Pandemic shock and economic divergence: political economy before and after the black death

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Abstract
We document how the Black Death activated politics 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 precipitated a divergence that coincided with prior 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 Intro

The Black Death of the 1300s was a shock to the supply of labor and a critical juncture. The shock shifted factor incomes and induced political conflict, leading to one of the highest stakes collective action problems in European history. The outcome was regional divergence. The pandemic led to increased bargaining power for labor, the erosion of feudal institutions, and urban growth in Western Europe; in Eastern Europe, it led to new restrictions on the mobility of rural labor and depressed urban development (Acemoglu, Johnson, and Robinson 2005; North and Thomas 1973; Jedwab, Johnson, and Koyama 2021; Ogilvie 2014).

Prior research suggests that this economic divergence reflected differences in collective action in the agrarian sector: powerful peasants won freedoms that promoted development in the West; in the East, tenant farmers were weak and the nobility imposed institutions that stunted growth (Brenner 1976; Acemoglu and Robinson 2012; Ogilvie and Carus 2014). However, the nature and origins of these differences in bargaining power, which are effectively unmeasured, are not well-established in the economics literature.

We argue that urban political economy was a leading factor shaping bargaining power and driving the divergence between a more dynamic West and a less dynamic East. We measure the relative cost of urban collective action before the Black Death using evidence on the fragmentation of rulers' territories and city charters. Before the pandemic, urban collective action was less costly in Western Europe, but economic activity in cities followed similar trends. The Black Death induced conflict over rents and made underlying political differences relevant. Afterwards cities secured greater institutional autonomy and grew in the West; the political and economic development of cities was depressed in the East. Construction and manufacturing in Eastern cities dropped by 1/3 relative to prior trends and the trajectory in the West. Figure 1 illustrates the divergence in construction in German cities.

The spatial pattern of urban divergence predicts changes in agrarian institutions, which appear later. Weak cities lowered outside options for the peasantry and increased rulers' dependence on the landed gentry (Acemoglu and Wolitzky 2011; Anderson 1974). The evidence supports the view that cities and contests over city institutions drove long-run development, even though most economic activity was agrarian (Marx 1965; Weber 1978).

Our analysis clarifies larger questions relating to political organization and growth.

Figure 1: Urban Construction
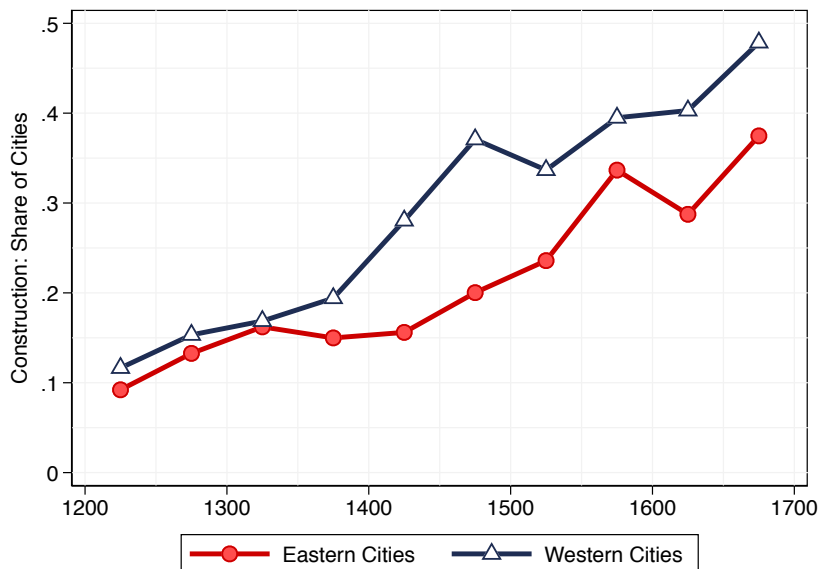
This graph shows the share of German-speaking cities with major construction projects in 50-year periods. Data are from the *Deutsches Städtebuch*. Eastern cities are located East of the Elbe River or its tributary the Saale ($n = 760$). Western cities are located West of the Elbe and the Saale ($n = 1{,}490$).

Political competition is widely viewed as a deep and distinctive factor driving growth in pre-modern Europe. Political fragmentation and the development of self-governing cities could impose constraints on rulers, shift resources to private actors, and promote capitalist development (Jones 2003; North 1981; Weber 1978; Baechler 1971). We document that regional differences in these seemingly core dimensions of political organization had limited economic implications before the Black Death. This shock to relative prices brought underlying political differences to life as key determinants of economic development.

The Black Death disturbed an equilibrium. Before the pandemic, labor was scarce in Eastern Europe, including large areas of German-speaking Europe. To attract Western settlers, Eastern rulers offered a good deal. Mass migration from West to East integrated territories with different institutions. Political fragmentation was low in the East and Eastern cities were granted self-government institutions from above, where in the West urban self-government institutions were frequently established from below. The Black Death raised the return to labor and redirected demand from agricultural to urban goods. Income shifted away from rulers and landowning nobles. In response, rulers moved to renege on prior concessions and conflict between rulers and cities increased. The outcome varied across regions.

We focus our study on German-speaking Europe, where the key cleavage emerged and

history offers a unique setting for economic analysis. We follow historians who emphasize that the divergence between regions cut through Germany, following the Elbe River, which 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).

To study the political economy process, we gather detailed 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 relative costs of collective action. We use evidence on the political fragmentation of territories, which indicates competition among rulers and "cheaper" urban collective action. We gather corroborating evidence on the homogeneity of city charters, which indicates where urban institutions were granted from above and rulers' relative power. 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 city-level politics, 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.

Our empirical analysis examines development across Eastern and Western regions of historic Germany. It is canonical in economic history that the Elbe River, and its tributary the Saale, traced an economic dividing line after the late middle ages.[1] We first document that the costs of urban collective action were higher in the East, as measured by city charters and political fragmentation. This holds overall and comparing cities along the Elbe border.

To study economic development, we focus on the pattern of urban construction, which provides uniquely fine-grained evidence on economic activity.[2] We find that the levels and

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[1]See Knapp (1887), Postan (1973), Makkai (1975), Szűcs (1983), Ennen (1987), and Ogilvie (1996).

[2]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.

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, and plague exposure. Within 100 kilometers of the border, we observe 343 Eastern and 342 Western cities which exhibit (1) underlying political differences, (2) similar economic trends before the pandemic shock, and (3) subsequent divergences in economic activity mirroring the pattern observed across historic Germany. When we conduct placebo exercises shifting the putative border between East and West, we find the largest estimate of the "Eastern" economic decline after the pandemic when the Elbe-Saale line is the border. The estimates fade and become insignificant as the placebo border is shifted East or West. In the manufacturing data, we observe a similar East-West divergence in the 1300s both across Germany and along the Elbe boundary. The post-1348 divergence in manufacturing is largest in new industries and muted in established industries. Within the East, these negative economic effects are not present in areas with mineral deposits, mining, and industrial activities related to mineral extraction.

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). This political divergence is observed across Germany and along the Elbe border.

Important changes in the agricultural sector appear later. In village level data, we find that the allocation of land to noble estates in Eastern Germany was stable for 150 years after the Black Death. Estate agriculture rose in the 1500s, when demand shifted towards agricultural goods and laws restricting labor mobility were introduced East of the Elbe.

The timing and the spatial pattern of the political economy divergence help us interpret the social process. Several lines of scholarship suggest international trade may have been a key factor driving regional divergence (Postan 1973; Wallerstein 1974; Wunder 1978). The

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fact that we observe the divergence starting in the 1300s, a century before shifts in demand towards Eastern agricultural goods, and when we compare border cities with similar access to transport and geographic endowments, suggests trade is unlikely to be a leading causal factor. Another possibility is that the pandemic interacted with pre-1348 differences in economic development, and could have had a more adverse impact where urban density and economic activity were lower (Acemoglu and Wolitzky 2011; Álvarez-Nogal, Prados de la Escosura, and Santiago-Caballero 2020). The fact that we observe the post-1348 divergence between East and West along the Elbe-Saale border, where the spatial density of cities and pre-1348 patterns of construction and manufacturing were similar, suggests that initial economic differences are unlikely to explain our core findings. In contrast, we do observe political differences across regions, including along the border, on the eve of the pandemic.

The colonial origins of the underlying, pre-1348 political differences between Eastern and Western German cities are important for our analysis. The territories East of the Elbe and Saale were a frontier zone, outside the Carolingian Empire, in the 800s. German princes initiated a *colonial* process that integrated the region into German-speaking Europe economically and culturally between the 900s and 1100s (Aubin 1966; Szűcs 1983). German princes expanded their territories East of the Elbe and enlisted entrepreneurs to develop hundreds of planned cities and villages and promote mass migration by Western settlers (Postan 1973). City institutions in the East were established largely by rulers using templates, unlike in the West (Kuhn 1956). Local variation notwithstanding, the Elbe became "the centre of German life," while still tracing a line between a "politically disjointed west" and an East initially characterized by "systematic quasi-modern administration, organised on rational territorial principles" (Barraclough 1957, pp. 251, 279).

We use this historical setting to study a general phenomenon: how economic shocks may activate underlying political features of society as drivers of economic development. We investigate a pivotal setting in which historical legacies and borders do not persistently shape economic activity but instead, having receded from view and seemingly been superseded, return to shape development when supply and demand shift (Szűcs 1983).

The divergence between Eastern and Western Europe is at the center of the larger debate on the transition from feudalism to capitalism. A leading strand in the literature examines how the Black Death increased the returns to labor and led to institutional changes that

prepared the ground for capitalism in Western Europe (North and Thomas 1973; Postan 1973). Observing that the Black Death led to radically different political and economic outcomes in Eastern Europe, Brenner (1976) and Acemoglu, Johnson, and Robinson (2005) frame the pandemic as a critical juncture in which a common shock interacted with pre-existing differences in agrarian class politics.[3] Our investigation has a similar conceptual structure, but examines detailed quantitative evidence and identifies key dynamics running through the political economy of cities. Our findings are consistent with research emphasizing the role of the urban sector, and outside options in the labor market, in the transformation of the European economy (Carsten 1954; Anderson 1974; Acemoglu and Wolitzky 2011).

Our study also contributes to research on core institutional and political processes shaping historical growth. Classic arguments by Weber (1978), Pirenne (1956), and Marx (1965) identify the self-governing city as a distinctive, *endogenous* institution that promoted long-run growth in Europe. Narrative evidence indicates that political changes in Eastern Europe limited the autonomy of cities and depressed growth in the period we study (Ogilvie 2014). However, almost all quantitative investigations have examined cross-sectional evidence observed centuries after the changes in political economy.[4] We develop quantitative evidence across time and space; identify the impact of a major shock on the economic and political development of self-governing cities; and uncover a cleavage leading to differences in growth.

Finally, we contribute to a literature on the historic impact of epidemics. Prior research indicates that the Black Death led to growth and lower inequality in Western Europe (Jedwab, Johnson, and Koyama 2021; Voigtländer and Voth 2013a;b; Alfani 2021). Historical studies suggest the Black Death also contributed to the divergence between Europe and Asia (Abu-Lughod 1991). No previous quantitative research documents how the Black Death precipitated the political economy divergence that we observe within Europe.[5]

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[3]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 from within historical materialism (Heller 2011; Anderson 2005; Epstein 2000; Harman 1998). We note that while Germany was not England, the regional variation in political and economic development we document foreshadows subsequent differences in capitalist development within Germany.

[4]See Ogilvie and Carus (2014) and Ogilvie (2014). One exception is Stasavage (2014), who examines 173 cities, almost all in Western Europe, and finds no lasting relation between a measure of urban autonomy and city population growth in our period. Cox (2017) finds cross-city population growth correlations were high in Western Europe after 1200 and interprets this as reflecting advantages conferred by urban autonomy and political fragmentation starting in 1200. Our evidence, designs, and findings stand in contradistinction.

[5]During the Protestant Reformation very localized plague outbreaks, which did not drive large shifts in factor incomes, led to increased public goods provision in cities (Dittmar and Meisenzahl 2019).

2 History

2.1 Political and Economic Development

European cities were in a process of economic and institutional transformation when the Black Death hit in the 1340s. Cities were politically subject to external feudal rulers, such as princes and counts, but were acquiring new corporate rights: formal institutions that secured self-government, transformed the legal system, and supported economic activity. In central Europe, an additional factor was in play: the prior colonization of territories East of the Elbe River had resulted in the economic and cultural integration, through mass migration and technology transfer, of regions with distinct political features.[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 endogenous

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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.

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 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).

Before the Black Death, there were political differences East and West of the Elbe River. Starting in the 11th 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). The resulting homogeneity of city charters in the East reflects the top-down process through which Eastern cities developed and is an indicator of lordly power (Kuhn 1956, p. 85; Schulze 1966, pp. 349-50). In this context, migrants brought Western technology and culture, and generated substantial revenue for the landowning nobility in the 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."

Historians suggest that economic trends were similar before the pandemic. Carsten (1947, p. 157; 1954, p. 88) indicates, "development in western and eastern Germany was running along parallel lines," and it, "only seemed a question of time until the east. . . would belong to the most developed parts of Europe." 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

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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).

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 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). Lords' use of military force against city governments across Eastern territories indicates that payoffs were large (see Appendix B).

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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).

While we emphasize the interplay between the pandemic and politics, 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 politics and institutions.

Culture also had the potential to shape the process we study. In our quantitative analysis, we find a divergence between cities in neighboring Western and Eastern cities that were culturally Christianized and Germanized *before* the period we study.[12] This suggests limits on the role of cultural differences (see Szűcs 1983). However, collective action and the experience of winning self-government from below in Western 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.[13] 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

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[12]Our analysis below documents divergence after the Black Death across cities within 100 kilometers of the Elbe. Crusades against Slavic pagans established German cultural dominance in this area before 1200, when our quantitative analysis begins. In 1174 the Bishop of Magdeburg could write that in Jüterbog, over 100 kilometers to the East of the Elbe, "where pagan rites used to be celebrated...now the Christian religion flourishes and the defence and protection of Christianity is firm and safe" (quoted in Bartlett 1995, p. 122).

[13]Benedictow (2004) argues for a higher death rate, however, this is subject to debate. See Noymer (2007).

(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

That the Elbe River traces a dividing line in economic history is a stylized fact. 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). For example, Saxony and parts of Thuringia lie in the East, but had mineral resources, industry, and more "Western" politics (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.[14]   The data we construct record the timing of major construction projects, measured by start dates. We classify construction into three sectors: private, state, and religious. Private comprises patrician homes and palaces, private merchant halls, and related buildings; state comprises town halls, city walls and bridges, and other public buildings; religious comprises churches, monasteries, and similar. Construction involved a range of architectural, 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." The evidence on the timing of construction starts 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 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.[15]

Politics.   We gather information on politics from the *Deutsches Städetebuch*. First, we gather information on the rulers of each city and each city's type or "family" of charter, and construct measures of political and charter fragmentation which proxy for costs of collective action.[16]   Second, we record the presence of major institutions, focusing on: city councils

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[14]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*.

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

[16]For information on city charters and "families" of city law we rely on Cantoni (2020). We also thank

(*Rat*); mayors (*Burgermeister*); and city charters. Third, 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. Fourth, we gather information on city courts, including whether: courts were active; cities or lords had ultimate jurisdiction; and cities or lords controlled judicial appointments. Fifth, 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). Sixth, we record information on city constitutions and related legal rights granted by lords.[17]

The collection of data on politics and institutions is an important component of our analysis. We gather evidence on the core institutions that together define the autonomous "Western city" (Weber 1978, p. 1226). Our study is the first to analyze systematic data on key institutions such as mayorships, councils, and city courts, to the best of our knowledge. These data thus enable us to test hypotheses and distinguish our study from prior research.[18]

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*.

Davide Cantoni for sharing data on territorial rulers. All other data we collect and code ourselves.

[17]Our analysis documents the existence of constitutions and related legal documents. Our "constitutions" variable comprises: *Privilegien*, *Stadtrechte*, *Stadtbriefe*, *Stadtverfassungen*, *Flecken- verfassungen*, *Handfeste*, *Weistümer*, *Herrschaftliche Ordnungen*, *Gerichtsordnungen*, *Schöffenordnungen*, *Stadtbücher*, *Stadtsatzungen*, *Stadtstatuten*, *Willküren*, *Rezesse*, and *Stadt(ver)ordnungen* or *Ratsordnungen*. The "autonomous laws" are a subset: *Wilküren*, *Beliebungen*, *Stadtsatzungen*, *Stadtstatuten*, *Rezesse*, *Rats-* or *Stadt(ver)ordnungen*. See Appendix A for details.

[18]For example, Cantoni (2020) provides data on municipal charters for the cities we study. While there are no significant pre-1348 differences in city charters between East and West, there are significant prior differences in our measure of *constitutions*, as we show in Table 1 below, and post-1348 differences in *autonomous laws*. We also build on Wahl's (2019) pioneering evidence on elections, citizen representation, and guild participation in 282 cities. Bosker, Buringh, and Van Zanden (2014) 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 minimal or even 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).

4 Political Differences Before the Pandemic

We begin our analysis by investigating the cost of collective action in the urban sector. We measure this cost with a proxy, the local fragmentation of rulers' jurisdictions, and corroborating evidence on the local fragmentation or non-homogeneity city charters.

