationship between economic and political development outcomes and different varying levels of political fragmentation. We examine cities in quintiles based on their exposure to political fragmentation and estimate a version

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fragmentation and manufacturing.

[51]We designate charters, councils, and mayorships as "major city institutions" (Section 5.2).

[52]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.

of equation (2) which includes interactions between indicators for fragmentation quintiles and an indicator for the post-1350 period, in place of a single continuous measure of fragmentation.

Figure F1 plots our estimates. We find large, positive shifts in post-1350 construction and politics for cities exposed to the highest levels of political fragmentation, relative to cities with low political fragmentation. We see some evidence of non-linearities, especially when we study our index of urban political autonomy. We control for the full set of time-varying controls as specified in Table F1.

Figure F1: Levels of Political Fragmentation and Development

This figure presents estimates of the relationship between post-1350 construction and political outcomes and political fragmentation across different quintiles of the political fragmentation distribution. Outcomes are a construction indicator and a summary measure of all political variables used in the main analysis. The political index of urban autonomy was created by dimension-reduction through generalized principal components analysis and can take on values from 0 to 1. The unit of analysis is the city half-century over the 10 half-centuries from 1200 through 1699. We control for the full set of time-varying controls as specified in Table F1.
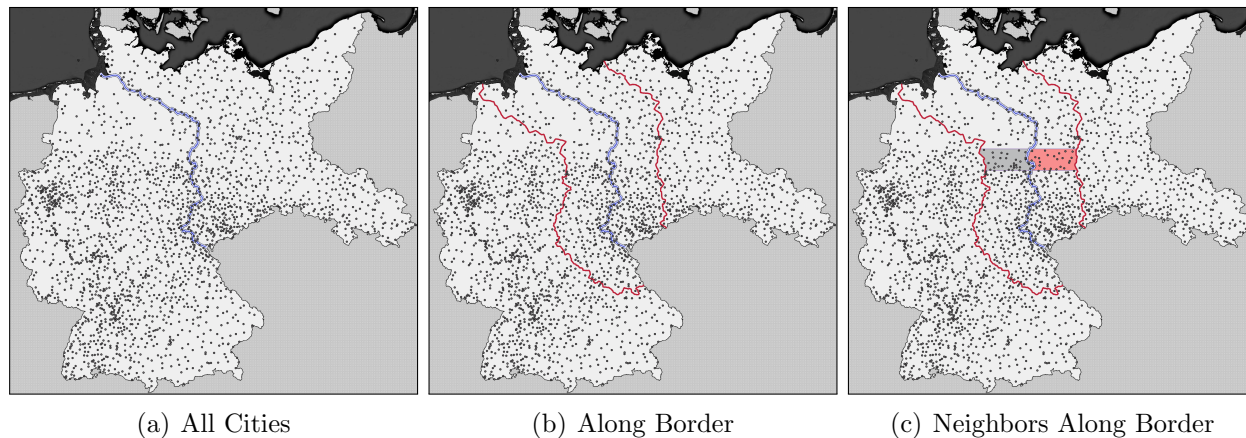
G   Economic Outcomes

This appendix presents evidence on and illustrates (1) our counterfactuals, (2) different approaches for estimating standard errors, and (3) the dynamic relationship between economic activity and institutional change.

G.1   The Core Counterfactuals

In our main analysis, we document a divergence in development across regions using three comparisons. In this subsection we illustrate and clarify the underlying counterfactuals.

Figure G1: Mapping the Counterfactuals

| (a) All Cities | (b) Along Border | (c) Neighbors Along Border |

This figure presents a stylized illustration of the comparisons we analyze. First, we study all cities and compare development on either side the Elbe-Saale border dividing the colonial East from the historic West. Second, we restrict the analysis to 343 Eastern and 342 Western cities which fall within 100 kilometers of the border. Third, we compare development across the border, comparing neighboring border cities located in the same gridcell.

Figure G1 presents maps that clarify the counterfactuals we study. First, we study all the variation in the data. We compare colonial Eastern and historic Western cities, divided by Elbe-Saale border. Figure G1 panel (a) corresponds to columns 1-4 in Table 2. Second, we examine Eastern and Western cities within 100-kilometers of the border. Panel (b) corresponds to column 5 in Table 2. This counterfactual studies a subset of cities that had similar access to river-borne transport and where urban density was similar: 342 Western and 343 Eastern cities lie within 100 kilometers of the border. Third, we compare Eastern border cities to neighboring Western border cities in the same gridcell. Panel (c) corresponds to column 6 in Table 2, in which we control for common factors that vary at the cell-by-time level. In this comparison, for our estimates to be confounded by omitted time-varying

factors, it would be necessary for unobserved shifts to affect neighboring cities, located on the same degree latitude, differentially across the border. Any potential confounder would need to cause a time-varying shift across neighboring cities which did not differ in their access to geographic endowments, transport infrastructure, and urban density. Note further, potential confounders related to the time-varying effects of rye suitability or of distance to the border are already absorbed by our time-varying controls.

G.2 Standard Errors

Our baseline regression analysis in Table 2 estimates standard errors allowing for spatial correlation within 50 kilometers. Our results are similar when we use other distance thresholds to study spatial correlation or cluster standard errors. Table G1 presents our point estimates with standard errors estimated allowing for spatial correlation within 50 kilometers (our baseline), 100 kilometers, or 200 kilometers, and, alternatively, clustering at the city-level. Further, we test for the presence of spatial autocorrelation by reporting z-Scores of the Moran statistics for 1350, our core period, using the five closest neighbors of each city. Neighbors are assigned equal weight and all other cities have zero weight. We find evidence of spatial autocorrelation in our full sample but fail to reject the null hypothesis of no spatial autocorrelation when we examine cities within 100 kilometers of the border. In this context it is important to note and reiterate that our main estimates are robust to substantially larger distance cut-offs allowing for spatial correlation within 50, 100, and 200 kilometers. These distance cut-offs correspond to 40, 150, and 500 neighbors on average, respectively.