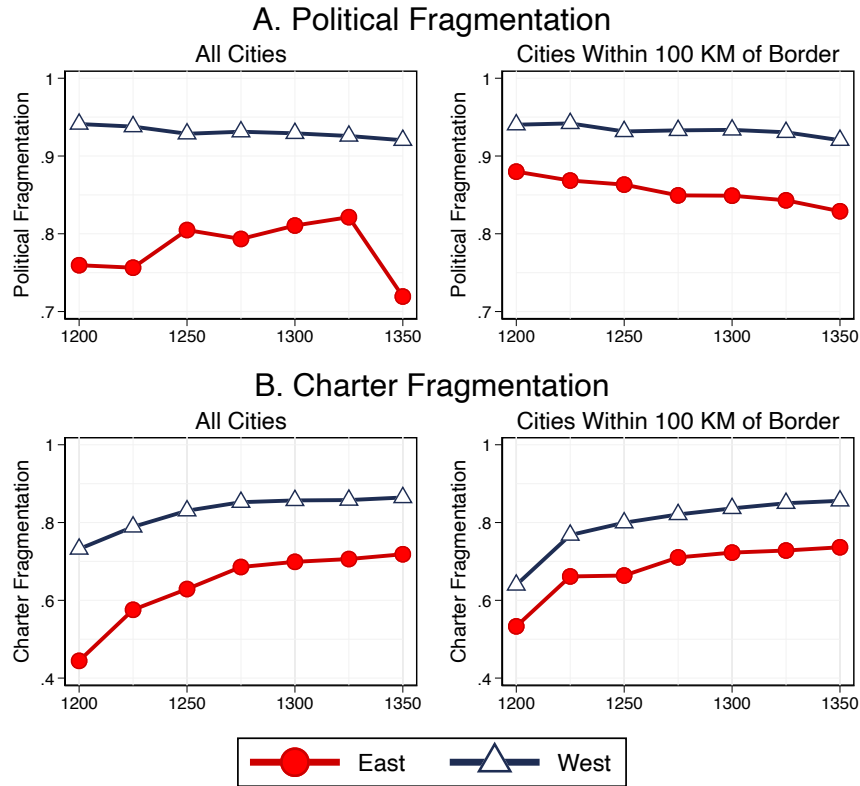Figure 2 maps the cities in our analysis, indicates the boundary formed by the Elbe and Saale Rivers, and clarifies how we measure political and city charter fragmentation. Cities were subject to external rulers such as princes and counts: over 400 different rulers held legal claims over cities in 1348. 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: $1 - HHI$. 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. Figure 2 illustrates the local variation in political rule and charters around one representative city (see also Appendix A).

Figure 2: The Regional Distribution of Cities and Political Differences
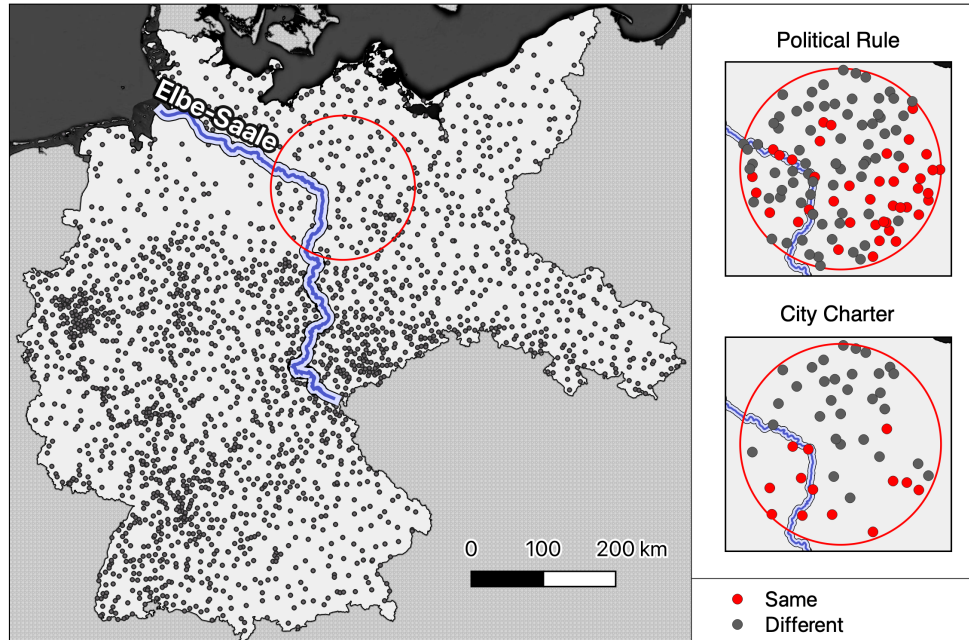
This figure maps the cities we study and indicates the Elbe-Saale border. Eastern cities are defined as those East of the Elbe River or its tributary the Saale ($n = 760$). Western cities are defined as those West of the Elbe-Saale ($n = 1,490$). Within 100km of the border, there are 343 Eastern and 342 Western cities. The figure illustrates the local variation that enters our measures of political and charter fragmentation in 1348 for a representative city, circled and magnified at right. This figure records whether cities were (red) or were not (black) subject to the same preponderant local ruler (or type of charter). Appendix A provides details on individual rulers (charters) and how measures of political and charter fragmentation are calculated.

Figure 3: Indicators of the Cost of Collective Action

A. Political Fragmentation

All Cities — Cities Within 100 KM of Border

B. Charter Fragmentation

All Cities — Cities Within 100 KM of Border

East   West

This figure summarizes political fragmentation and city charter fragmentation across regions. We present the mean city-level exposure to political (charter) fragmentation across cities in a region. For each underlying city i, city-level political (charter) fragmentation is measured by: $1 - HHI$, a Herfindahl index of the sum of squared ruler (charter) shares for cities within a 100 kilometer radius.

Figure 3 summarizes the regional differences in political and charter fragmentation, which indicate *lower* costs of urban collective action. Panel A summarizes political fragmentation across regions by plotting the mean, across all cities in a region, of our city-level measure. Political fragmentation was considerably lower in Eastern Germany; this difference was relatively stable over time; and this distinction is evident along the Elbe-Saale boundary where urban density was similar among neighboring Eastern and Western cities.[19] Panel B shows that city charter fragmentation was also relatively low in the East, including along the border. These results confirm and quantify the observation that territorial consolidation was greater in the East and that Eastern rulers granted more uniform charters.[20] Appendices A and C provide maps and document local political and charter fragmentation in further detail.

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[19]There are 343 Eastern and 342 Western cities within 100 kilometers of the boundary.

[20]The pattern of regional differences in fragmentation we document below 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.

Regional differences in political fragmentation reflected the larger pre-pandemic equilibrium. To characterize this state of affairs more fully, 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: $y_i = \alpha + \beta east_i + \epsilon_i$.

We find systematic regional differences in politics before the Black Death, as shown in Table 1. We confirm that political and city charter fragmentation were significantly lower in the East, indicating higher relative costs of collective action for Eastern cities. Consistent with different costs of collective action, cities in Eastern Germany were less likely to have had an open conflict with a territorial lord over the period from 1200-1349 or to have acquired constitutions institutionalizing urban autonomy. Cities in Eastern regions were also less likely to have received stand-alone grants of market rights, although regional differences in market rights did not coincide with any observable difference in economic development prior to 1350 (see below).[21] This evidence indicates that our measures of fragmentation are indicative of an equilibrium in which Western cities were characterized by more conflictual politics and the acquisition by cities of more extensive and varied rights. Significantly, we observe no regional differences in the mere presence of city charters, which points to the importance of the other dimensions of political economy on which we gather data.

In contrast, 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 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

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[21]Our evidence is consistent with but qualifies Cantoni and Yuchtman's (2014) study of market rights as an indicator of development. Cantoni and Yuchtman (2014) study changes in market rights that arose due to the appearance of universities in West Germany after 1380. Their results do not reflect the East of the Elbe variation, as they discuss in detail. Our results, notably along the Elbe border, do not reflect changes in proximity to universities. In addition, we find both no regional connection between market rights and growth before 1350 and no clear within-city relationship between market rights and growth. Before and after 1350, construction predicts the acquisition of market rights at the city-level, as discussed in Appendix C.

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Table 1: Regional Differences When the Pandemic Struck

	(1)	(2)	(3)	(4)	(5)	(6)
	All Cities			Within 100 KM of Border		
	β East	SE	Mean	β East	SE	Mean
Political Fragmentation c. 1350	-0.201	(0.036)	0.852	-0.091	(0.017)	0.875
City Charter Fragmentation c. 1350	-0.146	(0.032)	0.815	-0.120	(0.057)	0.796
Conflict With Lord 1200-1349	-0.026	(0.007)	0.021	-0.009	(0.005)	0.007
Constitutions by 1349	-0.051	(0.017)	0.096	-0.062	(0.027)	0.072
Market Rights by 1349	-0.095	(0.013)	0.092	-0.076	(0.023)	0.070
City Charter by 1349	-0.023	(0.064)	0.468	-0.024	(0.075)	0.347
Construction 1200-1349	-0.009	(0.034)	0.301	0.011	(0.058)	0.277
Manufacturing 1200-1349	-0.000	(0.013)	0.056	0.009	(0.013)	0.028
Rye Yields (Log)	0.086	(0.028)	8.353	0.040	(0.053)	8.368
Plague 1348-51	-0.039	(0.017)	0.097	-0.035	(0.030)	0.088

This table presents regression estimates examining political and economic differences between Eastern and Western cities in the mid-1300s. 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 on an indicator for "Eastern" cities in bivariate regressions. 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. "Conflict with Lord 1200-1349" measures the number of conflicts between a city and territorial lords. "Constitutions by 1349", "Market Rights by 1349", and "Charter by 1349" are indicators. "Manufacturing 1200-1349" and "Construction 1200-1349" are binary measures recording manufacturing and construction activities over this period. "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 the methodology of Colella et al. (2019).

in agricultural productivity in our analysis below.

Finally, we consider differences in the Black Death shock itself. We observe fewer plague outbreaks in Eastern cities during the Black Death and that this difference becomes statistically insignificant when we restrict attention to cities along the border. We show in our quantitative analysis below that these local plague differences do not drive or account for the observed post-pandemic economic and political divergence between regions. We in fact find that city-level outbreaks during the Black Death *negatively* predict subsequent 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 that there are no observable differences in mortality rates across regions. See Appendix D for details.

5 Economic Development

5.1 Construction

It may seem natural to presume that construction demand fell in the wake of the Black Death.[22] However, historical evidence indicates that construction continued and may even have increased after 1348. Lütge (1950, p. 258 – our translation) notes that many important building projects were initiated in the years after 1348 and observes that, "The construction industry was of particular importance during this period."[23] Further, we observe the price of building materials rising relative to both wages and grain prices after 1348, in cities where this evidence is available (Abel 1978, p. 52).[24] Historical evidence thus leads us to expect that construction may have increased, especially in economically dynamic areas.

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.

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 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:

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

[22]In a recent review article, Jedwab, Johnson, and Koyama (2021, pp. 8-9) suggest that, "building stopped" and that, "the demand for new buildings fell in the aftermath of the plague." Lopez and Miskimin (1962) provide one of the only quantitative studies of construction in our period and find that in Italy the building of city *walls* declined in the 15th century, but do not consider other types of construction.

[23]Lütge (1950) points to, among other projects, the laying of the foundation for the Erfurt Cathedral in 1349, the Frauenkirche in Eßlingen in 1350, construction on the parish church in Schwäbisch-Gmünd in 1351, the renovation of the Freiburg Cathedral in 1354, the Jakobikirche in Hamburg in 1354, and the Frauenkirche in Nuremberg in 1355. Lütge (1950, p. 258) emphasizes the resources committed to building by the bourgeois, "gripped by the fear of existence, gratitude and certainly also the enthusiasm for representation."

[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 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 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 examine and 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.

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 shifting implications of distance from the Elbe-Saale boundary measured 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 larger controlling for these factors, as shown in column 3. The "East × Post" estimate holds when we account for city-level variation in plague outbreaks during the years of the Black Death (column 4). Local plague outbreaks are themselves associated with a negative shift in the trend of construction.

The estimates are similar but slightly stronger 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. The estimate holds when we compare neighboring border cities in the same

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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 Colella et al. (2019). We obtain similar estimates allowing for correlation over different distances or clustering standard errors (Appendix F).

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Indicator for Construction Activity					
	All Cities				100 km Border	
East × Post 1350	-0.080	-0.100	-0.167	-0.168	-0.194	-0.195
	(0.024)	(0.030)	(0.055)	(0.054)	(0.072)	(0.068)
East × Trend in Centuries		0.020	0.023	0.024	0.074	0.068
		(0.019)	(0.035)	(0.034)	(0.060)	(0.055)
East × Post × Trend		-0.020	-0.022	-0.024	-0.011	0.000
		(0.023)	(0.037)	(0.036)	(0.071)	(0.064)
Distance × Post			0.022	0.021	0.062	0.108
			(0.012)	(0.012)	(0.078)	(0.058)
Distance × Trend			-0.002	-0.001	-0.033	-0.036
			(0.009)	(0.009)	(0.047)	(0.046)
Distance × Post × Trend			0.004	0.003	-0.050	-0.059
			(0.010)	(0.010)	(0.062)	(0.059)
Rye Yield × Post			-0.073	-0.068	0.048	0.697
			(0.113)	(0.113)	(0.169)	(0.220)
Rye Yield × Trend			0.039	0.033	-0.030	-0.239
			(0.070)	(0.071)	(0.114)	(0.182)
Rye Yield × Post × Trend			-0.151	-0.141	-0.097	0.139
			(0.080)	(0.082)	(0.127)	(0.220)
Plague 1348-51 × Post				-0.054	-0.086	-0.068
				(0.054)	(0.132)	(0.129)
Plague 1348-51 × Trend				0.065	0.059	0.058
				(0.047)	(0.103)	(0.103)
Plague 1348-51 × Post × Trend				-0.109	-0.078	-0.081
				(0.048)	(0.097)	(0.098)
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

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 examines 685 cities within 100 kilometers of the border between "East" and "West." "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. "East × Trend" interacts an indicator for Eastern cities with a time trend measured in centuries, such that a 1-unit change is 100 years. "Distance" measures the distance in 100 kilometers from a city to the Elbe-Saale border as a running variable. Eastern cities have positive distances. Western cities have negative distances. "Rye Yield" is the logarithm of potential yields within 25 kilometers of a city. "Plague 1348-51" is the number of plague outbreaks in a city 1348-1351. 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 Colella et al. (2019).

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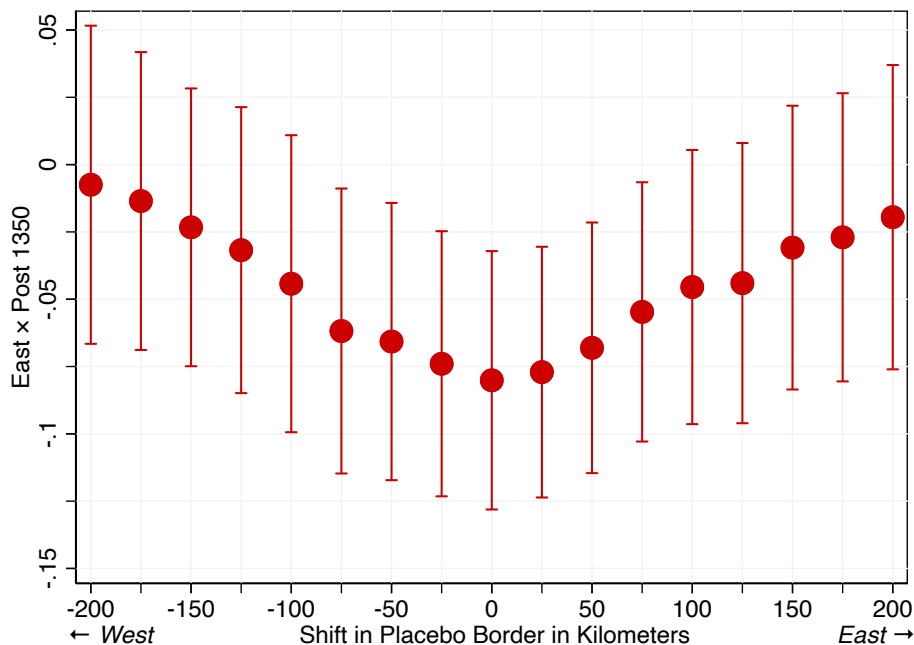

This graph shows the estimated Eastern effect on construction in a city after 1350 as one shifts the border dividing Eastern and Western cities. The estimate at 0 uses the Elbe-Saale border and corresponds to the "East × Post 1350" estimate in Table 2, column 1. Estimates shifting the border j kilometers 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 spatial standard errors as in Table 2.

gridcell (column 6). The stronger effect on the border could reflect *agglomeration shadows* spilling over the border or sharper local differences in politics. We find evidence consistent with spillovers, as we discuss below and in Appendices F and G.

The salience of the Elbe-Saale boundary can be understood through other comparisons. To illustrate, we estimate regressions in which we shift the boundary line dividing Eastern and Western cities and present the estimates in Figure 4. We find that the "East × Post" estimate is largest when the Elbe-Saale line is the border, and that estimated regional differences decay and become statistically insignificant as we shift the boundary East or West.

While this evidence points strongly, in our view, to the salience of the Elbe-Saale border, the underlying processes were complex and varied. For example, historians argue that Saxony and Thuringia comprised an intermediate zone in the East with more "Western" political and economic features. We examine this literature and provide heterogeneity analysis that supports our baseline findings in Section 7. We similarly document post-pandemic divergence within territories that span the Elbe, such as Brandenburg (Section 7 and Appendix H).

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Figure 5: Urban Construction by Sector
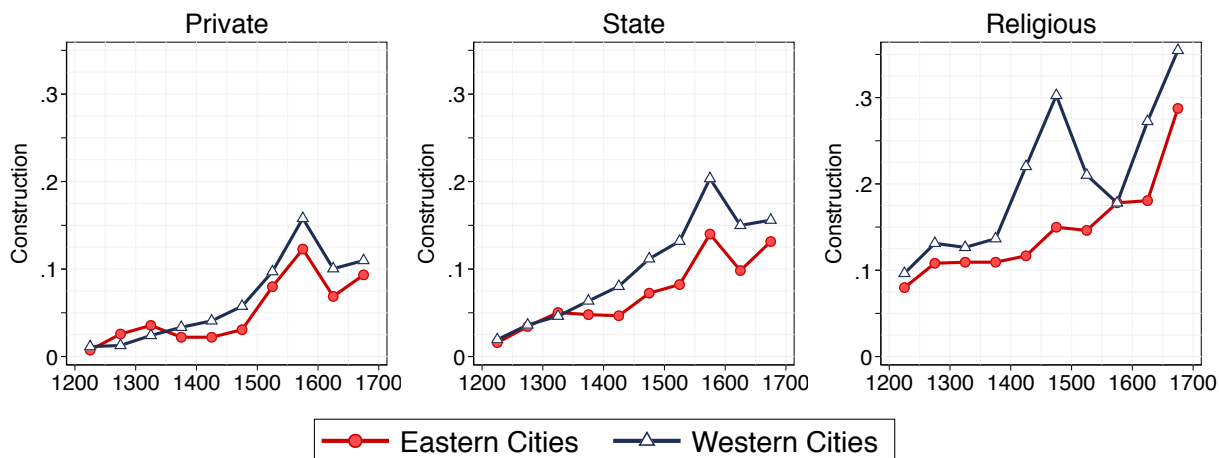
This graph shows the share of cities with major construction projects by sector in 50-year time periods from 1200 through 1699. Construction projects are recorded in the *Deutsches Städtebuch* and classified as described in text. Eastern cities are defined as those East of the Elbe River or its tributary the Saale ($n = 760$). Western cities are defined as those West of the Elbe and the Saale ($n = 1{,}490$).

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 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.

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[27]We discuss the data and this high-level classification in Appendix A.

5.2 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.

Figure 6: Manufacturing in German Cities
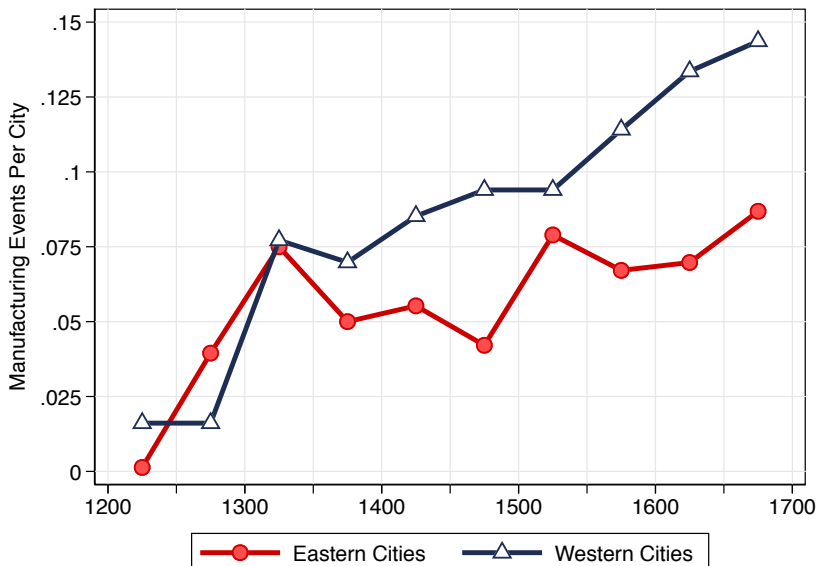
This graph shows the mean number of manufacturing events in Eastern and Western cities in 50-year time periods, measured by manufacturing and craft activities in the *Deutsches Städtebuch*. Eastern cities are East of the Elbe or the Saale Rivers. Western cities are West of the Elbe or the Saale.

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 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 pre- and 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 and local rye yields and city-level variation in the plague (columns 3 and 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 7), we show that these muted effects reflect highly significant declines in manufacturing across the East outside of Saxony-Thuringia, where mineral processing activities were important.

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Table 3: Shifts in Manufacturing Activity

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Indicator for Manufacturing Activity					
	All Cities				100 km Border	
East × Post 1350	-0.011	-0.034	-0.031	-0.031	-0.029	-0.032
	(0.008)	(0.013)	(0.018)	(0.018)	(0.020)	(0.020)
East × Trend in Centuries		0.019	0.020	0.021	0.035	0.033
		(0.011)	(0.014)	(0.014)	(0.017)	(0.016)
East × Post × Trend		-0.017	-0.009	-0.010	-0.025	-0.021
		(0.013)	(0.017)	(0.017)	(0.023)	(0.022)
Distance × Post			-0.000	-0.000	0.006	-0.004
			(0.006)	(0.006)	(0.019)	(0.019)
Distance × Trend			-0.001	-0.000	-0.016	-0.009
			(0.005)	(0.005)	(0.016)	(0.016)
Distance × Post × Trend			-0.002	-0.002	0.018	0.009
			(0.006)	(0.006)	(0.021)	(0.021)
Rye Yield × Post			-0.022	-0.019	-0.061	0.052
			(0.044)	(0.044)	(0.050)	(0.065)
Rye Yield × Trend			0.009	0.007	0.016	0.021
			(0.036)	(0.036)	(0.032)	(0.061)
Rye Yield × Post × Trend			-0.025	-0.021	-0.048	-0.079
			(0.046)	(0.045)	(0.046)	(0.066)
Plague 1348-51 × Post				-0.022	-0.015	-0.019
				(0.027)	(0.031)	(0.032)
Plague 1348-51 × Trend				0.029	0.023	0.025
				(0.019)	(0.023)	(0.023)
Plague 1348-51 × Post × Trend				-0.043	-0.023	-0.024
				(0.020)	(0.027)	(0.027)
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	0.04	0.04	0.04	0.04	0.03	0.03
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 examines 685 cities within 100 kilometers of the border between "East" and "West". "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. "East × Trend" interacts an indicator for Eastern cities with a time trend measured in centuries, such that a 1-unit change is 100 years. "Distance" measures the distance in 100 kilometers from a city to the Elbe-Saale border as a running variable. Eastern cities have positive distances. Western cities have negative distances. "Rye Yield" is the logarithm of potential yields within 25 kilometers of a city. "Plague 1348-51" is the number of plague outbreaks in a city 1348-1351. 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 in columns 1-4, and within 25 kilometers in columns 5-6, following the methodology of Colella et al. (2019).

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Figure 7: Manufacturing by Sector
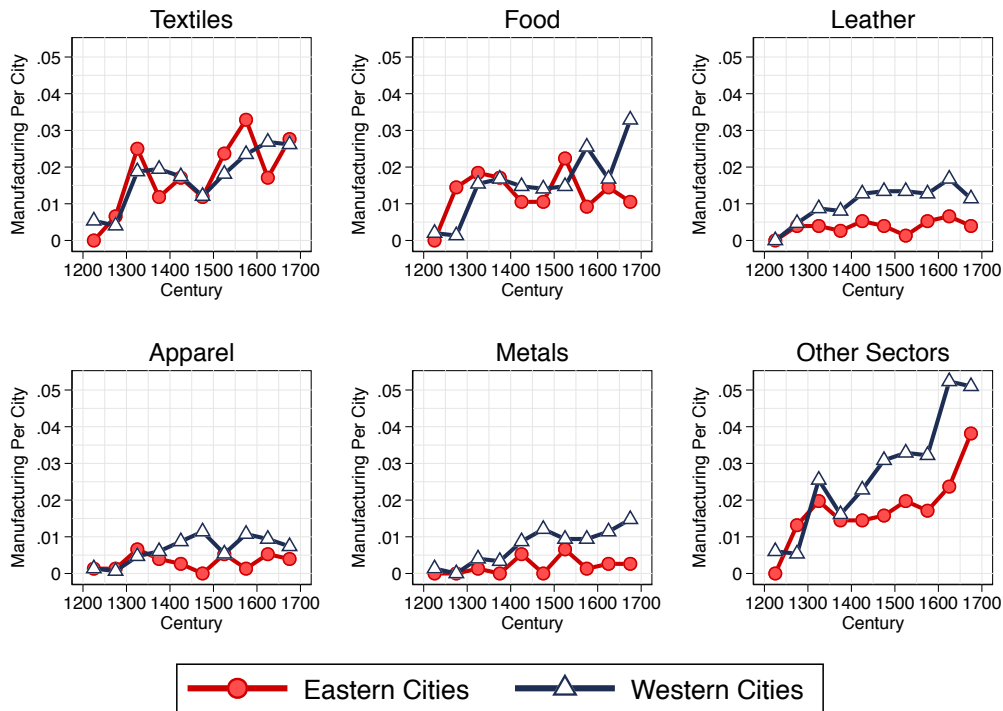
This graph shows the mean number of manufacturing events by sector in Eastern and Western cities in 50-year time periods. Data on manufacturing and craft activities are coded from the *Deutsches Städtebuch*. Sectoral classification as described in text. Eastern cities are those East of the Elbe River or its tributary the Saale. Western cities are those West of the Elbe and the Saale.

The dynamics of manufacturing across sectors further clarifies 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 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 data do reveal a Western advantage in apparel starting 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).

6 Political and Institutional Change

In this section, we investigate political and institutional change before and after the pandemic. We examine 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. Afterwards, politics shifts positively towards the development of urban institutions and municipal autonomy in the West.[28]

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 a 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 including 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).

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

[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 connects with 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.

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 document similar patterns in collective action: after the pandemic we find a differential increase in Western cities forming cross-city alliances, engaging in 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 (Marx 1965, p. 131; Engel 1993, p. 285). To protect trade and safeguard existing privileges from predatory lords, cities set up trade and defence alliances (Engel 1993, pp. 284ff; Isenmann 2014, p. 315). Similarly, we observe a shift in the West towards the passage of autonomous town laws. These laws are described by historians as simultaneously legal acts of "anti-lordly revolution" (Ebel 1958, p. 11; Weitzel 2009) and as *economic institutions* reducing transactions costs and improving 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 G).

Estimation. We examine how politics shifted in Eastern cities after the Black Death in an analysis that parallels our study of construction. To implement the analysis, we create

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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.

Figure 8: Changes in Municipal Politics Along the Border
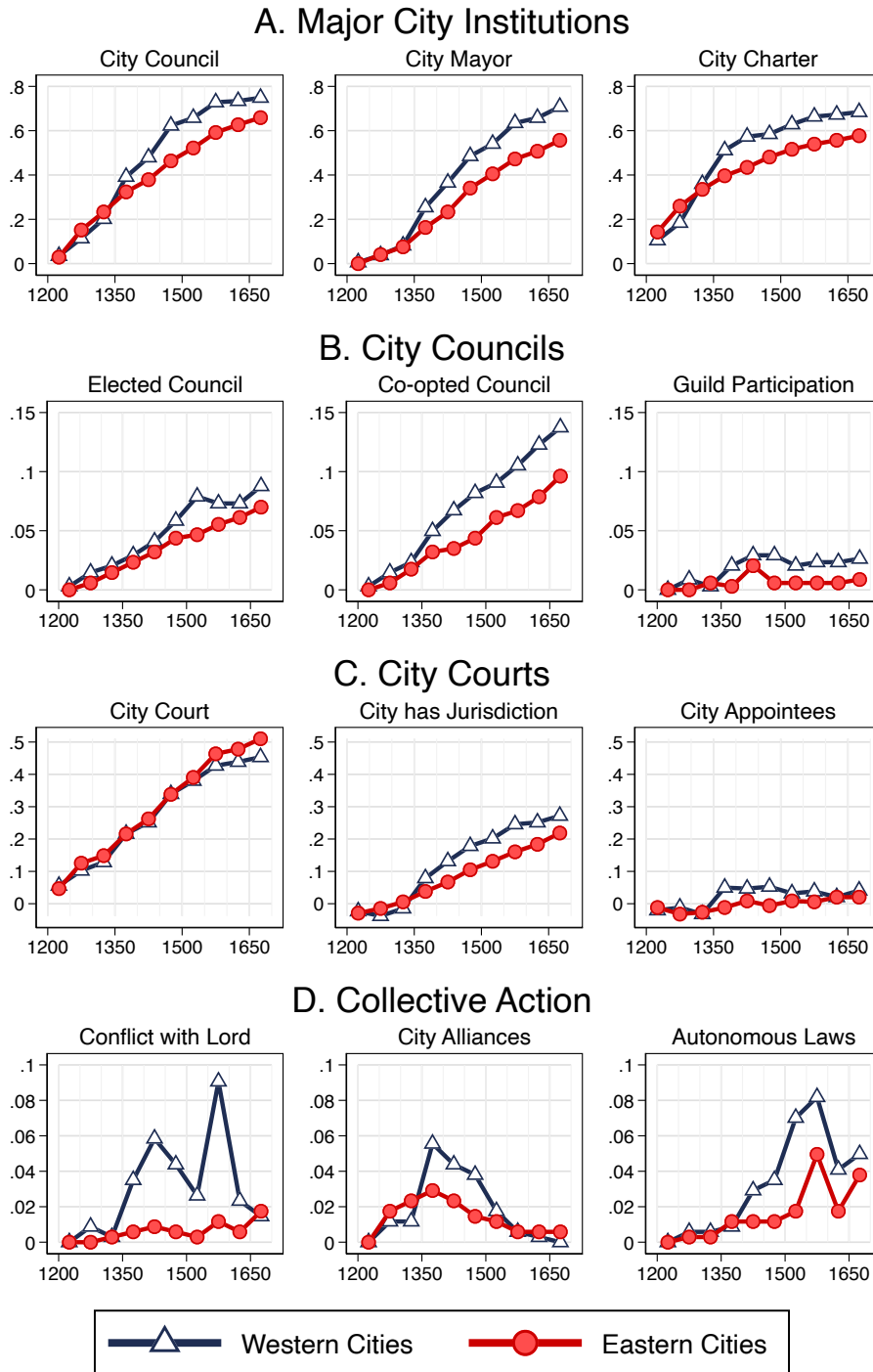
This figure presents evidence on changes in municipal governance. The figure compares cities within 100 kilometers of the Elbe-Saale border, of which 343 are Eastern and 342 are Western. Panel A shows the share of cities with: active city councils (*Rat*); mayors (*Buergermeister*); and city charters. 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.

indices for the establishment of (A) major city institutions, (B) city council autonomy, (C) city courts 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 4 presents our results. Columns 1-4 present estimates examining all cities; columns 5-8 restrict to cities within 100 kilometers of the Elbe-Saale border. In Panel A, we control for regional trends. We find significant negative shifts in politics in the East post-1350. In the full sample, a statistically significant divergence is observable with respect to major institutions and collective action. In the border sample, we see strong and statistically significant shifts on all dimensions except the selection of the council (column 6). In Panel B, we control for potentially time-varying implications of distance from the border and agricultural productivity. Our findings become stronger on most dimensions when we introduce these controls. We estimate very large and significant reductions in the development of major institutions in Eastern cities when we compare cities across Germany (column 1) and along the Elbe (column 4). We similarly find large and significant reductions in the development of autonomous city courts (column 5). We observe weaker effects but similarly negative effects on city council autonomy. Interestingly, we find that collective action is depressed across Eastern Germany (Panel B, column 4), but not along the border once we account for time-varying agricultural productivity, indicating that along the border patterns of collective action are indeed predicted by agricultural endowments (Panel B, column 8). This finding motivates our examination of variation across Eastern regions in the next section.

While we argue that the indices we study provide powerful lenses for studying political change, alternative measures might be developed. We use dimensionality reduction to construct a unified index of urban political autonomy and confirm our core findings in Appendix G. Our unified analysis indicates quite sharply that there were similar regional differences in political change when we study the variation across all of Germany and when we compare Eastern and Western cities along the border. This suggests that the slightly larger regional differences in construction along the border (Table 2 above) may reflect local spillovers stretching across the Elbe, which we study and document in Appendix F.