G.3 Economic Activity and Institutional Change

Our main analyses show that institutional and economic development evolved jointly after Black Death. It is natural to wonder, however, whether major city institutions including city charters, councils, and mayors drove or responded to differences in economic activity within cities and whether this changed over time. To study this question, we estimate panel regressions. We examine how construction outcomes varied with leads, lags, and current

Table G1: Standard Errors of Shifts in Urban Construction

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Indicator for Construction Activity					
	All Cities				100 km Border	
Colonial East × Post 1350	-0.08	-0.10	-0.17	-0.17	-0.19	-0.20
Spatial SE (50km)	(0.02)	(0.03)	(0.05)	(0.05)	(0.07)	(0.07)
Spatial SE (100km)	(0.04)	(0.03)	(0.04)	(0.04)	(0.07)	(0.07)
Spatial SE (200km)	(0.05)	(0.04)	(0.06)	(0.05)	(0.06)	(0.07)
Clustered SE (City)	(0.01)	(0.03)	(0.04)	(0.04)	(0.08)	(0.08)
Colonial East × Trend in Centuries		0.02	0.02	0.02	0.07	0.07
Spatial SE (50km)		(0.02)	(0.03)	(0.03)	(0.06)	(0.06)
Spatial SE (100km)		(0.02)	(0.02)	(0.02)	(0.06)	(0.06)
Spatial SE (200km)		(0.02)	(0.03)	(0.03)	(0.05)	(0.06)
Clustered SE (City)		(0.02)	(0.04)	(0.04)	(0.07)	(0.07)
Colonial East × Post × Trend		-0.02	-0.02	-0.02	-0.01	0.00
Spatial SE (50km)		(0.02)	(0.04)	(0.04)	(0.07)	(0.06)
Spatial SE (100km)		(0.03)	(0.03)	(0.03)	(0.07)	(0.06)
Spatial SE (200km)		(0.03)	(0.04)	(0.04)	(0.03)	(0.06)
Clustered SE (City)		(0.02)	(0.04)	(0.04)	(0.07)	(0.07)
Observations	22500	22500	22500	22500	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes
Mean Outcome	0.27	0.27	0.27	0.27	0.24	0.24
Western Cities	1490	1490	1490	1490	342	342
Eastern Cities	760	760	760	760	343	343
Moran z-Score	5.41	2.96	2.94	2.87	1.12	1.22

This table replicates the estimates examining urban construction in Table 2 using different methods of computing standard errors. The outcome is a binary variable that takes the value of 1 if a major urban construction project is recorded in the *Deutsches Städetebuch* (Keyser 5 vols. 1939-1974) in a city period. The unit of analysis is the city half-century from 1200 through 1699. The specifications and variable definitions correspond to the baseline estimates. Standard errors are in parentheses. In the first row following an estimate, we report standard errors allowing for arbitrary spatial correlation within 50 kilometers. In the second and third rows following an estimate, we report standard errors allowing for arbitrary spatial correlation within 100 and 200 kilometers except for columns 5 and 6 which allow for arbitrary spatial correlation within 50 kilometers, due to properties of the VCV matrix at this distance. In the fourth row following an estimate, we report standard errors clustered at the city level.
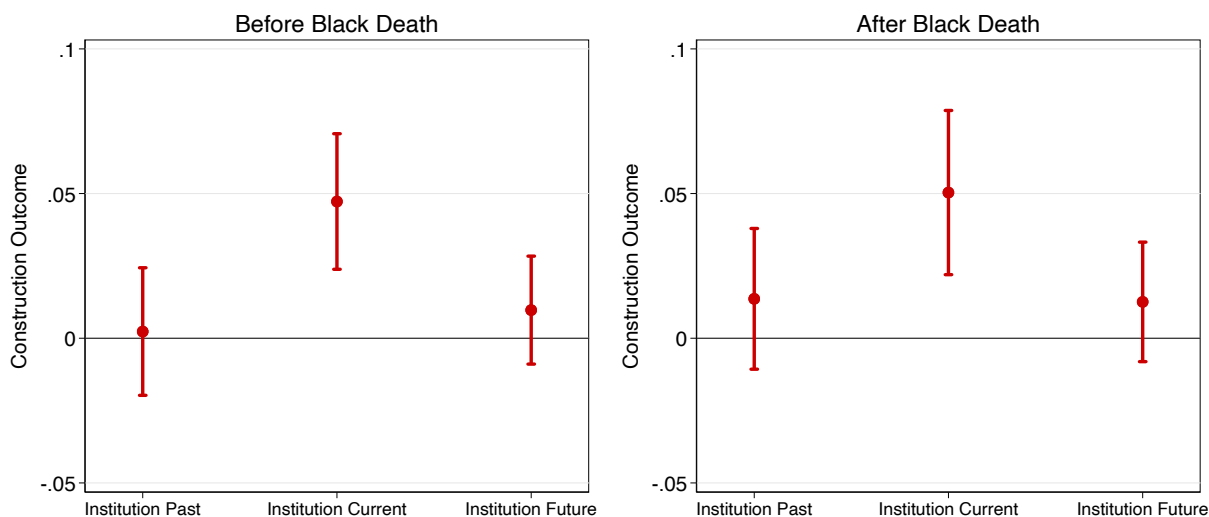
values of major city institutions. We estimate models of the form:

$$y_{it} = \beta_1 institution_{i,t-1} + \beta_2 institution_{i,t} + \beta_3 institution_{i,t+1} +$$

$$\beta_4(institution_{i,t-1} \times post_t) + \beta_5(institution_{i,t} \times post_t) + \beta_6(institution_{i,t+1} \times post_t)$$

$$+ \alpha_i + \delta_t + \epsilon_{i,t}$$

To study the effects more granularly, we examine time in 25-year intervals. The interaction terms enable us to test whether and how leads and lags of major city institutions were related to construction after 1350, which is the post-period.

We present our findings in Figure G2. We observe evidence that construction is predicted

Figure G2: Major Institutions and Urban Construction

This figure reports estimates from Equation (G.3). The outcome is an indicator for construction activity in a city period. The independent variables measure lags, current values, and leads of an indicator for the establishment of a major city institution including a council, mayor, or a charter. In the lefthand panels, "Institutions Past" corresponds to β_1, "Institutions Current" corresponds to β_2, and "Institutions Future" corresponds to β_3. In the righthand panels, "Institutions Past" corresponds to $\beta_1 + \beta_4$, "Institutions Current" corresponds to $\beta_2 + \beta_5$, and "Institutions Future" corresponds to $\beta_3 + \beta_6$. Graphs present 95 percent confidence intervals, estimated clustering standard errors at the city level.

by current institutions, implying that construction rose *at the same time* when institutions were conferred. After the Black Death, we see no shift in magnitudes, suggesting that the fundamental relationship between institutions and economic development has not been altered. We view these results as suggesting that economic and institutional change were likely to have a reciprocal or two-way relationship, and more broadly as indicative of the endogeneity of these relationships.

H   Political Outcomes

This appendix augments and clarifies our quantitative analysis of political change. We (1) study composite dimensions of the political index of urban autonomy; (2) discuss politics away from the border; (3) consider political change in cities that were chartered before the pandemic; (4) explore heterogeneity across cities located in political territories that span and do not the Elbe-Saale border; and (5) examine the potential consequences of the top-down foundation of cities by rulers before and after the pandemic.