Table 4: Shifts in City Politics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		All	Cities			Cities Within	100 KM of Border	
	Major Institutions	Council Autonomy	Law Courts	Collective Action	Major Institutions	Council Autonomy	Law Courts	Collective Action
Panel A. Baseline								
East × Post 1350	-0.127	-0.007	-0.016	-0.093	-0.364	-0.034	-0.198	-0.085
	(0.069)	(0.018)	(0.043)	(0.021)	(0.107)	(0.023)	(0.060)	(0.025)
East × Trend	-0.029	-0.017	-0.058	0.031	-0.025	-0.003	0.052	0.009
	(0.084)	(0.014)	(0.033)	(0.017)	(0.097)	(0.020)	(0.040)	(0.013)
East × Post 1350 × Trend	0.091	0.005	0.133	-0.017	0.006	-0.008	-0.021	0.006
	(0.100)	(0.017)	(0.039)	(0.021)	(0.119)	(0.030)	(0.061)	(0.020)
Panel B. Time-Varying Controls								
East × Post 1350	-0.416	-0.048	-0.233	-0.136	-0.354	-0.061	-0.220	-0.027
	(0.136)	(0.026)	(0.066)	(0.035)	(0.173)	(0.045)	(0.097)	(0.036)
East × Trend	-0.067	-0.014	0.039	0.048	-0.112	0.019	0.065	-0.002
	(0.123)	(0.025)	(0.047)	(0.024)	(0.143)	(0.047)	(0.066)	(0.024)
East × Post 1350 × Trend	0.056	0.003	-0.033	-0.034	0.126	-0.043	-0.045	0.009
	(0.152)	(0.036)	(0.063)	(0.030)	(0.169)	(0.069)	(0.111)	(0.037)
Observations	22500	22500	22500	22500	6850	6850	6850	6850
Mean	1.270	0.130	0.398	0.063	1.221	0.111	0.406	0.054

This table presents regression estimates examining shifts in city-level politics. Panel A presents baseline estimates. Panel B presents estimates with time-varying controls, including the distance to the border and agricultural productivity. The specifications correspond to Table 2, columns 3 and 4, respectively. All estimates include city and time period fixed effects. "Major 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. "Council Autonomy" is an index recording whether cities have (1) an elected council, (2) a co-opted council, or (3) guild participation in the council. This index takes values from 0 to 3 and corresponds to Figure 8, Panel B. "Law 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. The variables on jurisdiction rights and judicial appointment take on negative values if the lord holds jurisdiction and appoints jurists to the court. Thus, this index takes values from -2 to 3 and 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 index takes values from 0 to 3 and corresponds to Figure 8, Panel D. The unit of analysis is the city-half-century over the 10 half-centuries from 1200 through 1699. Columns 1-3 examine 2,250 German-speaking cities. Columns 4-6 examine 685 cities within 100 kilometers of the border between "East" and "West". "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. "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. In Panel B, we proceed analogously by interacting measures of distance to the border and rye yield separately with a Post-1350 indicator, a time trend, and a "Trend × Post-1350" measure and include them as control variables. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Colella et al. (2019).

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7 Differences in Political Economy Within the East

While we focus on the divergence between East and West, more local differences in political economy also shaped outside options in the labor market and incentives for rulers.

An important distinction within the East is between the core area where coercion in agriculture became widespread in the 1500s and a subregion where coercion remained limited. The core area comprises Pomerania, Mecklenburg, Schleswig-Holstein, Brandenburg, and Silesia. The subregion where coercion did not develop comprises Saxony and Thuringia. Saxony had silver, copper, and tin mines which supported urban growth; Thuringia had copper mines and smelting and liquation plants established in the 1400s in and near its cities (Scott 2001, pp. 64, 76, 107-9). A large share of revenue for rulers came from mining rights, and historical evidence suggests this shifted the balance of power and incentives for rulers (Harnisch 2015, p. 41).[32] Rulers in Saxony responded to post-1348 budgetary challenges by making political concessions to cities in exchange for revenue commitments (Carsten 1959, pp. 191-5), consistent with North's (1981) model of Western European institutional change.

The history leads us to expect that urban development and politics looked relatively "Western" in Saxony and Thuringia after the pandemic.[33] 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 for cities in Saxony and Thuringia (Appendix Figure H1 maps these cities). Table 5 presents our estimates and shows that negative economic shifts after 1350 are concentrated in the core regions where coercion in agriculture developed. We find no significant decline in construction and manufacturing in Saxony and Thuringia relative to the West. We find no evidence of a divergence in "Major Institutions" in Saxony and Thuringia. We observe relative declines in collective action in both regions after the pandemic, but these are larger in the Eastern core.

Importantly, we observe economic and political declines in the cities of the Eastern core before 1500 (Table 5, Panel B). This finding frames our examination and interpretation of economic and institutional dynamics in the agrarian sector below (Section 8).

More local evidence supports and nuances our findings. Within historic Brandenburg,

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[32]Mining rights were assigned to rulers within the Holy Roman Empire. This was legally enshrined in the Golden Bull of 1356, a key constitutional document. Thus politics reflected endowments and institutions.

[33]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 Economy within the East

	Construction	Manufacturing	Major Institutions	Collective Action
Panel A: Data 1200-1699				
Post × Eastern Core	-0.132	-0.046	-0.206	-0.100
	(0.030)	(0.016)	(0.070)	(0.023)
Post × Saxony-Thuringia	-0.006	0.000	0.099	-0.074
	(0.024)	(0.010)	(0.083)	(0.028)
Panel B: Data 1200-1499				
Post × Eastern Core	-0.064	-0.035	-0.160	-0.070
	(0.030)	(0.016)	(0.059)	(0.022)
Post × Saxony-Thuringia	-0.015	-0.002	0.055	-0.058
	(0.021)	(0.009)	(0.052)	(0.028)

This table presents regression estimates of regional shifts in economic and political outcomes. Outcomes are as in Table 4. Panel A examines all data (*n*= 22,500). Panel B restricts to pre-1500 (*n*=13,500). "Post" is an indicator for periods after 1350. "Eastern Core" is an indicator for Eastern cities not in Saxony or Thuringia. "Saxony-Thuringia" is an indicator for Eastern cities in Saxony and Thuringia. All models include region-specific trends and post-trends and city and time fixed effects. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Colella et al. (2019).

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 such as Neumark and Uckermark exhibit "Eastern" declines in construction and institutional development. By the 1500s, agrarian development became more coercive in Eastern Brandenburg. More globally along the Elbe border, the Eastern declines in construction and major institutional development after the pandemic are most pronounced across cities in territories that do not span the river. We present these analyses in Appendix H, which examines local heterogeneity in more detail.

8 Changes in Agriculture

A rich literature examines the role of the agrarian sector in the divergence between Eastern from Western Europe (Knapp 1887; Perkins 1986; Ogilvie 2014). An influential view is that developments in the agrarian sector *caused* a reduction in urban growth in Eastern Europe (Brenner 1976). Historical research suggests two dimensions of change in Eastern agriculture were particularly important: the development of farming on noble estates (*demesne*) and the

introduction of legal institutions restricting the mobility of agricultural labor.[34] The timing of these changes in the agricultural sector help us interpret the economic process, including the relationship between developments in cities and in agriculture.

8.1 The Rise of Agriculture on Estates Managed by the Nobility

Narrative evidence indicates that agricultural production on noble estates expanded 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 shock shifted the terms of trade against grain agriculture, and that incentives for Eastern lords to expand estate production for export remained low until grain prices rose in the 1500s (Abel 1978). Thus Hagen (1985, p. 89) observes in Brandenburg:

> "By 1375 the economic appeal of noble demesne farming was waning. In the period 1375-1450 the land devoted to it. . . shrank. . . although the massive desertion of peasant farms. . . would have easily permitted enlargement of the noble demesnes. . . arable farming had grown unprofitable."

To assess these dynamics quantitatively, we examine evidence on estate agriculture in the core Eastern territory of Brandenburg. Administrative data on the allocation of plots to estate agriculture at the village level are recorded in the Brandenburg land book (*Landbuch*) and cadastral tax register (*Schossregister* or *Schosskataster*), for the years 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.[35] 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.

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[34]Other features of agrarian life and politics are also informative. A large literature investigates the number of days tenant farmers (serfs) were required to work on noble estates (Ogilvie 2014; Cerman 2012). Important arguments also concern the role of peasant revolts. We review evidence on peasant revolts in Appendix B: there were few revolts before 1500 and all located away from the core sections of the Elbe border.

[35]We focus on the time-series for two reasons. First, there is limited cross-sectional variation in Brandenburg in agricultural endowments that might otherwise shape the incentives for the development of estate agriculture. Second, 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 document relatively more "Western" patterns of urban economic and political development after the Black Death.

Figure 9: The Development of Estate Agriculture
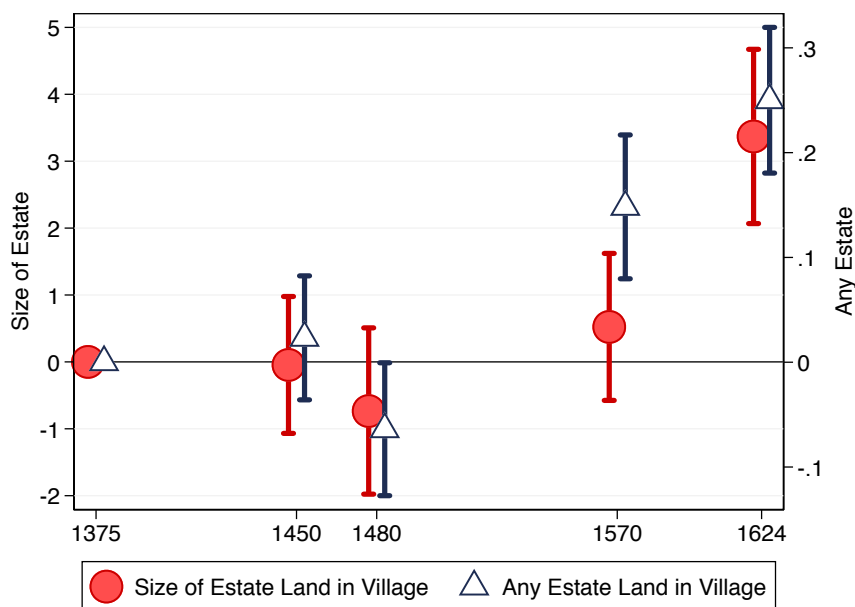
This figure presents estimates of time-period fixed effects in panel regressions examining estate agriculture in Brandenburg, conditional on village fixed effects (see text). The first outcome is the size of noble estates, measured in *Hufen* units in a village-year. *Hufen* were units of land equivalent 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

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 only rose systematically 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 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.[36] Fourth, within Brandenburg, estate agriculture developed most post-1500 where urban development declines were largest 1350-1500 (see Appendix H).

8.2 Institutions Restricting Labor Mobility in Agriculture

Laws restricting the mobility of tenant farmers are widely understood as political indicators and as institutions that shaped economic life East of the Elbe (Cerman 2012). Table 6 summarizes the major legal changes restricting labor mobility in Eastern regions. 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 6: 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 these laws 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 institutions could be influenced by peasant mobilization, 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 none along the Elbe border, as we discuss in Appendix B. At a

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[36]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 19% reduction in total land under cultivation at the village level relative to pre-1350 levels.

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

9   Conclusion

The Black Death generated one of the most pivotal examples of a general phenomenon: how large economic shocks induce political conflicts that shape the path of development.

We examine how political power and the costs of collective action became core determinants of economic change after the pandemic shocked prices, shifting income away from the landowning nobility and towards cities and tenant farmers. We specifically study how the Black Death interacted with political dynamics running through the urban sector. Our analysis documents regional differences in political fragmentation and the development of the self-governing city within Europe. Political fragmentation is often viewed as promoting development across economic epochs because of the constraints it imposed on European rulers. The self-governing city has been identified as one of the most important institutions shaping Europe's path to capitalism, since at least Karl Marx and Max Weber. However, economic development was similar in Eastern and Western regions before the Black Death, despite greater political fragmentation and more bottom-up city development in the West.

The Black Death led to a divergence in urban development that reflected prior political differences within Europe. Following the pandemic, cities in the West secured autonomous institutions that promoted economic activity. In the East, rulers restricted city autonomy and urban activity was depressed for several hundred years. This divergence in urban political economy shaped bargaining power in the agrarian sector, and foreshadows a later cleavage in which coercion by and for the wealthy was institutionalized in Eastern 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.

<div align="center">Table A1: Summary Statistics</div>

	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)
Main Institutions Index	1.270	(1.191)	1.221	(1.212)
Council Autonomy Index	0.130	(0.376)	0.111	(0.343)
Courts Index	0.398	(0.891)	0.406	(0.915)
Collective Action Index	0.063	(0.259)	0.054	(0.241)
Constitutions	0.073	(0.347)	0.077	(0.351)
Plague 1348-51	0.094	(0.292)	0.082	(0.274)
Manufacturing Activity	0.041	(0.198)	0.030	(0.170)
Construction Activity	0.268	(0.443)	0.243	(0.429)
Political Fragmentation	0.852	(0.152)	0.875	(0.069)
City Charter Fragmentation	0.815	(0.137)	0.796	(0.157)
Market Rights	0.200	(0.400)	0.177	(0.382)
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, market rights, 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 value 1 in all periods after an active council was mentioned and takes on 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 value 1 in all periods after an active mayor was mentioned and takes on 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 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 value 1 in all periods after a co-optation 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 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.[37]

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

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[37]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)

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."

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.*[38] 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.

Major Institutions Index is an index taking integer values from 0 to 3 that is defined as the sum of *City Council* (1/0), *City Mayor* (1/0), and *City Charter* (1/0).

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[38][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).

Council Autonomy Index is an index taking integer values from 0 to 3 that is defined as the sum of *Elected Council* (1/0), *Co-Opted Council* (1/0), and *Guild Participation* (1/0).

Courts Index is an index taking integer values from -2 to 3 that is defined as the sum of *City Court* (1/0), *City Jurisdiction* (-1/0/1), and *Judicial Appointment* (-1/0/1).

Collective Action Index is an index taking integer values from 0 to 3 that is defined as the sum of *City Alliances* (1/0), *Conflict with Lord* (1/0), and *Autonomous Laws* (1/0).

Constitutions is a binary indicator for the presence of any type of constitutional document. We include the following legal documents: *Privilegien, Stadtrechte, Stadtbriefe, Stadtverfassungen, Fleckenverfassungen, Handfeste, Weistümer, Herrschaftliche Ordnungen (e.g. Polizei- und Landesordnungen), Gerichtsordnungen, Schöffenordnungen, Stadtbücher, Stadtsatzungen, Stadtstatuten, Willküren, Stadt(ver)ordnungen, Rezesse*, and *Ratsordnungen*. An example of a type of constitution is from 1330 in Ebersberg in Bavaria. The *Deutsches Städtebuch* indicates: "Verleihung eines Hofmarksprivileg durch Kaiser Ludwig den Bayern 1330." (Keyser 5 vols. 1939-1974, Band 5 Teil 2, p. 166) In our translation: "Conferment of a Hofmark privilege by Emperor Ludwig the Bavarian in 1330." While there is some ambiguity in the classification of legal documents as constitutions, our findings hold when we examine a restricted set of documents which are unambiguously "constitutional". In the restricted set of core constitutions we include Stadtverfassungen, Stadtrechte, Stadtbriefe, Weistümer, and Handfeste. In Table A3, we provide further references and brief descriptions of the restricted set of core constitutional documents.

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*). An example from 1349 in 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."

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.

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 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).

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 own review of the *Deutsches Städtebuch*. Second, we compute a Herfindahl index (HHI) of political concentration for each city using all neighboring cities 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). Second, we compute a Herfindahl index (HHI) of city charter concentration for each city using all neighboring cities within a 100km radius. Third, we define:

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

for all cities as of 1348. We provide an illustration in Figure A2 below.

Market Rights measures the presence of market rights, as recorded by Cantoni (2020).

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. Penalities 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 (1999, 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)

Table A3: Description of Core Constitutional Documents

Legal Document	Description	Reference
Stadtrechte, *Stadtverfassung*, *Handfeste*	Formally, charters were a set of constitutional documents. Substantively, charters contained (i) privileges describing the relation to the lord and other territories, (ii) constitutional documents describing the basic structure of the city institutions (e.g. council and court), and (iii) material law relating to the legal status of burghers such as civil- and penal law. *Handfeste* were city law documents with constitutional character.	Dusil and Lück (2012); Johannek (1999, pp. 1901-2)
Privileg, *Stadtbrief*	Privileges were rights granted by secular or religious rulers. These rights included the right to bear arms and royal regalian rights, which concerned the economic life (e.g. market, fair, coinage, staple rights, and customs duties), the internal organization (e.g. council, construction, and building of walls) and jurisdiction rights. The extension of municipal powers through privileges, especially legislative and tax powers, curtailed the powers of lordly city officials. *Stadt*- or *Freiheitsbriefe* were legal documents through which privileges could be conferred.	Heinig (1999, pp. 226-7)
Weistum	*Weistümer* were legal guidelines and took the form of a judgment on a hypothetical legal case. At its core, *Weistümer* regulated the legal communal relations within and between the community and its landlords. They confirmed or formalized existing law. They consisted of provisions on levies and services, rights of use of forests, water, and pasture, as well as regulations concerning jurisdiction, occupation, and court proceedings.	Isenmann (2014, p. 181); Kroeschell (1980, p. 127); Schildt (1999, p. 2142)

Political and City Charter Fragmentation

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

Figure A1: Construction of the Political Fragmentation Index
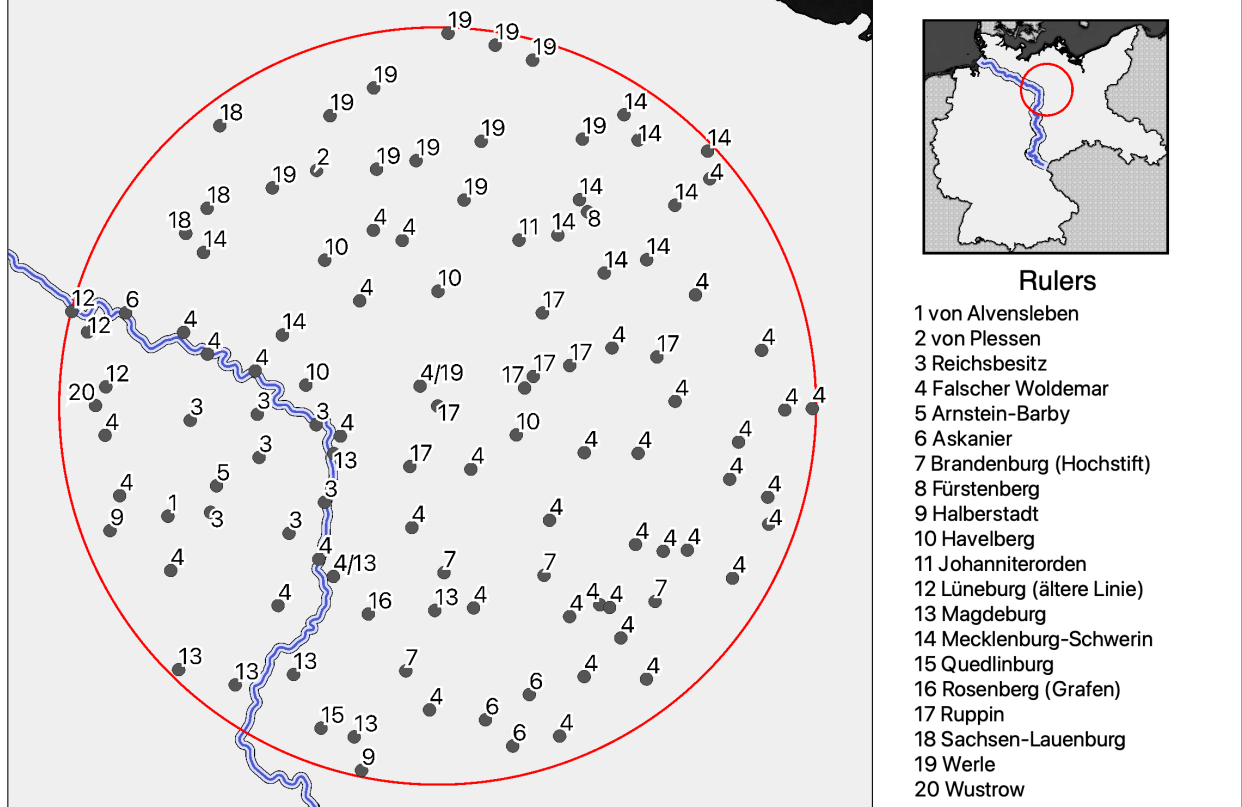
This figure displays territorial rulers for cities within a 100km radius of a representative city. Each dot corresponds to a city and each number corresponds to a ruler. For each ruler, we calculate the share of cities under their jurisdiction. We measure fragmentation by $1-$ the sum of squared ruler shares of cities. We indicate the presence of multiple rulers separating their numbers with a "/".