H.1   Dimensions of Politics

Our main analysis focuses on the regional divergence in political development after the Black Death. For expositional purposes, we present key estimates on a unified political index of urban autonomy but do not report estimates on disaggregated dimensions in the main text (Table 4, p. 30). Here, we create indices for the establishment of (A) major city institutions, (B) city council autonomy, (C) city court rights, and (D) collective action. We index changes on these four dimensions of politics by summing the values of the individual variables in each Panel of Figure 8. Thus in any given period, the index for "major institutions" can take values from 0 (if a city does not have a council, a mayor, or a charter) to 3 (when a city has all major institutions).

Table H1 presents the analysis of the complete set of composite dimensions of the political index of urban autonomy. We observe consistent and relatively stable reductions in all dimensions of political changes leading to city self-government in Eastern cities across all cities and along the Elbe boundary, especially once we introduce control variables.

H.2   Political Change Away From Border

In the main text, we present graphical evidence on political change along the Elbe-Saale border (Figure 8, p. 28). First, we plot the political index of urban autonomy in H1 for all cities and cities along the Elbe-Saale border. Consistent with our analysis, we observe a political divergence both when we restrict the analysis to cities along the border and, though attenuated, when we study all cities.

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Count for Political Activity					
	All Cities				100 km Border	
Panel A. Major Institutions						
Colonial East × Post 1350	-0.06	-0.13*	-0.11***	-0.42***	-0.36**	-0.39**
	(0.07)	(0.07)	(0.03)	(0.13)	(0.17)	(0.16)
Mean Outcome	1.27	1.27	1.27	1.27	1.22	1.22
Panel B. Council Autonomy						
Colonial East × Post 1350	-0.04**	-0.01	-0.05*	-0.05*	-0.06	-0.06
	(0.02)	(0.02)	(0.03)	(0.03)	(0.05)	(0.05)
Mean Outcome	0.13	0.13	0.13	0.13	0.11	0.11
Panel C. Courts						
Colonial East × Post 1350	0.04	-0.02	-0.23***	-0.23***	-0.22**	-0.25***
	(0.05)	(0.04)	(0.07)	(0.07)	(0.10)	(0.10)
Mean Outcome	0.40	0.40	0.40	0.40	0.41	0.41
Panel D. Collective Action						
Colonial East × Post 1350	-0.04***	-0.09***	-0.14***	-0.14***	-0.03	-0.03
	(0.01)	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)
Mean Outcome	0.06	0.06	0.06	0.06	0.05	0.05
Panel E. Political Index of Urban Autonomy						
Colonial East × Post 1350	-0.01	-0.03*	-0.11***	-0.11***	-0.10***	-0.11***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Mean Outcome	0.32	0.32	0.32	0.32	0.33	0.33
Observations	22500	22500	22500	22500	6850	6850
City and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Latitude-Cell × Time FE	No	No	No	No	No	Yes
Western Cities	1490	1490	1490	1490	342	342
Eastern Cities	760	760	760	760	343	343

This table presents regression estimates examining urban politics. Panel A reports estimates of "Major Institutions", an index recording whether cities have (1) an active city council, (2) a mayor, or (3) a city charter. The index takes values from 0 to 3. The presence of any component increases the index by 1. Panel B reports estimates of "Council Autonomy", an index recording whether cities have (1) an elected council, (2) a co-opted council, or (3) guild participation in the council. Panel C reports estimates of "Law Courts", an index recording whether cities (1) had an active court, (2) had jurisdiction in this court, and/or (3) appointed jurists to the city court. The variables on jurisdiction rights and judicial appointment take on negative values if the lord holds jurisdiction and appoints jurists to the court respectively. Thus, this index takes values from -2 to 3. Panel D reports estimates of "Collective Action", an index recording whether cities (1) passed autonomous laws, (2) engaged in conflict with a lord, or (3) entered into alliances with other cities. This index takes values from 0 to 3. Panel E reports estimates of the "Political Index of Urban Autonomy", the principal components index we use in the main analysis (see Table 4). 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." The specifications of the columns correspond to Tables 2 and 3. "Colonial East × Post-1350" 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. The "Latitude Cell × Time FE" interact indicators for time periods and indicators for 1/2 degree (55 kilometer) latitude bands. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Conley (1999).

Second, we extend the analysis of all composite dimensions of the political index of urban autonomy to all cities in our data in Figure H2. This evidence suggests that, before we introduce control variables in our quantitative analysis, the post-1350 divergence in politics may be weaker when examining all the variation in the data, as against when we focus on the Elbe border. However, when we introduce controls for underlying regional trends and the potentially time-varying implications of differences in geographic endowments in our quantitative analysis, we find that political shifts were broadly similar across Germany and along the border (Table H1, p. 46).

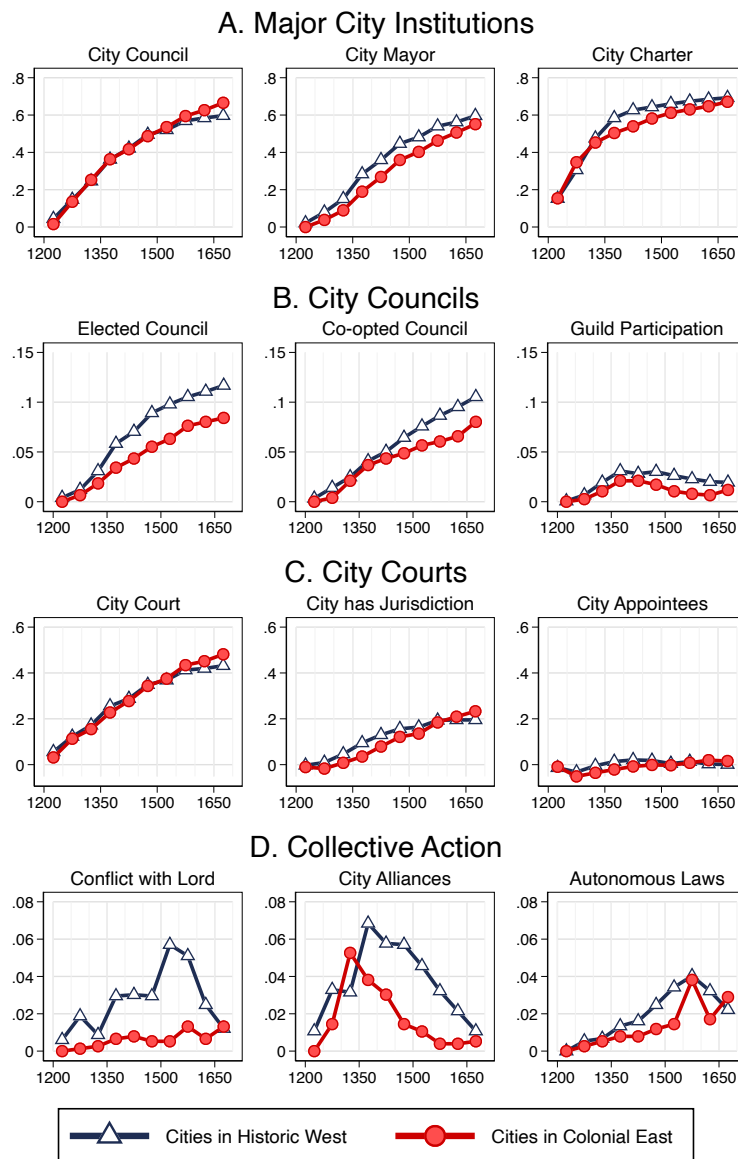## H.3 Politics and the Margin of Urban Development