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.[39] 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. Note that when

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[39]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. There are two such examples in the illustration: a city over which the Falscher Woldemar and Werle lords had claims, and a city over which the Falscher Woldemar and the Archbishopric of Magdeburg held claims.

calculating fragmentation, we include observations on both sides of the border. Thus, cities closer to the border contain information from their immediate neighbors on the other side of the Elbe-Saale.

We proceed analogously for the construction of city charter family fragmentation index and illustrate the process for a representative city in Figure A2. Here we only show those cities with charters belonging to larger families of city law.

Figure A2: Construction of the City Charter Fragmentation Index
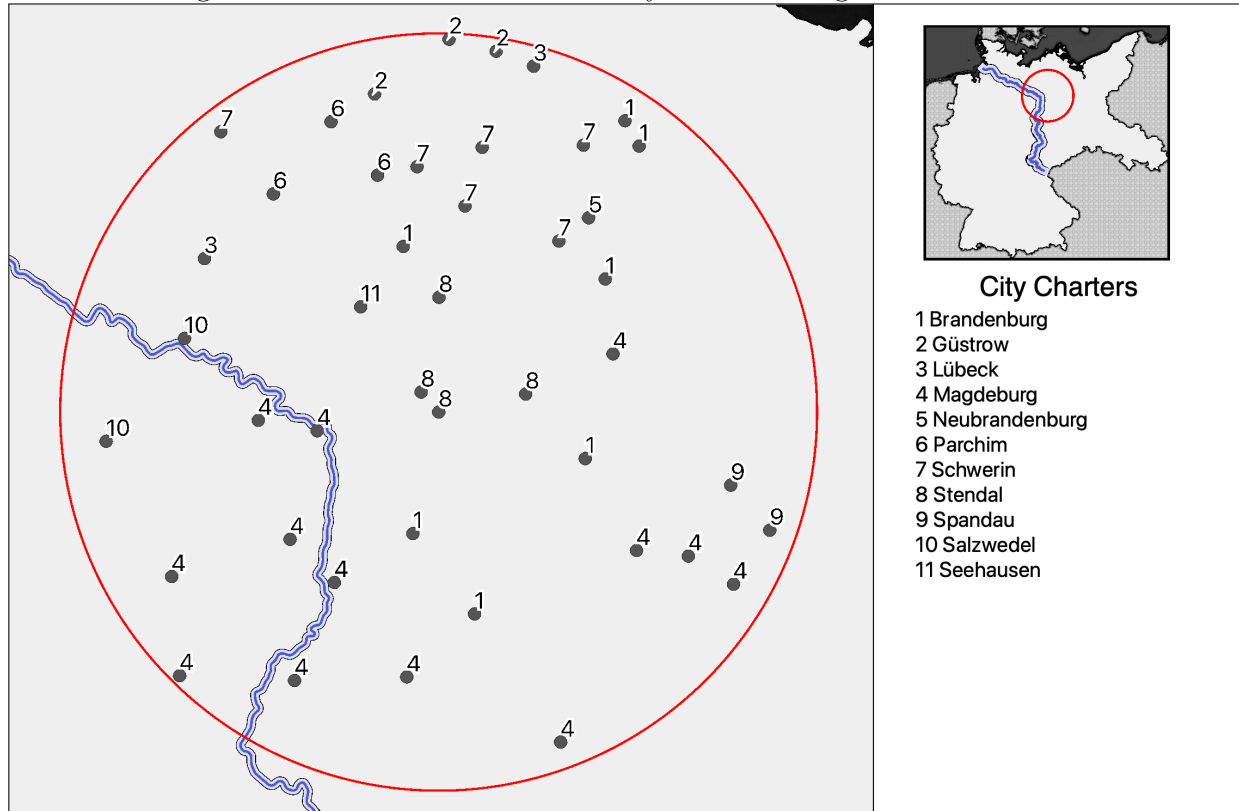
This figure displays legal charter families for cities within a 100km radius of a representative city. Each dot corresponds to a city and each number corresponds to a different family of charters. For each charter family, we calculate the share of cities under their jurisdiction. We measure fragmentation by $1-$ the sum of squared charter shares of cities. We only include cities with a charter family designated in 1348 in the *Deutsches Städtebuch*. We do not observe a city charter family when the location in question was not yet a settlement or was an informal settlement or when information on the city charter is unclear or missing.

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B   History

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

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 over the span of a few centuries in the middle ages. Over 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. The chartering of cities was concentrated between the 13th and 15th centuries, the period at the heart of our study.[40]

Research on cities emphasizes key dimensions of political and economic development that define types or models of urban development in Europe.[41] There is broad agreement regarding the core dimensions of urban autonomy, though the precise characteristics which enter a given definition vary. The core characteristics in definitions of the ideal city 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 speaks to all of these dimensions, with the exception of fortification. Thus, in his classic discussion of the ideal-typical "Western"

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[40]We acknowledge 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 economically large or important (Bartlett 1995; Weber 1978).

[41]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
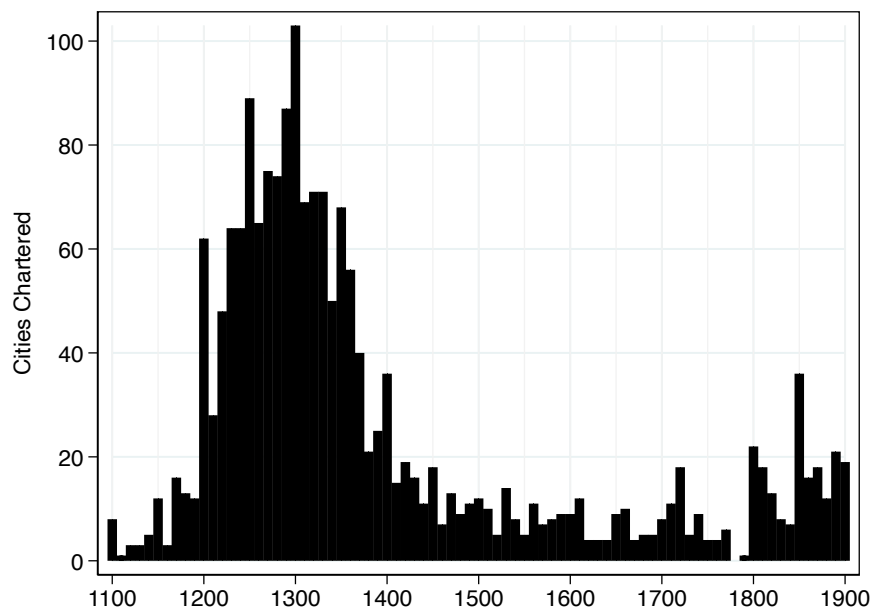
This graph shows the number of cities which were granted legal status as cities through the grant of a city charter in 10-year time periods from 1100 through 1900. City charters are recorded in the *Deutsches Städtebuch* and coded by Cantoni (2020). The figure is inspired by Stoob (1956, p. 28) who provides an important early example of the quantitative analysis of the evidence in the *Deutsches Städtebuch*.

medieval city, Max Weber notes:

> "To constitute a full urban community the settlement had to represent a relative predominance of trade-commercial relations with the settlement as a whole displaying the following features: 1. a fortification, 2. a market, 3. a court of its own and at least partially autonomous law, 4. a related form of association [frequently based on an oath], and 5. at least partial autonomy and autocephaly, thus, also, an administration by authorities in the election of whom the burghers participated."[42] (Weber 1978, p. 1226)

Henri Pirenne similarly observes:

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[42]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 this provides another model of politics.

"In spite of innumerable differences of detail, the towns of the Middle Ages presented everywhere the same essential features, and the same definition may be applied to one and all. We may formulate this definition by saying that the medieval city was a fortified agglomeration inhabited by a free population engaged in trade and industry, possessing a special law, and provided with a more or less highly developed jurisdiction and communal autonomy. The city enjoyed immunities which 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 gradually from 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 important liberties, often in the course of 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 notably was the case in cities East of the Elbe River, which were established and granted governance institutions by rulers during a colonial process.

B.2   The Development and Colonization of Eastern Territories

The Germanic colonization of the 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 early 1100s that mass

migration into the East by Western 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 initial tax exemptions, favorable rents, reduced labor obligations, secure property rights, and institutions securing communal self-government for settlers. At one point, "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 have emphasized 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 claims of overpopulation in Western Germany (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 substantial monopoly rights, land holdings, and vested 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 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 had important consequences (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 institutional 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 at the end of the 12th century, 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; on the gradual development of cities in Saxony see Schlesinger 1987).

The variation in urban legal institutions was also substantive as constitutional documents differ in their content (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 and 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

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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 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).

When the Black Death hit, the impacts were shaped by the prevailing conditions across East and West. The shock to labor supply triggered distributional struggles. The landowning gentry, threatened by unfavorable shifts in relative factor incomes, reacted by attempting to depress wages in both countryside and cities. Maximum wages, mobility restrictions, and attacks on cities' trade and manufacturing rights were meant to prevent a shift from the nobility towards agricultural workers and urban dwellers. It was within this context, that prior political differences were activated.

Lower political fragmentation in the East led to prior differences in the allocation of power within the communal government, a stronger link between city and territorial sovereign, and a reduced cost of reversing legal guarantees. In the West, higher political fragmentation among lords constrained their rule over cities and thus raised the success probability of revolts for cities. Hard-won collections of interdependent constitutional documents provided stronger protection of communal freedoms. At the same time, the prior struggle over constitutional liberties in Western cities might have instilled a strong political culture regarding the capacity for collective action, created a deep-rooted sense for the commune, and instilled a value for autonomy in itself. These differences shaped the future bargaining strength of cities. When Eastern cities' attempted to make their own policy over the 14th and 15th centuries, they were quickly suppressed by lords (Carsten 1954; Kuhn 1975, p. 239).

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 underlying pattern of institutions and technological development in that epoch.

One set of historical arguments affirms that 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 a key piece of evidence indicating that European society was at or near resource limits. More generally, some historians interpret the narrative record as showing us that growth was slowing down before the Black Death, as resource constraints increasingly bound; 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). In light of these observations, historians have debated whether the economic changes that followed the Black Death in fact largely reflected pre-existing economic dynamics characterizing European society (Rösener 2012; Pitz 1965).[43]

A second set of arguments suggests that key aspects of 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 pre-1348 or that demographic growth was slowing. 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 (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, where peasants in England and Northeastern France paid close to 1/2 of their output. Second,

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[43]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.

Figure B2: Urban Construction
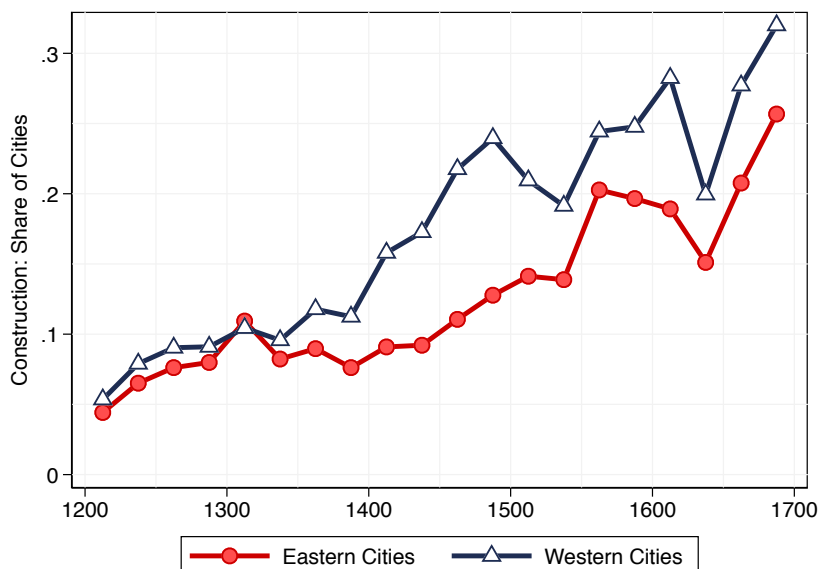
This graph shows the share of cities with major construction projects in 25-year periods. Data on construction projects are from the *Deutsches Städtebuch*. Eastern cities are located East of the Elbe River or its tributary the Saale ($n = 760$). Western cities are located West of the Elbe and the Saale ($n = 1,490$).

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 historical record is arguably somewhat ambiguous, the quantitative evidence we collect reveals a regional divergence, driven by shifts in development patterns, *after* the Black Death. Our baseline analyses show that there were effectively steady economic and political trends up until 1350 (see Figures 1 and 8 in main text). These analyses focus on the period from 1200 forwards and examine the pattern of development through the lens of 50-year time periods. The patterns in the data are similar when we consider development at a more finely-grained frequency. Figure B2 presents the evidence on city construction in 25-year periods: this further disaggregation shows that there is little evidence of declines or of a slowdown in the one hundred fifty years before the Black Death and that the divergence between East and West indeed opens up after the pandemic.

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 in Europe 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 the decentralized and partitioned sovereignty. Thus, 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 in turn "activated" by the development of money relationships, urban structures, and the commercial penetration of rural areas (Wickham 2008; Wunder and Hauptmeyer 1991, p. 96). Further, within the feudal order, rulers worked to consolidate and strengthen 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 labour services and economic rent" (Epstein 2000, p. 49).[44] In our setting, cities were themselves 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).

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[44]For this reason, Epstein (2000) refers 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.

B.5 Agrarian Politics and Development

Our discussion of agricultural politics and development focuses on the introduction of territorial laws restricting labor mobility in agriculture and the allocation of land to noble estates. Along these dimensions, the evidence we gather suggests little change in Eastern Germany before 1500 and pronounced changes afterwards (Section 8).

To interpret the relationship between our findings and agrarian politics several further considerations are important. Key contributions to the historical literature suggest that the observed changes in agriculture reflected the balance of power between the landowning nobility and tenant farmers. This balance could reflect deep-rooted historical differences in the organization of villages and peasant communities that pre-dated the Black Death, as suggested by Brenner (1976); but if so, it is natural to wonder why key changes in agrarian relations appear with a long lag after the Black Death. However, it is also likely that the political organization of rural communities was to some extent evolving over time, including in response to the pandemic shock. In particular, it is possible that political dynamics within the agricultural sector shifted after the Black Death and before 1500 along margins we do not explore and in ways shaped the development of the urban sector.

A significant body of research emphasizes the role of peasant revolts as indicators of political mobilization by tenants in the agrarian sector (Blickle 1988; Brenner 1976; Bierbrauer 1980). It is thus natural to consider peasant revolts as a source of potential evidence on spatial and temporal shifts in rural politics.

In the context of our study, several observations are important. First, while the number of peasant revolts grew after the Black Death, there were relatively few peasant revolts in German-speaking Europe before 1500. Bierbrauer (1980) records 16 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 (the "Great Rising") or the German Peasants' War (1524-6).[45] Second, there is no evidence of differential peasant mobilization along the Elbe boundary over the decades immediately following the Black

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[45]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.