Our baseline analysis takes the set of city locations as given, and studies the pattern of development across these locations. However, it is possible that political developments are not observed for some city time periods because locations were, in those periods, still small towns or villages in which limited political change took place. Thus the observed divergence in politics between Western and Eastern cities could in part reflect urbanization on the

Figure H1: Political Index of Urban Autonomy across Regions (PCA)

This figure presents evidence on changes in city politics over time. The outcome is a summary measure of all political variables used in the main analysis. The political index of urban autonomy was created by dimension-reduction through generalized principal components analysis and can take on values from 0 to 1. The unit of analysis is the city half-century over the 10 half-centuries from 1200 through 1699. The left-hand figure compares all cities across the Elbe-Saale border, of which 896 are Eastern and 1494 are Western. The right-hand figure compares all cities across the Elbe-Saale border, of which 343 are Eastern and 342 are Western.

Figure H2: Changes in Municipal Politics Across Regions

A. Major City Institutions

B. City Councils

C. City Courts

D. Collective Action

—△— Cities in Historic West   —●— Cities in Colonial East

This figure presents evidence on changes in municipal governance. The figure compares cities across the Elbe-Saale border, of which 896 are Eastern and 1494 are Western. Panel A shows the share of cities with: active city councils (*Rat*); mayors (*Buergermeister*); and city charters. Panel B shows the share of cities with: elected city councils; co-opted city councils, i.e. city councils able to appoint members; and city councils with guild participation. Panel C shows the share of cities with courts; the allocation of jurisdiction rights (positive if the city held jurisdiction rights, negative if the lord held jurisdiction rights; and the control over judicial appointees (positive if the city controlled the appointees, negative if the lord controlled the appointees). Panel D shows the share of towns observed in open conflict with an external lord; the share of cities entering into alliances with other cities; and the share of towns passing autonomous laws.

extensive margin – more Western locations becoming economically vibrant – and could in part reflect political change on the intensive margin – existing locations developing politically in the West.

To examine this question, we focus our regional comparisons on locations that were chartered cities before 1350. Figure H3 replicates our baseline analysis restricting the analysis to cities with charters by or before 1349. We find that, in general, there was a positive shift in Western political development after 1350. Fewer Western cities than Eastern cities had city councils before 1350; immediately afterwards Western cities caught up (Panel A). Western and Eastern cities established mayorships at similar rates before 1350; immediately afterwards, the Western rate increased (Panel A). The selection of the city council was more mixed as we show in Panel B: Eastern cities had more elected councils post-1350; Western cities shifted further toward co-opted councils and councils with guild participation. In terms of the legal system, we observe a differential shift toward city jurisdiction and cities making judicial appointments in the West after 1350 (Panel C). We similarly observe a differential shift towards urban collective action in the West after the pandemic (Panel D).
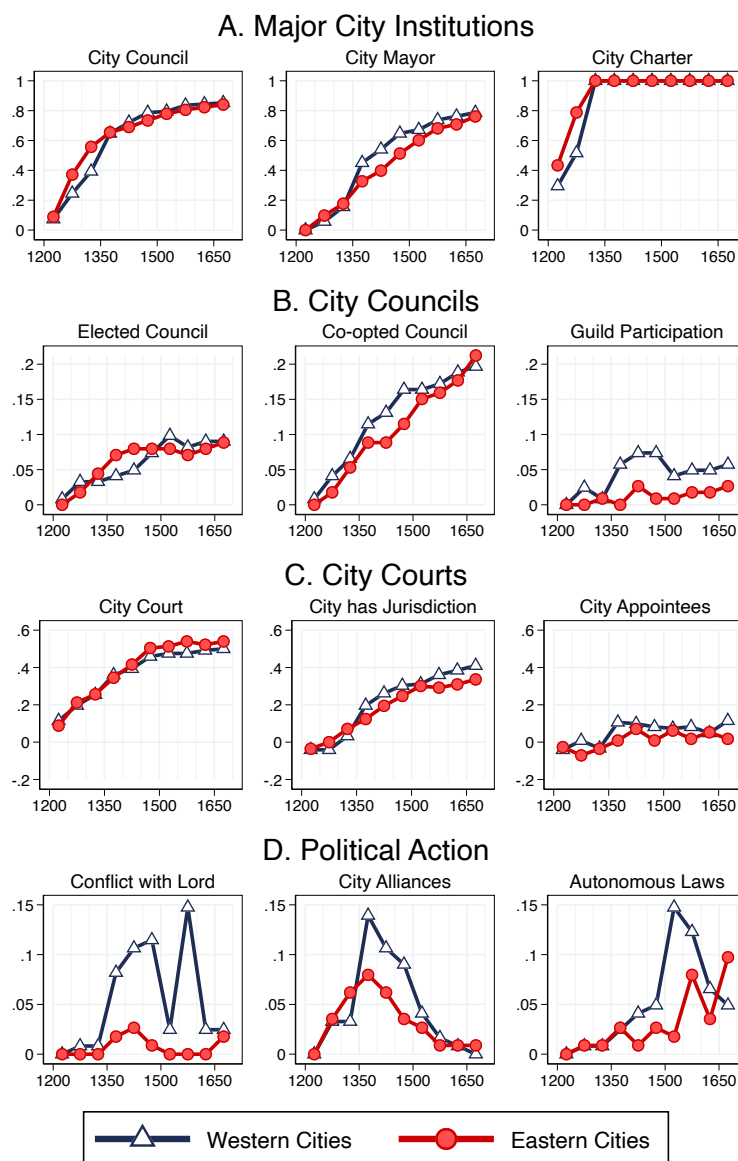
H.4   Heterogeneity Along the Elbe Boundary

The political geography along the Elbe River was complicated and some rulers had jurisdiction over cities on either side of the line.

A natural question is whether the documented effects along the border reflect a further dimension of heterogeneity and differ for (A) cities in territories that spanned the Elbe and (B) cities in territories that did not. To explore this question, we examine cities close to the border but cut the data to differentiate between those located in jurisdictions that did and did not span the border.

Table H2 presents regression estimates examining shifts in development for cities located along the Elbe border. In Panel A, we examine cities along the border that were located in the jurisdictions of lords whose territories spanned (or contained cities on both sides of) the Elbe-Saale border as of 1350. Panel B displays similar results for cities along the Elbe border that were located in jurisdictions that did not span the border in 1350.

For our most central outcomes, we find that the estimated post-pandemic declines in

Figure H3: Changes in Municipal Politics of Chartered Cities Along the Border

This figure presents evidence on changes in municipal governance for cities that had a charter before 1350. The figure compares cities across 100km of the Elbe-Saale border, of which 113 are Eastern and 122 are Western. Panel A shows the share of cities with: active city councils (*Rat*); mayors (*Buergermeister*); and city charters. Panel B shows the share of cities with: elected city councils; co-opted city councils, i.e. city councils able to appoint members; and city councils with guild participation. Panel C shows the share of cities with courts; the allocation of jurisdiction rights (positive if the city held jurisdiction rights, negative if the lord held jurisdiction rights; and the control over judicial appointees (positive if the city controlled the appointees, negative if the lord controlled the appointees). Panel D shows the share of towns observed in open conflict with an external lord; the share of cities entering into alliances with other cities; and the share of towns passing autonomous laws.

construction are somewhat muted in territories that spanned the border. Thus the estimate for construction is a statistically insignificant -0.07 in territories spanning the border and a highly significant -0.13 for territories along but not spanning the border (column 1). In contrast, we see larger negative shifts in manufacturing in territories spanning the border (-0.54 in Panel A column 2) compare to territories not spanning the border (-0.25 in Panel A column 2). We observe a significant post-pandemic shift in major institutions of -0.360 in territories spanning the border and a slightly larger and highly significant shift of -0.364 in territories along but not spanning the border (column 3). The development of city courts is somewhat lower for Eastern cities in territories spanning the border (-0.3 in Panel A, column 5), whereas the equivalent shift is smaller in territories not spanning the border (-0.2 in Panel B, column 5). The results across these subsets of the data are thus broadly similar, if somewhat mixed, and provide some evidence that sharper economic shifts are seen along key margins where the underlying political units were most cleanly differentiated along the border.

H.5   Top Down City Foundation and Development

Eastern cities were more frequently founded by lords. It is theoretically possible that this sort of "top down" foundation, rather than political fragmentation *per se*, explains the divergence.

In this sub-section, we present regression estimates examining shifts in development across types of city foundations, specifically analyzing the impact of the top-down foundation of a city through a lord after the Black Death. Table H3 shows that there is a slightly negative but statistically insignificant relationship between a city being founded top down (by a lord) and post-1350 construction, manufacturing, and politics. This pattern holds controlling for underlying regional trends (column 2) and when we focus our analysis on 1,490 cities within the West (column 3). While cities founded by lords developed slightly differently after the Black Death, the nature of the founding process is not a strong predictor of subsequent economic and political development and thus is not likely to explain the divergence that we observe across regions.

Table H2: Development Shifts in Territories Spanning and Not Spanning the Border

	(1) Construction	(2) Manufacturing	(3) Institutions	(4) Council	(5) Courts	(6) Collective Action
Panel A. Spanning the Border						
East × Post 1350	-0.071	-0.054**	-0.360***	-0.007	-0.304***	-0.058*
	(0.077)	(0.023)	(0.124)	(0.036)	(0.068)	(0.031)
East × Trend in Centuries	0.015	0.040***	-0.163	-0.025	0.009	-0.001
	(0.053)	(0.014)	(0.106)	(0.037)	(0.068)	(0.026)
East × Post × Trend	-0.010	-0.028	0.201*	0.004	0.073	0.006
	(0.048)	(0.018)	(0.122)	(0.052)	(0.106)	(0.042)
Observations	3370	3370	3370	3370	3370	3370
Mean	0.248	0.032	1.230	0.118	0.437	0.050
Panel B. Not Spanning the Border						
East × Post 1350	-0.132**	-0.025*	-0.364***	-0.034	-0.198***	-0.085***
	(0.056)	(0.015)	(0.107)	(0.023)	(0.060)	(0.025)
East × Trend in Centuries	0.041	0.020**	-0.025	-0.003	0.052	0.009
	(0.030)	(0.009)	(0.097)	(0.020)	(0.040)	(0.013)
East × Post × Trend	-0.058*	-0.010	0.006	-0.008	-0.021	0.006
	(0.035)	(0.012)	(0.119)	(0.030)	(0.061)	(0.020)
Observations	6850	6850	6850	6850	6850	6850
Mean	0.243	0.030	1.221	0.111	0.406	0.054

This table presents regression estimates examining shifts in city-level politics for cities located along the Elbe-Saale border. Panel A examines cities in territories that span the Elbe-Saale border. Panel B examines cities in territories that do not span the border. "Manufacturing" and "Construction" measure the count of manufacturing and construction activities. "Institutions" is an index recording whether cities have (1) an active city council, (2) a mayor, or (3) a city charter. This corresponds to Figure 8, Panel A. "Council" is an index recording whether cities have (1) an elected council, (2) a co-opted council, or (3) guild participation in the council. This corresponds to Figure 8, Panel B. "Courts" is an index recording whether cities (1) had an active court, (2) had jurisdiction in this court, and/or (3) appointed jurists to the city court. This corresponds to Figure 8, Panel C. "Collective Action" is an index recording whether cities (1) passed autonomous laws, (2) engaged in conflict with a lord, or (3) entered into alliances with other cities. This corresponds to Figure 8, Panel D. The unit of analysis is the city-half-century over the 10 half-centuries from 1200 through 1699. W"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. "East × Trend" interacts an indicator for Eastern cities with a time trend. The time trend is measured in centuries, such that a 1-unit change is 100 years. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Conley (1999). Statistical significance at the 0.1, 0.05, and 0.01 confidence level denoted *, **, and ***.

Table H3: Shifts across Types of City Foundation

	(1)	(2)	(3)
Outcome: Construction			
Top-Down City Foundation × Post	-0.07	-0.04	-0.11
	(0.07)	(0.07)	(0.09)
Outcome: Manufacturing			
Top-Down City Foundation × Post	-0.03	-0.02	-0.04
	(0.05)	(0.05)	(0.09)
Outcome: Political Index of Urban Autonomy			
Top-Down City Foundation × Post	-0.03	-0.02	-0.04
	(0.03)	(0.03)	(0.04)
Observations	22500	22500	14900
Time-varying Controls	Yes	Yes	Yes
Regional Trends Controls	No	Yes	No
Excluding East	No	No	Yes

This table presents regression estimates examining shifts in development across types of city foundations. We analyze whether the top-down foundation of a city through a lord developed differentially after the Black Death. The outcomes are construction activity, manufacturing activity, and a summary measure of all political variables as used in the main analysis. The unit of analysis is the city-half-century. Columns 1-3 examine cities over the 10 half-centuries from 1200 through 1699. Columns 1-2 analyze 2,250 German-speaking cities. Column 3 examines 1490 cities within the "West". "Top-Down City Foundation × Post-1350" interacts an indicator for cities that were founded by lords and an indicator for time periods from 1350 forwards. We include the complete set of our time-varying controls used in the main analysis. 'Distance" measures the distance in 100 kilometers from a city to the Elbe-Saale border as a running variable. "Rye Yield" is the logarithm of potential yields within 25 kilometers of a given city. "Plague 1348-51" is the number of plague outbreaks in a city 1348-1351, recorded in the *Deutsches Städetebuch*. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Conley (1999). Statistical significance at the 0.1, 0.05, and 0.01 confidence level denoted *, **, and ***.