Death, when we observe sharp changes in urban political economy, so far as we are aware. Third, all but one conflict are located south of Frankfurt am Main; all but three conflicts are located south of Stuttgart, indicating the narrow geographic spread of peasant revolts before 1500. Fourth, the fact that revolts are not observed does *not* imply that other forms of political and economic action were absent in the rural sector. We certainly do not rule out the possibility that important political changes were also developing in agriculture and outside cities. We further note that revolts are imperfect proxies for political mobilization: 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

In the main text, we discuss how cities shaped payoffs across sectors and influenced the larger political balance. In this section, we review how cities shaped outside options of peasants and held valuable economic rights and monopoly concessions that became contested. We also discuss how the conflicts between cities and rulers could have military dimensions or run through territorial political assemblies (diets), which were instrumental in instituting serfdom. We frame our discussion in the context of rulers' incentives to suppress cities and how these incentives might have differed across regions.

A large literature points to the importance of cities in the larger economic order as locations offering outside options in the labor market. Migration into cities by agricultural laborers created pressure on lords to offer competitive employment arrangements in order to retain labor (von Inama-Sternegg 1899; Lamprecht 1886; Epperlein 1989). The threat of losing labor to cities induced the minor 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). Historians also argue that the development of cities and of outlets in which to sell their agricultural output tended 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 and urban groups. 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 of cities as an outside option for agricultural 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 here 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."

Along one dimension, lords moved to directly limit labor mobility. Under customary norms, a period of residence in a city secured legal freedom for laborers, memorialized in the famous aphorism *Stadtluft macht frei* (town air makes one free). However, this norm was contested and where cities were weak, lords were ultimately able to prohibit towns from accepting runaway serfs and more broadly to lower the value of outside options in the urban sector (Epperlein 1989, p. 325). The major laws limiting labor mobility, which we discuss in the main text, institutionalized such restrictions.

Along another dimension, 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).

The outcome of these distributional conflicts reflected prior distributions of political power and, equivalently, the relative costs of urban collective action. Strong autonomous cities 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, urban bargaining power 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). However, "[w]here the ruler had more plentiful alternative sources of revenue (e.g. from taxes on mining) and political support (e.g. from towns), he was able to resist the demands of the nobility (often expressed partly through a parliament) to a greater extent" (Ogilvie and Carus 2014, p. 19). Saxony and Thuringia exemplify this.

Our quantitative analysis indicates that differences in *ex ante* urban political economy shaped differences in political and economic outcomes across regions. In the East, low political fragmentation characterized a region in which the costs of urban collective action were relatively high. In the West, political fragmentation sheltered cities from lordly suppression and we observe stronger and more successful urban resistance. 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."

C Political Differences Before the Pandemic Struck

C.1 Political and Legal Fragmentation

In the main text, we analyze evidence on political and legal fragmentation. Our baseline analysis presents summary statistics on the fragmentation of political authority and of city law "families" (i.e. types of city law) calculated at the city level.

Our main analysis shows that there were differences in political fragmentation and in the fragmentation of city law families across the East and the West and, indeed, along the Elbe border. Generically, fragmentation was higher in the West.

However, the underlying political patterns were highly variegated and the Elbe River was *not* associated with a uniform shift in political arrangements. Thus, while considerable historical evidence indicates that political institutions differed across regions and that the Elbe traced an important boundary, we are *not* dealing with a strict spatial discontinuity in which one side of the spatial border is subject to "treatment" and the other is not.

To clarify the nature of the historical political arrangements and the nature of our analysis, it is useful to consider additional evidence on the underlying geographic variation in the underlying political arrangements. (See also the maps detailing the construction of our indices of political and city charter fragmentation in Appendix Figures A1 and A2.)

Figure C1 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. Note that this explains why some apparently small and isolated territories are shaded to reflect that they fall within the jurisdiction of large lordships. The areas 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. These families so-called are types of city charters, such as Lübeck law, Magdeburg law, and so on. We shade territories to reflect whether or not the individual cities in these territories had city charters belonging to widely adopted families. 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.

Figure C1: Political and Legal Fragmentation Around 1350
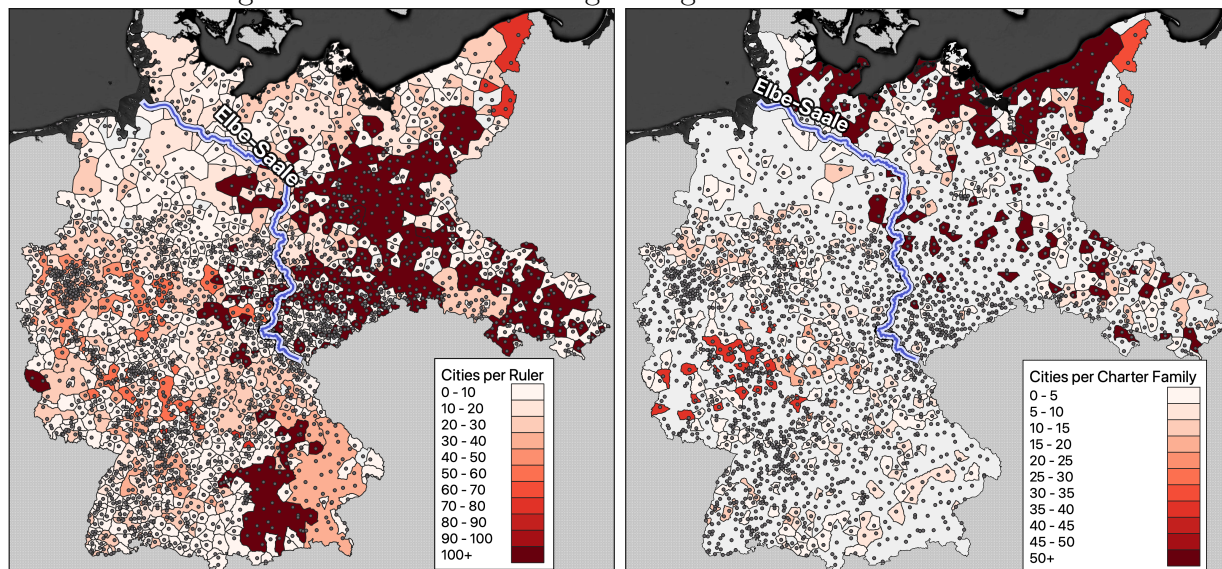
The lefthand panel shades territories by the number of cities under the jurisdiction of the lord (or lords) of the cities in that territory. Darker colors indicate cities subject to lords who control larger numbers of cities. The lefthand panel shades areas around cities to reflect the number of total cities with the same family of city law.

C.2 Market Rights and Economic Activity

One difference between Western and Eastern cities before the Black Death was in the acquisition of market rights: Western cities were more likely to have acquired stand-alone market rights. Despite this difference in market institutions, our main analyses show that construction and manufacturing did not differ systematically across regions before the Black Death.

It is, however, natural to wonder whether market rights 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 values of market rights. We estimate models of the form:

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

$$\beta_4(market_{i,t-1} \times post_t) + \beta_5(market_{i,t} \times post_t) + \beta_6(market_{i,t+1} \times post_t) \quad (2)$$

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

We examine time in 50-year intervals and, to study the effects more granularly, in 25-year intervals. The interaction terms enable us to test whether and how leads and lags of market rights were related to construction after 1350, which is the post-period.

We present our findings in Figure C2. In Panel A, we observe evidence that construction

Figure C2: Market Rights and Urban Construction
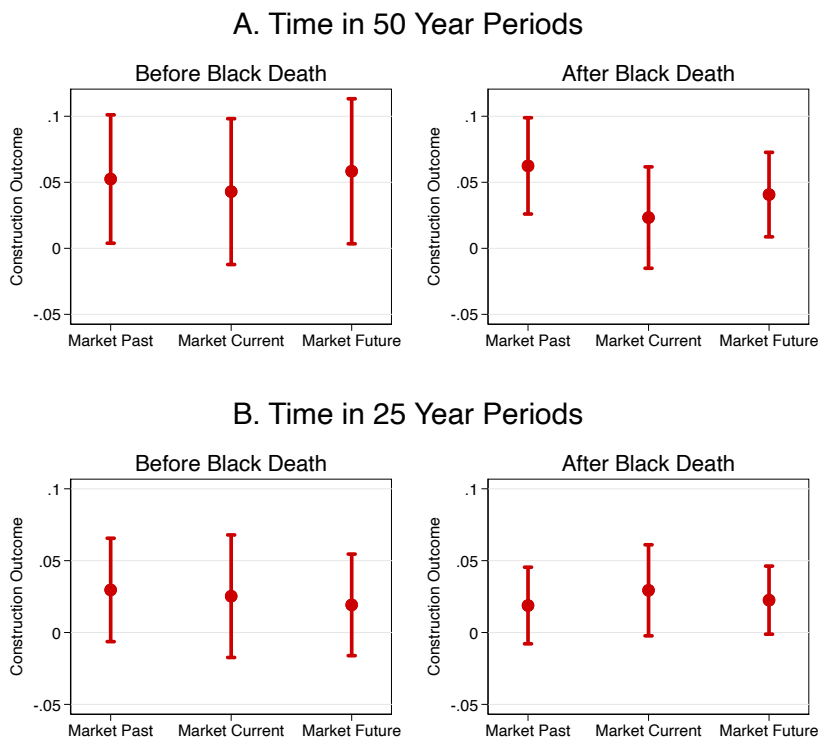
This figure reports estimates from Equation (2). The outcome is an indicator for construction activity in a city-period. The independent variables measure lags, current values, and leads of an indicator for market rights. In the lefthand panels, "Markets Past" corresponds to β_1, "Markets Current" corresponds to β_2, and "Markets Future" corresponds to β_3. In the righthand panels, "Markets Past" corresponds to $\beta_1 + \beta_4$, "Markets Current" corresponds to $\beta_2 + \beta_5$, and "Markets Future" corresponds to $\beta_3 + \beta_6$. Graphs present 95 percent confidence intervals, estimated clustering standard errors at the city level.

is predicted by lagged markets and future markets, implying that construction rose *before* market rights were conferred and that construction increased *after* market rights were

conferred. After the Black Death, we see a shift in magnitudes, with past markets becoming a larger predictor quantitatively. In Panel B, we report similar analyses in which we examine time in 25-year periods, for which are estimates are more muted. 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.

D The Plague

The historical literature emphasizes that the second half of the 1300s was a period of massive, pan-European demographic shocks. However, recent economics research has examined how variation in the city-level intensity of the Black Death, may have shaped development (Jedwab, Johnson, and Koyama 2019).

To clarify and support our main analysis, this Appendix reviews and provides further evidence on the local intensity of the Black Death and local variation in plague outbreaks.

D.1 Variation in Black Death Mortality

An important question for our analysis is whether there were differences in the mortality shock of the Black Death across regions. In recent research, Jedwab, Johnson, and Koyama (2019) use data from Christakos et al. (2006) to 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 this section, we examine mortality and household desertion rates across locations we study. Table D1 investigates the intensive margin of plague exposure by examining differences in mortality and 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). 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.

This evidence accords with a long line of research which suggests that the magnitude of the shocks was broadly similar across regions, local variation notwithstanding (e.g. Lütge 1950; Vasold 2003; Brenner 1976; Acemoglu and Robinson 2012).[46]

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[46]Recent work by political scientists reviews the same Christakos et al. (2006) data and suggests mortality during the Black Death was *higher* in the West (Gingerich and Vogler 2021), but this conclusion is misleading.

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. (2005)				
Mortality Rate	0.386	0.394	-0.008	0.951
Observations	4	5	9	9
Panel B. Christakos et al. (2005) including Regions				
Mortality Rate	0.386	0.471	-0.085	0.519
Observations	4	7	11	11
Panel C. Christakos et al. (2005) & Keyser (1950)				
Mortality Rate	0.477	0.494	-0.017	0.889
Observations	10	7	17	17
Panel D. Desertion Rates				
Desertion Rate	0.273	0.300	-0.027	0.388
Observations	26	10	36	36

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

D.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 G1).

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 that 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 4-6, p. 23).

Politics. We observe stronger relationships between the outbreaks during the Black Death and political outcomes. These come out especially clearly when we study our unified index of political development at the city-level in Table G1 (Appendix p. 42). 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

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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 view and possibility, 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, our finding of a *negative* city-level relationship between Black Death shocks and subsequent political economy trends highlights how the Black Death shaped development through channels that reflected its epoch. These channels involved the on-going development of the politics and institutions of the self-governing city. These channels were notably different from the specific and quite 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

This appendix reviews the evidence on incomes and prices that frames our quantitative analyses of economic and political dynamics, which may be conceived of as quantities.

E.1   Labor incomes

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

Historical research indicates that the Black Death broadly 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), 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).[47]

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

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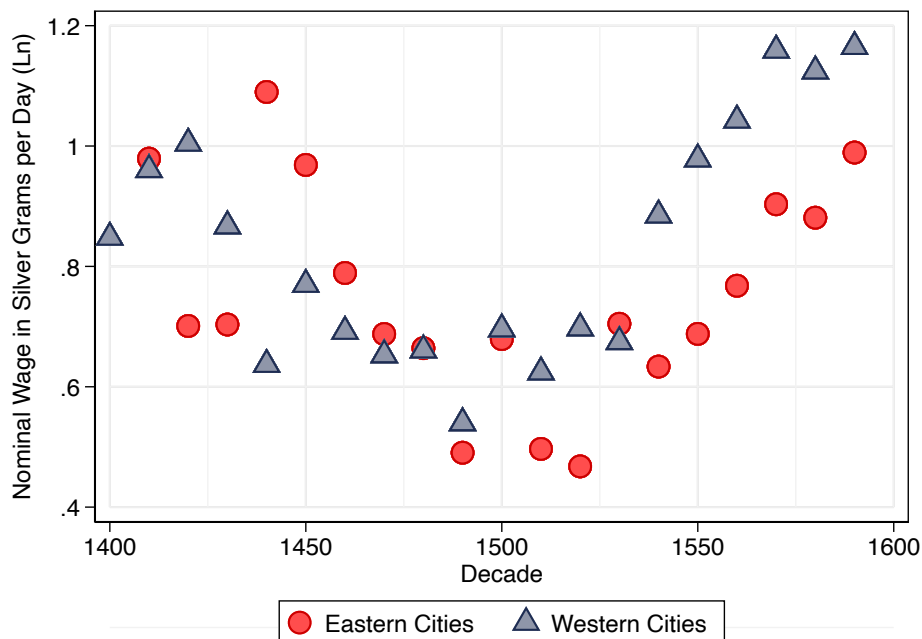
This figure plots nominal wages by decade from Abel (1978), Allen (2010), and Pfister (2017). Wages are measured in grams of silver per day (ln). The eastern locations are: Gdansk, Hamburg, Leipzig, and Rostock. The Western locations are: Augsburg, Frankfurt am Main, Göttingen, Munich, Speyer, Wüerzburg,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

and the cost of living across cities is very limited (Allen 2010; Pfister 2017).

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

Figure E2: Grain Prices
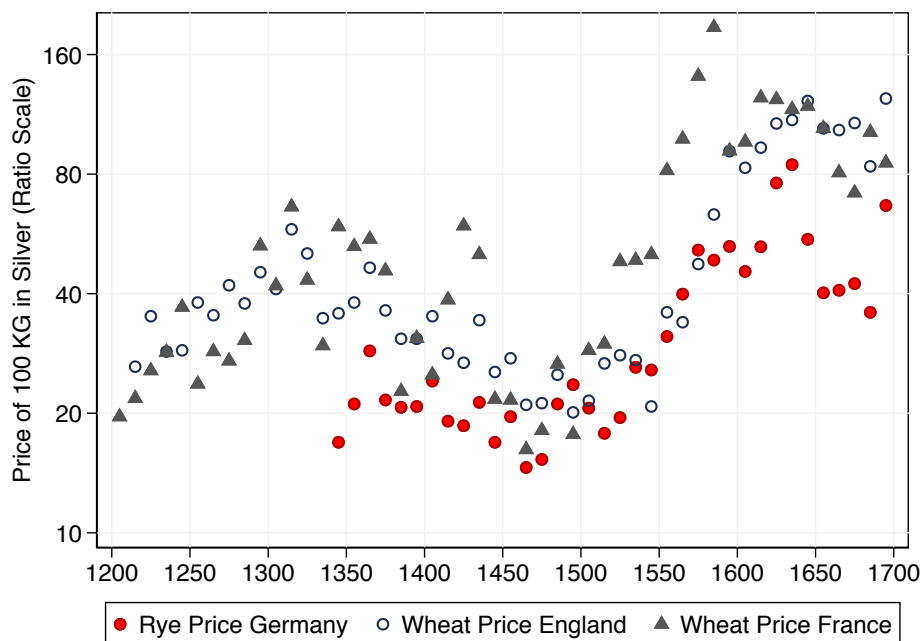
This figure plots grain prices from Abel (1978). Prices are measured in silver grams per 100 kilograms of grain. The "German" price is the mean across thirteen German-speaking cites.

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 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 little to no labor obligations, held land with favorable hereditary rights, and were personally free (Carsten 1954, p. 88; Aubin 1966, p. 468; Blickle 2003, p. 301; Melton 2015, p. 9; Thausing 1912, p. 487; Hagen 1985, pp. 83-84; Kaak 1991, pp. 374-75).

The Black Death initiated what has been described as the "golden age of wage labor" (Abel 1978) and, simultaneously, a crisis for social groups dependent on feudal land rents. Higher labor costs, lower grain prices, and deserted fields 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).