I Heterogeneity

We focus our investigation on the economic and political divergence between Colonial Eastern and Western German speaking Europe. We find that urban development the colonial East declined starting in the late 1300s. We also study differences in urban development across regions within the colonial East and find that urban development declined between 1350 and 1500 in a core area where coercion in agriculture subsequently became widespread and did not decline between 1350 and 1500 in Saxony and Thuringia, where coercion did not subsequently become widespread.
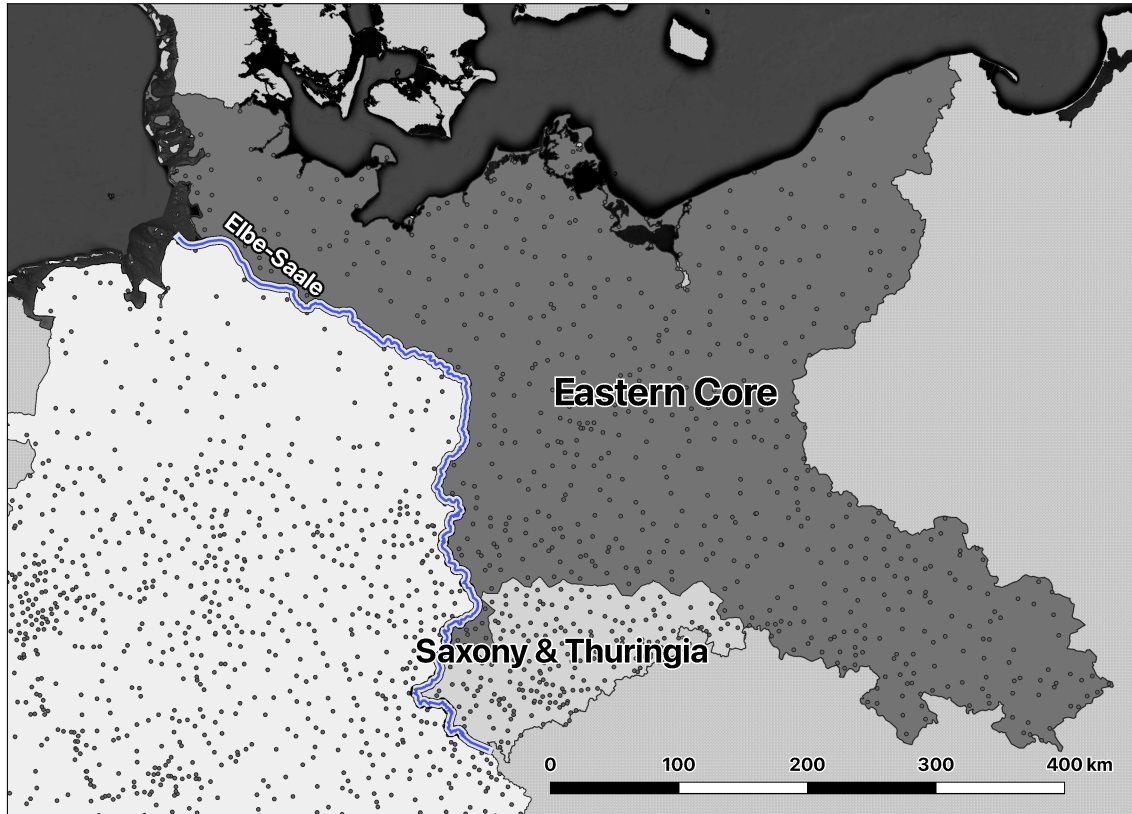
However, historical research points to the existence aof further within-region variation and to the fact that the Elbe River did not mark a uniform shift in economic and political arrangements (Scott 2001; Cerman 2012). Indeed, while we find that the East-West distinction is salient, we are *not* looking at a setting in which an unambiguous "treatment" is cleanly applied on one side of the border as in a spatial regression discontinuity design.

To clarify the variation and thus the social process, this section presents and considers several further comparisons. First, we clarify the geography of the comparison between the "Eastern Core" and Saxony-Thuringia in the main text and examine regional differences in light of evidence on historic mining activity. Second, we consider a further disaggregation of three broad sub-regions within the larger East. Third, we study more finely-grained within-region comparisons within historic Brandenburg, which spanned the Elbe River.

I.1 The Geography of the Eastern Core and Saxony-Thuringia

The analysis in the main text documents how the distinctive pattern of economic and political development in Saxony and Thuringia represented an important fissure within the territories East of the Elbe or Saale (Section 5.3). In our quantitative analysis, we find that the negative post-1350 shifts in economic and political development in Eastern cities are driven by the variation from the "Eastern core" which excludes cities in Saxony and Thuringia. After the Black Death, development was more "Western" in the cities of Saxony and Thuringia. To clarify the geography of the comparison, we map the cities of Eastern Germany in Figure I1. Coinciding with subsequent development patterns, we also document that these regions differed sharply in terms of prior political fragmentation and the geographic distribution of

Figure I1: Cities in the Eastern Core and in Saxony-Thuringia

This map shows the locations of cities in the East. Eastern cities are defined as those East of the Elbe River or its tributary the Saale ($n = 760$).

mineral deposits. In Saxony and Thuringia, political fragmentation followed Western levels more closely and rulers' revenue was largely derived from mining rights.

We can also test whether the inclusion of mining cities drives our results, as rulers in Saxony made political concessions to individual mining cities. Our results remain virtually unchanged when we (i) drop all potential mining cities around Freiberg, the historic mining center of Saxony, and (ii) when we drop all Saxon cities in which mining activity was documented between the second half of the 1300s and the mid-1400s.[53] Thus, the observed differences in development patterns do not depend on the inclusion of historic mining sites.

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[53]Following Burghardt (2018, p. 196) we drop: Auerbach, Eibenstock, Ehrenfriedensdorf, Lößnitz, Grünhain, Schlettau, Geyer, Thum, Dippoldiswalde, Berggießhübel, and Freiberg. Note that Burghardt lists three additional localities which are not included in our sample: Vogstsberg, Ulrichsberg, and Treppenhauer.

I.2   Variation Across Broad Sub-Regions Within the East

We next examine shifts in urban political and economic activity across three broad subregions within the East. We focus on three subregions in which agrarian political economy developed somewhat differently, particularly after 1500.

The first subregion comprises the Northeastern areas of historic Germany, including Mecklenburg, Pommern, and Schleswig-Holstein. Particularly strong forms of subjection developed in these territories, including relatively early mobility restrictions, elevated labor dues, extensive estate agriculture, and serfdom (Blickle 2003, p. 241; Kaak 2007, p. 96; North 2015, p. 134). The second subregion comprises more central Eastern areas comprising Brandenburg, Saxony-Anhalt, and Silesia. In these areas, the peasantry's economic and political situation was, in general, more moderate in and after the 1500s, although in the Eastern parts of Brandenburg more severe and coercive manifestations of serfdom were common (Blickle 2003, p. 241). The third subregion comprises Saxony and Thuringia. In these areas, the peasantry's legal and economic situation remained relatively favorable over the post-pandemic period. Peasants were personally free, faced no mobility restrictions, performed fewer labor services, and their land holdings were largely spared from expropriation (Blickle 2003; Achilles 1991, p. 30; Schattkowsky 1995, p. 386). To clarify the geography of the comparison between cities in the North East, Central East, and Saxony and Thuringia regions, we map the cities of Eastern Germany in Figure I2.
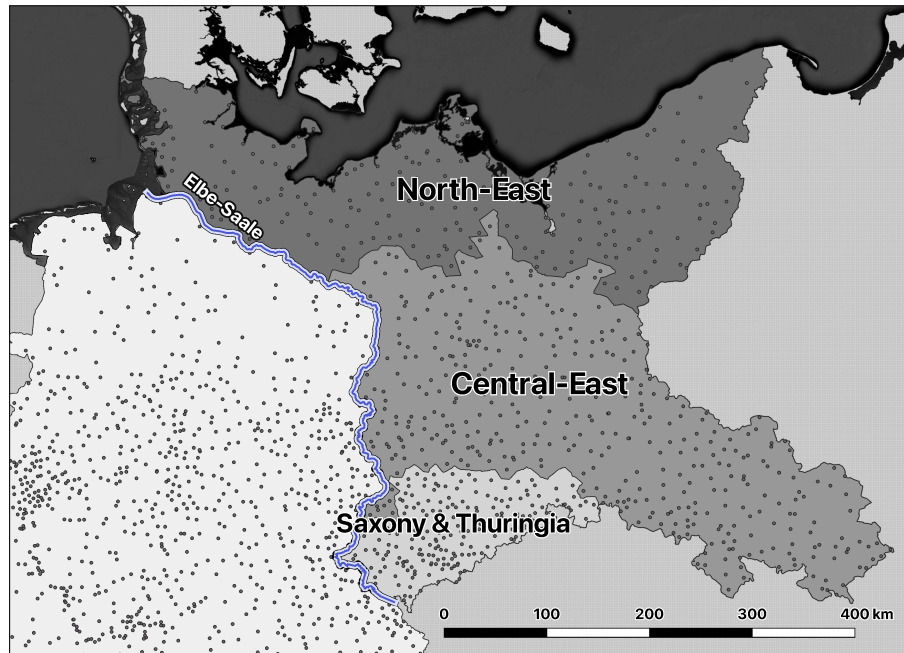
The spatial pattern of urban divergence corresponds to the heterogeneity across these three Eastern regions. Table I1 reports regression estimates and provides further evidence that the documented divergence between East and West took place before 1500 and thus before key shifts in agriculture. In Columns 1-4, we restrict our sample to fall within 6 half-centuries from 1200 through 1499. In Columns 5-8 we restrict our sample to fall within the 10 half-centuries from 1200 through 1699. "Post-1350×Region" interacts an indicator for time periods from 1350 forwards and an indicator for cities by Eastern regions. We also find that the divergence in construction was strongest in the North-East, yet find that the divergence in manufacturing was driven by Central-East regions including Brandenburg, Saxony-Anhalt, and Silesia.

Table I1: Eastern Divergence Before 1500 and 1700 by Region

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Before 1500				Before 1700		
	Construction	Manufacturing	Institutions	Collective Action	Construction	Manufacturing	Institutions	Collective Action
Post 1350 × North-East	-0.117**	0.005	-0.250***	-0.084**	-0.165***	0.005	-0.381***	-0.114***
	(0.049)	(0.019)	(0.073)	(0.033)	(0.049)	(0.015)	(0.083)	(0.033)
Post 1350 × Central-East	-0.021	-0.058***	-0.103*	-0.098***	-0.103***	-0.071***	-0.109	-0.126***
	(0.032)	(0.018)	(0.060)	(0.027)	(0.030)	(0.020)	(0.071)	(0.029)
Post 1350 × Central	-0.024	-0.005	0.041	-0.059**	-0.012	-0.006	0.065	-0.074***
	(0.026)	(0.013)	(0.054)	(0.023)	(0.030)	(0.011)	(0.075)	(0.023)
Observations	13500	13500	13500	13500	22500	22500	22500	22500
Mean	0.195	0.030	0.938	0.058	0.268	0.040	1.270	0.063

This table presents regression estimates examining the divergence of the East prior to 1500 and 1700 by Eastern regions. "Manufacturing" and "Construction" measure the count of manufacturing and construction activities. "Institutions" is an index recording whether cities have (1) an active city council, (2) a mayor, or (3) a city charter. The index takes values from 0 to 3. The presence of any component increases the index by 1. This corresponds to Figure 8, Panel A. "Collective Action" is an index recording whether cities (1) passed autonomous laws, (2) engaged in conflict with a lord, or (3) entered into alliances with other cities. This index takes values from 0 to 3 and corresponds to Figure 8, Panel D. We examine 2,250 German-speaking cities a the city-half-century level. In Columns 1-4, we restrict our sample to fall within 6 half-centuries from 1200 through 1499. In Columns 5-8 we restrict our sample to fall within the 10 half-centuries from 1200 through 1699. "Post-1350×Region" interacts an indicator for time periods from 1350 forwards and an indicator for cities by Eastern regions. We control for underlying regional trends and account for the fact that trends might have changed after 1350. "North-East" includes Schleswig, Holstein, Mecklenburg, and Pomerania. "Central-East" includes Brandenburg, Saxony-Anhalt, and Silesia. "Saxony-Thuringia" includes Saxony and Thuringia. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Conley (1999). Statistical significance at the 0.1, 0.05, and 0.01 confidence level denoted *, **, and ***.