While much of the literature has focused on the returns to labor and to landownership, evidence on interest rates also sheds light on how the returns to different factors shifted across time and space. Interest rates on annuities issued by city councils rose leading up to the Black Death and then fell sharply. 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
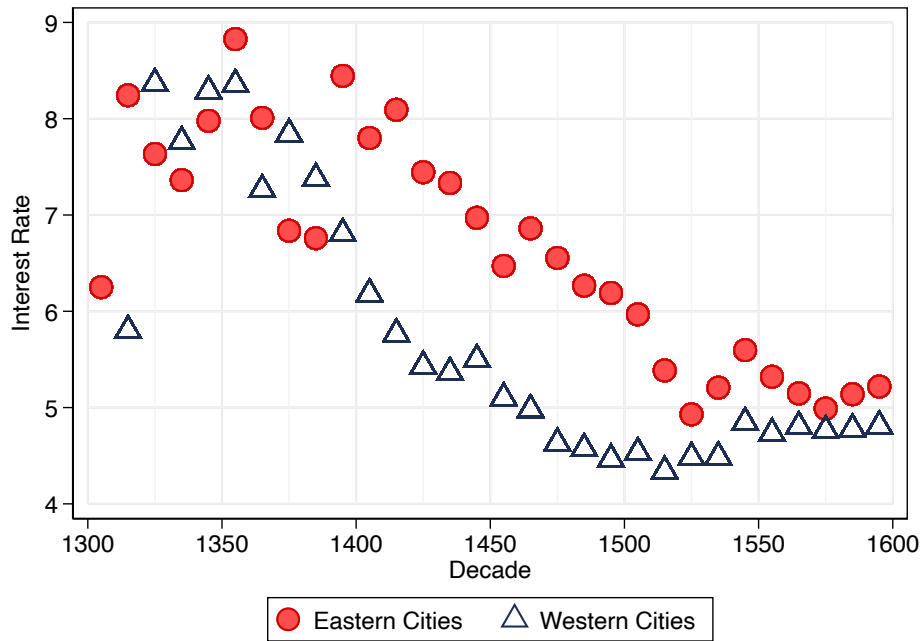
This figure plots mean interest rates by region-decade for urban governments borrowing across 35 cities. The eastern locations are: Berlin, Breslau, Gdansk, Erfurt, Halle, Hamburg, Leipzig, Lübeck, Mölln, Prussian Cities, and Wismar. The Western locations are: Aachen, Augsburg, Bonn, Breisgau, Bremen, 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   Economic Development

This appendix presents evidence on (1) potential economic spillovers across the Elbe-Saale boundary and (2) different approaches for estimating standard errors.

F.1   Spillovers Across the Border

It is natural to wonder about potential spillovers in development across regions.

Our main results indicate slightly larger regional shifts in construction along the Elbe-Saale border than across all cities (Table 2). The difference between our estimates of regional differences for all Germany and for cities along the border is small quantitatively and not statistically significant (the point estimates are -0.17 and -0.19, respectively). However, the dynamism of cities in the West could have cast *agglomeration shadows* and compromised the development of nearby Eastern cities through a "business stealing" effect.

To examine role of potential spillovers, we test whether cities close to Western cities with high construction post-1350 had any differential pattern in construction after 1350 and whether this differed for Eastern cities near fast growing Western cities. To operationalize this, we first construct an indicator for geographic gridcells on the Western side of the border with above median construction after 1350. We then examine with cities in neighboring gridcells experience any difference in construction post-1350 and whether there was any further difference for cities in neighboring cells on the Eastern bank of the Elbe-Saale line.

We report our estimates in Table F1, focusing on construction and spillovers before 1500. Panel A examines the evidence after 1350 cross-sectionally. We find no significant decline in construction in cities near fast growing Western neighbors in general, but that when we examine progressively tighter geographic comparisons there was less construction in Eastern cities close to fast growing Western cities (1/2 degree cells are approximately 55 kilometers, 1/10 cells are 11 kilometers). Panel B examines the evidence in the panel. Here we find no negative effect of being near fast growing cities that is common to all cities ("High-Construction × Post"). We find a negative and statistically significant effect of being near fast growing neighbors specific to Eastern cities in the post-1350 period ("High-Construction × East × Post"). These estimates are consistent with negative but quite local spillovers across the border.

Table F1: Agglomeration Shadows Before 1500

Size of Grid Cell Latitude	(1) –	(2) $\frac{1°Lat}{2}$	(3) $\frac{1°Lat}{2}$	(4) $\frac{1°Lat}{10}$	(5) $\frac{1°Lat}{25}$
	Outcome: Half-Centuries with Construction				
Panel A. Cross-Section 1350-1499					
East	-0.718***	-0.514**	-0.268*	0.127	-0.062
	(0.250)	(0.227)	(0.151)	(0.167)	(0.201)
High-Construction			-0.289	0.198	-0.360
			(0.262)	(0.312)	(0.242)
High-Construction × East			-0.984*	-1.307**	-1.138***
			(0.516)	(0.534)	(0.371)
Mean	0.67	0.67	0.67	0.67	0.67
Gridcell FE		Yes	Yes	Yes	Yes
Panel B. Panel 1200-1499					
East × Post	-0.108***	-0.059**	-0.021	0.003	0.003
	(0.034)	(0.028)	(0.029)	(0.027)	(0.033)
High-Construction × Post			0.002	0.047*	-0.010
			(0.050)	(0.027)	(0.014)
High-Construction × East × Post			-0.117**	-0.127**	-0.149***
			(0.050)	(0.050)	(0.048)
Mean	0.18	0.18	0.18	0.18	0.18
Gridcell-Time FE		Yes	Yes	Yes	Yes

This table presents regression estimates examining the presence of agglomeration shadows. We examine 685 cities within 100 kilometers of the border between "East" and "West". Panel A analyzes cross-sectional agglomeration shadows by looking at the total count of half-centuries with construction activity from 1350 to 1499 at the city-level. Panel B examines dynamic agglomeration spillovers by looking at a binary indicator for construction activity in a given half-century from 1200-1499 at the city-half-century-level. "East" is an indicator for Eastern cities, defined as cities located East of the Elbe or Saale Rivers. "High-Construction" is a binary variable indicating whether cities in the neighboring Western grid cell experienced above-median construction measured as the count of half-centuries with any construction activity in the period 1350-1499. "High-Construction × East" interacts an indicator for Eastern cities with a dummy indicating whether the neighboring Western cities experienced above-median construction. In Panel B, "East × Post" interacts an indicator for Eastern cities and an indicator for time periods from 1350 forwards. "High-Construction × Post" interacts "High-Construction" (as defined above) with an indicator for time periods from 1350 forwards. "High-Construction × East × Post" is similarly defined. In column 1, we do not partition the border by grid cells. In column 2, we define neighbors as being in the same geographic grid cell of 1/2 degree latitude. Columns (4) - (5) gradually decrease the size of the grid cells. In Panel A, we include grid cell fixed effects starting with column 2. In Panel B, we include city-, and time-fixed-effects in all specifications, and introduce grid cell-time fixed-effects starting with column 2. Standard errors in parentheses are estimated allowing for arbitrary spatial correlation within 50 kilometers, following the methodology of Colella et al. (2019). Statistical significance at the 0.1, 0.05 and 0.01 confidence level denoted *, **, and ***.

F.2 Standard Errors

Our baseline regression analysis in Table 2 estimates standard errors allowing for spatial correlation within 50 kilometers. Our substantive results are similar when we use other distance thresholds to study spatial correlation or cluster standard errors. Table F2 illustrates by presenting our point estimates with standard errors estimated allowing for spatial correlation within 50 kilometers (our baseline) or 100 kilometers and, alternatively, clustering at the city level.

Table F2: Standard Errors of Shifts in Urban Construction

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Indicator for Construction Activity					
	All Cities				100 km Border	
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)
Clustered SE	(0.01)	(0.03)	(0.05)	(0.05)	(0.09)	(0.09)
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)
Clustered SE		(0.02)	(0.04)	(0.04)	(0.08)	(0.08)
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)
Clustered SE		(0.02)	(0.04)	(0.04)	(0.08)	(0.08)
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

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 row following an estimate, we report standard errors allowing for arbitrary spatial correlation within 100 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 third row following an estimate, we report standard errors clustered at the city-level.

G Politics

This appendix augments and clarifies our quantitative analysis of political change. We construct and examine a unified index of political change; discuss politics away from the border; consider political change in cities that were chartered before the pandemic; and review secondary aspects of our main estimates.

G.1 Indexing Political Change

Motivated by historical research, our main analysis examines and indexes several dimensions of political and institutional change. It is natural to wonder whether our findings on city politics depend on how we aggregate the political variables and, more broadly, what a unified index of politico-institutional change would indicate about the political process we study.

To examine these questions, and reduce the dimensionality of the data, we create a summary index of city politics through generalized principal components analysis (PCA), which accommodates binary data. Figure G1 summarizes the pattern of political change using PCA dimension reduction. Consistent with our analysis of the raw data, we observe a relatively sharp political divergence when we restrict the analysis to cities along the border.

We next study shifts in the political index more formally, using regression analyses that parallel our examination of construction and manufacturing in the main text. We report these estimates in Table G1, which shows that we observe highly significant and very stable reductions in overall political changes leading to city self-government in Eastern cities across different samples and time-horizons. Columns 1-3 restrict our analysis to the 6 half-centuries from 1200 to 1500. Columns 4-6 study shifts over the period of 10 half-centuries from 1200 to 1700. Columns 3 and 6 restrict the sample to fall within 100 kilometers distance to the Elbe. We note that the divergence in the political index occurs before 1500 and thus precedes key changes in the agricultural sector. We also note that there was an underlying positive trend in political change for cities hit by the plague, pointing to the endogeneity of outbreaks, but that after the Black Death the level and trend of political change fell in cities that were hit.

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Table G1: Shifts in Index of City Politics

	(1)	(2)	(3)	(4)	(5)	(6)
			Outcome: Index for Politics (PCA)			
	Data 1200 to 1499			Data 1200 to 1699		
	All Cities		100 km Border	All Cities		100 km Border
East × Post 1350	-0.08***	-0.08***	-0.06**	-0.11***	-0.11***	-0.10***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
East × Trend in Centuries	-0.01	-0.00	-0.00	-0.01	-0.00	-0.00
	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)
East × Post × Trend	-0.04	-0.05	-0.07	0.00	-0.00	0.01
	(0.05)	(0.05)	(0.07)	(0.04)	(0.04)	(0.05)
Distance × Post	0.02***	0.02***	-0.02	0.02***	0.02***	0.01
	(0.01)	(0.01)	(0.03)	(0.01)	(0.01)	(0.04)
Distance × Trend	-0.01	-0.00	0.01	-0.01	-0.00	0.01
	(0.01)	(0.01)	(0.03)	(0.01)	(0.01)	(0.03)
Distance × Post × Trend	0.02**	0.02**	0.04	0.01*	0.01*	-0.01
	(0.01)	(0.01)	(0.05)	(0.01)	(0.01)	(0.04)
Rye Yield × Post	-0.07	-0.06	-0.09	-0.07	-0.06	-0.10
	(0.05)	(0.05)	(0.06)	(0.07)	(0.07)	(0.10)
Rye Yield × Trend	0.19***	0.18***	0.21***	0.19***	0.18***	0.21***
	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)	(0.05)
Rye Yield × Post × Trend	-0.23**	-0.22**	-0.30***	-0.25***	-0.24***	-0.31***
	(0.11)	(0.10)	(0.11)	(0.09)	(0.09)	(0.08)
Plague 1348-51 × Post		-0.06***	-0.04		-0.07***	-0.05*
		(0.01)	(0.03)		(0.01)	(0.03)
Plague 1348-51 × Trend		0.12***	0.12***		0.12***	0.12***
		(0.01)	(0.01)		(0.01)	(0.01)
Plague 1348-51 × Post × Trend		-0.16***	-0.17***		-0.15***	-0.16***
		(0.02)	(0.03)		(0.02)	(0.01)
Observations	13500	13500	4110	22500	22500	6850
Mean	0.24	0.24	0.21	0.33	0.33	0.32

This table presents regression estimates examining shifts in politics. The outcome is a summary measure of all political variables used in the main analysis. The index was created by dimension-reduction through generalized principal components analysis and can take on values in the range of 0 to 1. The unit of analysis is the city-half-century. Columns 1-3 examine cities over the 6 half-centuries from 1200 through 1499. Columns 4-6 examine cities over the 10 half-centuries from 1200 through 1699. Columns 1-2 and 4-5 analyze 2,250 German-speaking cities. Columns 3 and 6 examine 685 cities within 100 kilometers of the border between "East" and "West". "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. "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. All other variables are defined similarly. "Distance" measures the distance in 100 kilometers from a city to the Elbe-Saale border as a running variable. Eastern cities have positive distances. Western cities have negative distances. "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 within 50 kilometers, following the methodology of Colella et al. (2019). Statistical significance at the 0.1, 0.05 and 0.01 confidence level denoted *, **, and ***.

G.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). We extend the analysis to all cities in our data in Figure G2. 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 4, p. 30).

G.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 or from which little evidence

Figure G1: Index of City Politics Across Regions (PCA)
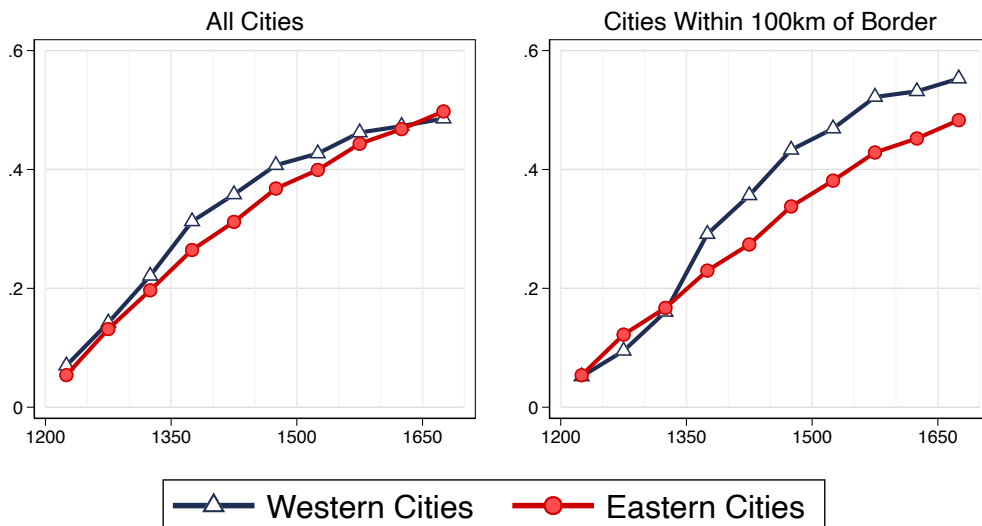
This figure presents evidence on changes in city politics over time. The outcome is a summary measure of all political variables used in the main analysis. The index was created by dimension-reduction through generalized principal components analysis and can take on values from 0 to 1. The unit of analysis 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 G2: Changes in Municipal Politics Across Regions
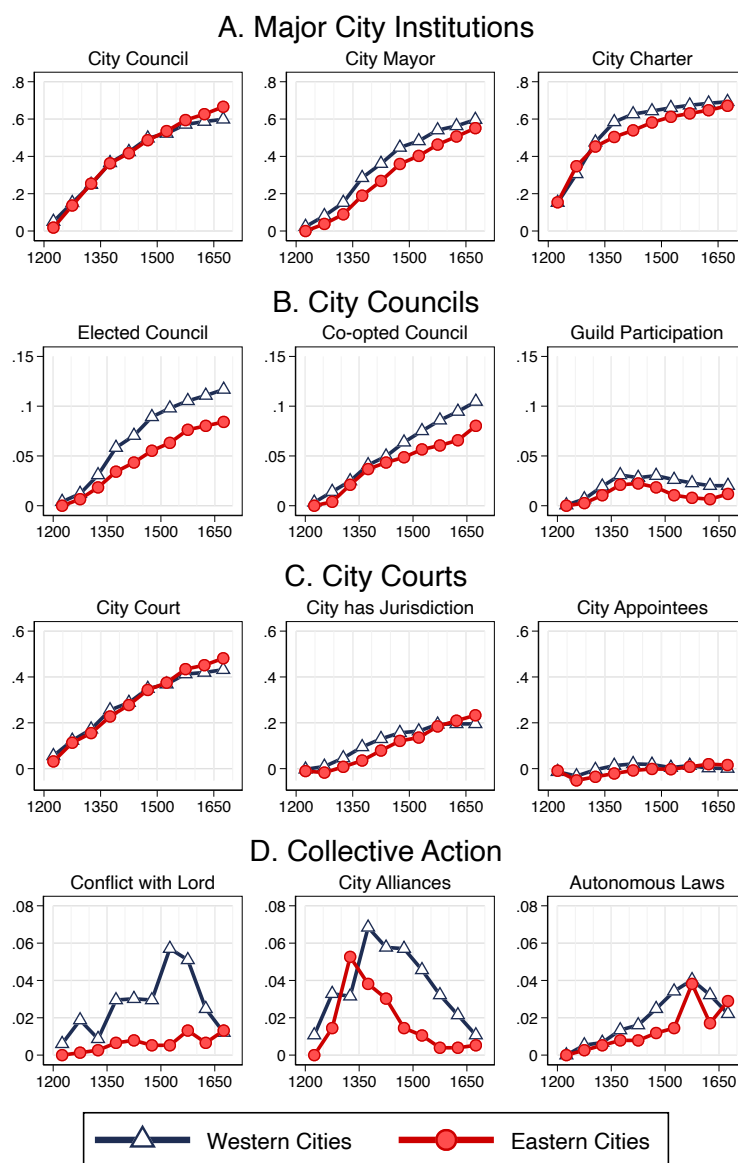
A. Major City Institutions