Figure I2: Eastern Cities in the North-East, Central-East, Saxony and Thuringia Regions
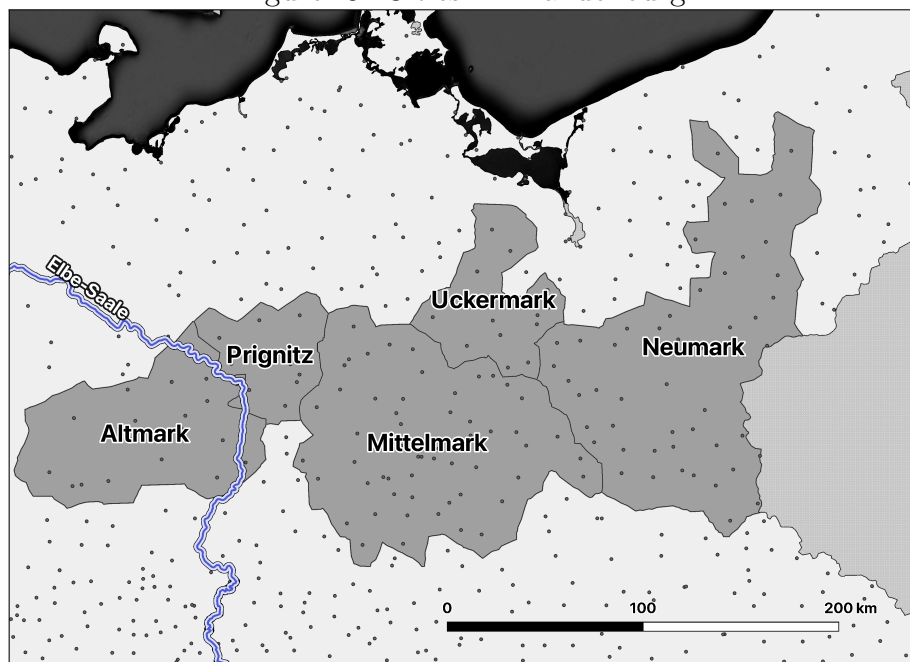

This map shows the locations of cities in the East. Eastern cities are defined as those East of the Elbe River or its tributary the Saale ($n = 760$).

I.3 Variation Within Historic Brandenburg

While we have documented differences across Eastern regions, historians have also highlighted more local heterogeneity within regions. For example, within historic Brandenburg, weak and strong forms of subjection coexisted. In the most Western part of Brandenburg – the Altmark region, located almost entirely West of the Elbe – the legal status of the peasantry was on par with regions in the West and the development of estate agriculture was limited (Harnisch 1979, pp. 344-5; Blickle 2003, p. 241). In contrast, sharper forms of subjection including serfdom prevailed in the North-Eastern parts of Brandenburg, including the Neumark and Uckermark regions (Cerman 2012, p. 16; Harnisch 1979, pp. 344-5; Enders 2008). In the Mittelmark and parts of the Prignitz, the most central parts of Brandenburg, conditions were more moderate. Peasants faced mobility restrictions but largely still paid fixed money rents at the time of the Thirty Years War (Kaak 2007, pp. 71-2; Blickle 2003, p. 241; Enders 2016, p. 787). These tendencies notwithstanding, extensive research indicates that there were important local variations (Scott 2001; Cerman 2012). For example, the fragmented land possessions of the Johanniter Order in Eastern parts of Brandenburg exhibited stronger property rights for peasants and milder forms of subjection

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Figure I3: Cities in Brandenburg

This map shows the locations of cities in Brandenburg. The map is based on Kaak (1991) and depicts regions as of 1648.

compared to their immediate surroundings (Kaak 2007, p. 94).[54] We provide a map of the regions within Brandenburg in Figure I3.

In Table I2, we examine heterogeneity across sub-regions of Brandenburg over different time horizons. We restrict our analysis to cities within Brandenburg. We compare post-1350 shifts in development across sub-regions relative to the most Western part of Brandenburg, the Altmark region, which is the reference category. The results indicate that a relative economic and political decline is observed in cities in Eastern parts of Brandenburg including the Mittelmark, Neumark, and Uckermark regions. Yet importantly, this negative shift is attenuated in somewhat more Western parts like the Prignitz and those parts of Eastern Brandenburg where the Johanniter Order held land. Cities even further in the West of Brandenburg, in the Altmark, did not diverge from the Western path.

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[54]Towns in Eastern Brandenburg where the Johanniter Order possessed land include Schwiebus, Sonnenburg, Teltow, Berlin-Wilmersdorf, Koenigsberg (Neumark), Sternberg (Neumark), Küstrin, Lagow, and Lebus.

Table I2: Political Economy Shifts Within Brandenburg and Over Different Time Horizons

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Outcomes 1200-1499				Outcomes 1200-1699		
	Constr-uction	Manu-facturing	Insti-tutions	Collective Action	Constr-uction	Manu-facturing	Insti-tutions	Collective Action
Post 1350 × Prignitz	-0.215	-0.041	-0.136	0.074	-0.415*	-0.079	-0.093	-0.119
	(0.282)	(0.138)	(0.221)	(0.138)	(0.231)	(0.117)	(0.298)	(0.128)
Post 1350 × Johanniter Order	-0.274	0.046	-0.140	0.007	-0.459**	0.002	-0.113	-0.043
	(0.253)	(0.103)	(0.356)	(0.040)	(0.203)	(0.076)	(0.412)	(0.064)
Post 1350 × Mittelmark	-0.324**	-0.197***	0.083	-0.020	-0.388***	-0.195***	0.048	-0.129*
	(0.136)	(0.073)	(0.202)	(0.056)	(0.112)	(0.072)	(0.200)	(0.072)
Post 1350 × Uckermark	-0.347*	-0.096	-0.229	-0.211	-0.465***	-0.134	-0.267*	-0.361*
	(0.191)	(0.125)	(0.174)	(0.196)	(0.124)	(0.124)	(0.162)	(0.195)
Post 1350 × Neumark	-0.342***	-0.107**	-0.032	-0.123	-0.437***	-0.102*	-0.015	-0.187*
	(0.116)	(0.049)	(0.181)	(0.094)	(0.092)	(0.056)	(0.192)	(0.100)
Observations	864	864	864	864	1440	1440	1440	1440
Mean	0.157	0.032	0.959	0.071	0.200	0.036	1.331	0.053

This table presents regression estimates examining heterogeneity within Brandenburg. We restrict our analysis to observations within Brandenburg prior to 1500 and 1700 by sub-regions. We restrict our analysis to observations within Brandenburg. The omitted category is the Altmark region, constituting the most Western part of Brandenburg. Outcomes are defined as above. "Post" is an indicator for time periods from 1350 forwards. "Prignitz" is an indicator for cities in the Prignitz region. "Johanniter Order" is an indicator for cities in Brandenburg where the Johanniter Order held land. "Mittelmark" is an indicator for cities in the Mittelmark region. "Uckermark" is an indicator for cities in the Uckermark region. "Neumark" is an indicator for cities in the Neumark region. We control for region-specific trends and post-trends, and for city and time fixed effects. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 20 kilometers, following the methodology of Conley (1999). Statistical significance at the 0.1, 0.05, and 0.01 confidence level denoted *, **, and ***.

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