B. City Councils

C. City Courts

D. Collective Action

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.

survives. Thus the observed divergence in politics between Western and Eastern cities could in part reflect urbanization on the 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.
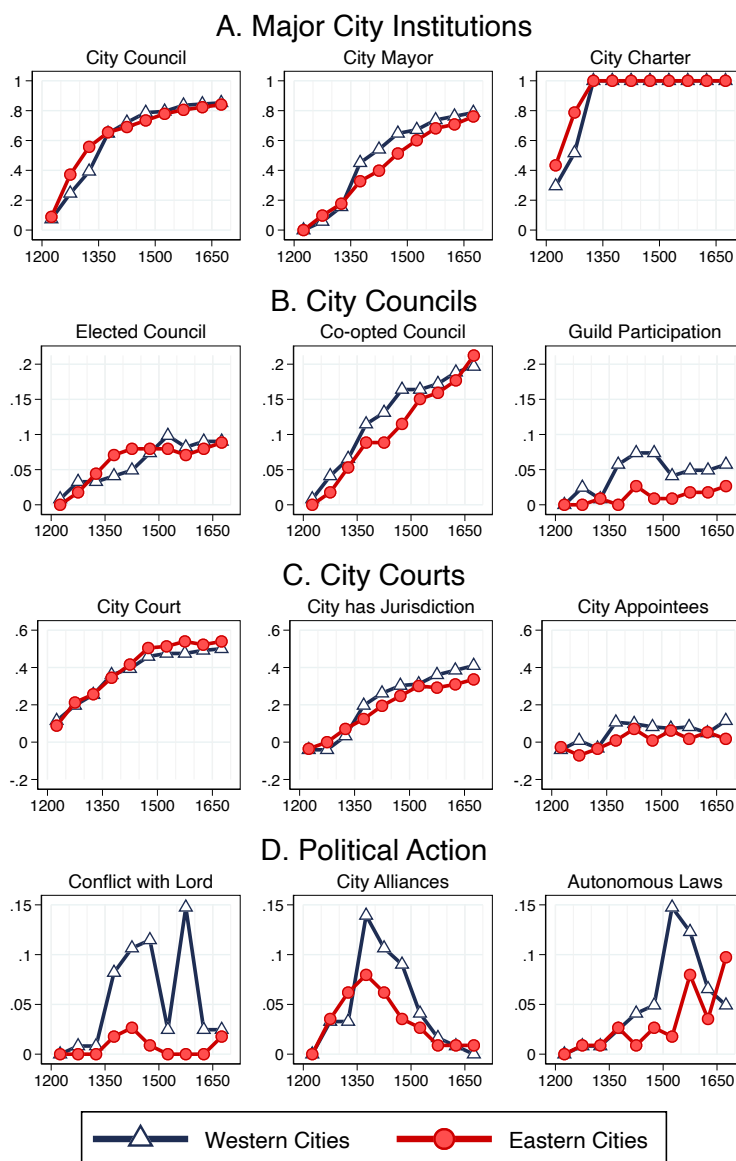
To examine this question, we focus our regional comparisons on locations that were chartered cities before 1350. Figure G3 replicates our baseline analysis restricting analysis to cities with charters by or before 1349. We find that, in general, there was a positive shift in Western political development 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).

G.4 Correlates of Political Change

Our main analysis focuses on the regional divergence in political development after the Black Death. For expositional purposes, we present key estimates but do not report estimates on all "control" variables in the main text (Table 4, p. 30).

Table G2 presents the complete set of parameter estimates, including the estimates on time-varying factors such as the distance to the border and agricultural productivity. We find an underlying positive trend in political outcomes in locations with higher agricultural potential that was effectively eliminated after 1350: the parameter estimate on "Rye Yield × Trend" is positive and significant in all but one model; while the parameter estimate on "Rye Yield × Post × Trend" is negative, significant, and of similar magnitude. Thus, where agricultural potential previously was associated with positive trends in the development of the institutional self-government within-region, this ceased to be the case after the pandemic.

Figure G3: Changes in Municipal Politics of Chartered Cities Along the Border

A. Major City Institutions

B. City Councils

C. City Courts

D. Political Action

△ Western Cities ● Eastern Cities

This figure presents evidence on changes in municipal governance for cities which 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.

Table G2: Shifts in City Politics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Cities				Cities Within 100 KM of Border			
	Main Institutions	Council Autonomy	Law Courts	Political Action	Main Institutions	Council Autonomy	Law Courts	Political Action
East × Post 1350	-0.416***	-0.048*	-0.233***	-0.136***	-0.354**	-0.061	-0.220**	-0.027
	(0.136)	(0.026)	(0.066)	(0.035)	(0.173)	(0.045)	(0.097)	(0.036)
East × Trend	-0.067	-0.014	0.039	0.048**	-0.112	0.019	0.065	-0.002
	(0.123)	(0.025)	(0.047)	(0.024)	(0.143)	(0.047)	(0.066)	(0.024)
East × Post 1350 × Trend	0.056	0.003	-0.033	-0.034	0.126	-0.043	-0.045	0.009
	(0.152)	(0.036)	(0.063)	(0.030)	(0.169)	(0.069)	(0.111)	(0.037)
Distance × Post	0.093***	0.011	0.068***	0.014*	0.016	0.030	0.024	-0.063
	(0.030)	(0.007)	(0.015)	(0.008)	(0.156)	(0.041)	(0.106)	(0.047)
Distance × Trend	-0.008	-0.003	-0.036***	-0.007	0.055	-0.029	-0.028	0.006
	(0.027)	(0.007)	(0.013)	(0.004)	(0.113)	(0.035)	(0.053)	(0.018)
Distance × Post × Trend	0.035	0.002	0.058***	0.008	-0.074	0.044	0.050	0.004
	(0.032)	(0.009)	(0.015)	(0.006)	(0.136)	(0.051)	(0.079)	(0.030)
Rye Yield × Post	-0.332	0.020	-0.159	-0.064	-0.606	-0.004	0.000	-0.036
	(0.317)	(0.046)	(0.113)	(0.063)	(0.471)	(0.070)	(0.148)	(0.056)
Rye Yield × Trend	0.774***	0.066	0.307**	0.071	0.944***	0.106**	0.323***	0.123**
	(0.262)	(0.040)	(0.120)	(0.059)	(0.230)	(0.046)	(0.091)	(0.048)
Rye Yield × Post × Trend	-1.001***	-0.045	-0.384**	-0.115*	-1.313***	-0.109*	-0.550***	-0.160**
	(0.357)	(0.063)	(0.171)	(0.069)	(0.271)	(0.066)	(0.131)	(0.067)
Observations	22500	22500	22500	22500	6850	6850	6850	6850
Mean	1.270	0.130	0.398	0.063	1.221	0.111	0.406	0.054

This table presents regression estimates examining shifts in city-level politics. "Major 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. "Council Autonomy" is an index recording whether cities have (1) an elected council, (2) a co-opted council, or (3) guild participation in the council. This index takes values from 0 to 3 and corresponds to Figure 8, Panel B. "Law 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. 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 and 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 index takes values from 0 to 3 and corresponds to Figure 8, Panel D. The unit of analysis is the city-half-century over the 10 half-centuries from 1200 through 1699. Columns 1-3 examine 2,250 German-speaking cities. Columns 4-6 examine 685 cities within 100 kilometers of the border between "East" and "West". "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. "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 Colella et al. (2019). Statistical significance at the 0.1, 0.05 and 0.01 confidence level denoted *, **, and ***.

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H Sub-Regional and Local Heterogeneity

H.1 Overview

We focus our investigation on economic and political divergence between Eastern and Western Germany. Our analysis follows and tests historical research, which emphasizes the role of the Elbe River as a key economic boundary. We find that urban development East of the Elbe and its tributary the Saale fell behind urban development in the West starting in the late 1300s, and thus before key changes in the agrarian sector. We also study differences in urban development across regions within the East. We find that urban development declined between 1350 and 1500 in a core area where coercion in agriculture subsequently became widespread. In contrast, urban development 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 and importance of further within-region variation and to the fact that the Elbe River did not mark a uniform, discontinuous 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. Second, we consider a further disaggregation of three broad sub-regions within the larger East. Third, we study more finely-grained within-region comparisons, focusing on provinces within historic Brandenburg, which itself spanned the Elbe River. Fourth, we more globally study heterogeneity along the Elbe boundary. We specifically study development shifts along the Elbe distinguishing the effects observed (A) for cities located in territories that span the Elbe-Saale border and (B) for cities along the border but in territories that do not span the border.

Figure H1: Cities in the Eastern Core and in Saxony-Thuringia
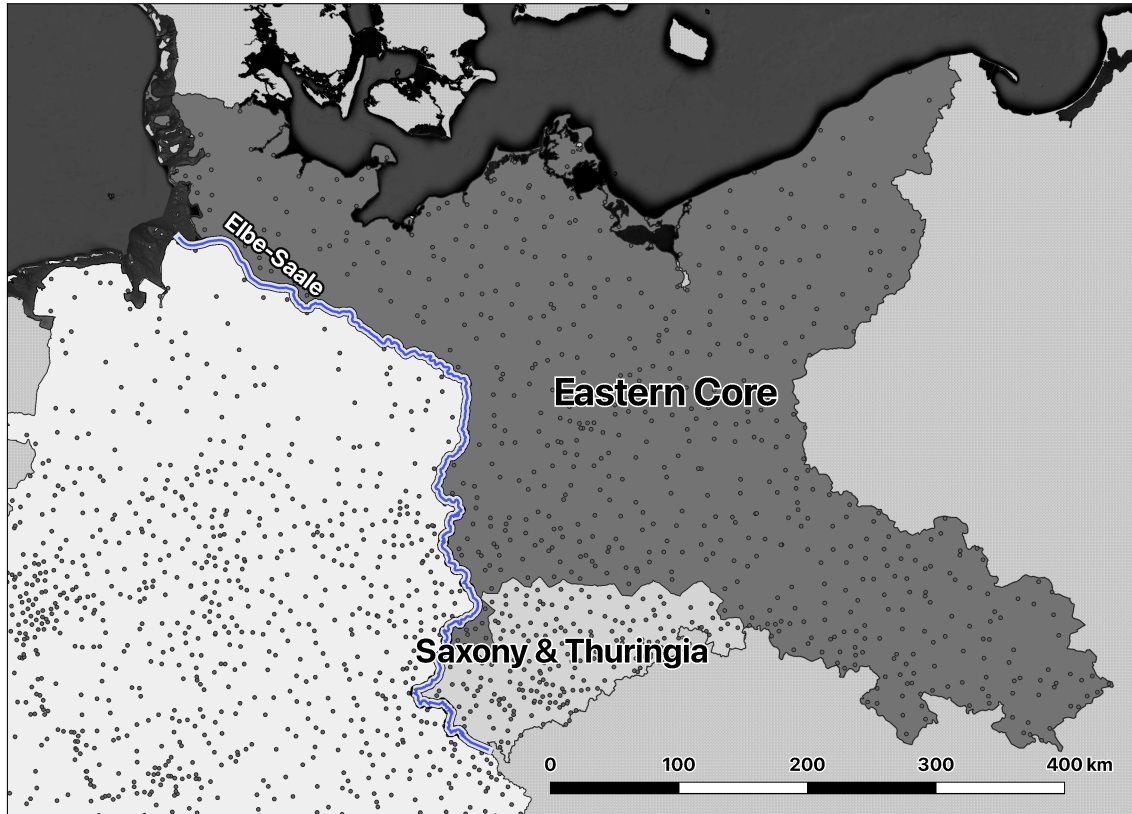
This map shows the locations of cities in the East. Eastern cities are defined as those East of the Elbe River or its tributary the Saale ($n = 760$).

H.2 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 7). 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. Indeed, we find that after the Black Death development was more "Western" in the cities of Saxony and Thuringia. To clarify the geography of the comparison between cities in the Eastern core and cities in Saxony and Thuringia, we map the cities of Eastern Germany in Figure H1.

H.3 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

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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).

The spatial pattern of urban divergence corresponds to the heterogeneity across these three Eastern regions. Table H1 reports regression estimates and provides further evidence that the documented divergence between East and West took place prior to 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. 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 H2.

H.4 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

Table H1: Eastern Divergence Before 1500 and 1700 by Region

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
		Before	1500			Before	1700	
	Constr-uction	Manu-facturing	Insti-tutions	Political Action	Constr-uction	Manu-facturing	Insti-tutions	Political 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 Colella et al. (2019). Statistical significance at the 0.1, 0.05 and 0.01 confidence level denoted *, **, and ***.

Figure H2: Eastern Cities in the North-East, Central-East, Saxony and Thuringia Regions
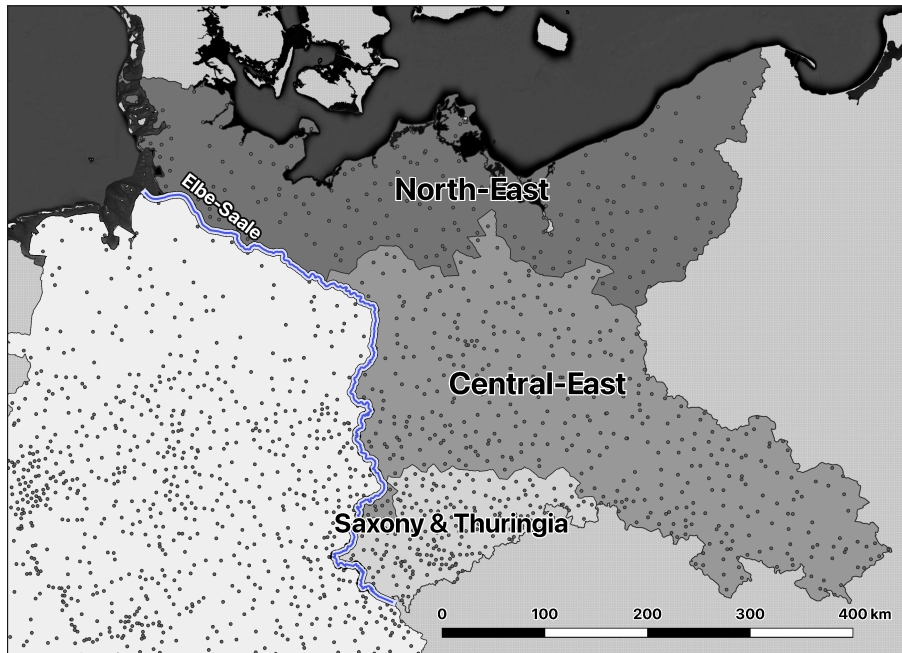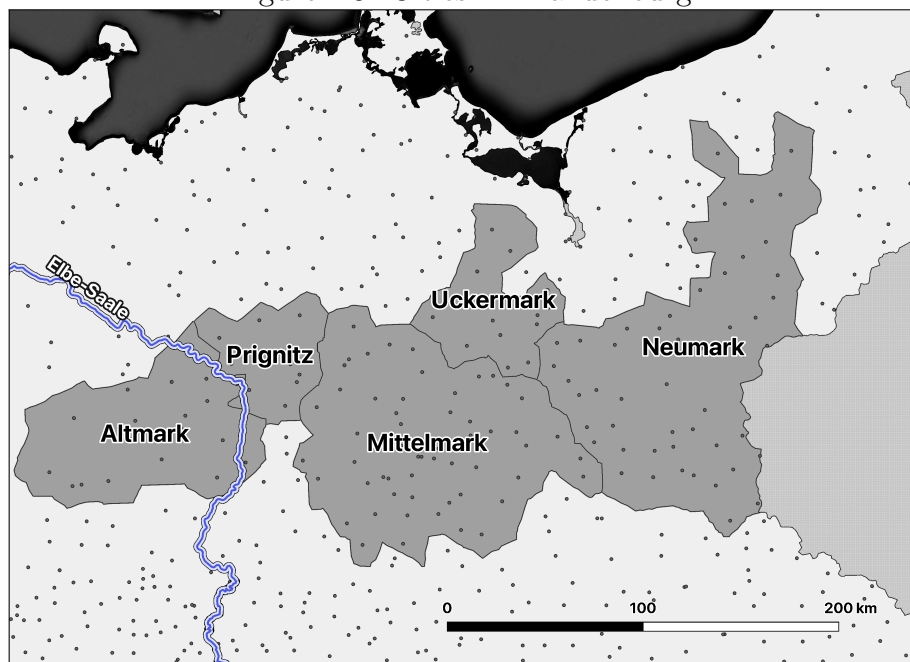

This map shows the locations of cities in the East. Eastern cities are defined as those East of the Elbe River or its tributary the Saale ($n = 760$).

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 compared to their immediate surroundings (Kaak 2007, p. 94).[48]

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

Figure H3: 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.

In Table H2, 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. We provide a map of the regions within Brandenburg in Figure H3.

H.5 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

Table H2: 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	Political Action	Constr- uction	Manu- facturing	Insti- tutions	Political 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. 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 Colella et al. (2019). Statistical significance at the 0.1, 0.05 and 0.01 confidence level denoted *, **, 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 H3 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 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.

Table H3: 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 Colella et al. (2019). Statistical significance at the 0.1, 0.05 and 0.01 confidence level denoted *, **, and ***.

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