Trade and Political Institutions in Late Medieval European Cities
Origins and Long-run Consequences

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Abstract

The first part of the thesis establishes a link between medieval trade, agglomeration and contemporary regional development in ten European countries. It documents a significant positive relationship between involvement in medieval trade and regional economic development today. The analysis indicates that a long-lasting effect of medieval trade on contemporary regional development is transmitted via its effect on agglomeration and industry concentration. Further empirical analyses show that medieval trade positively influenced city development both during the medieval period and in the long run; they also reveal a robust connection between medieval city growth and contemporary regional agglomeration and industry concentration. This research highlights the long-run importance of medieval trade in shaping the development of cities as well as the contemporary spatial distribution of economic activity throughout Europe.

Next, a new city-level data set on political institutions in pre-modern Europe is introduced. It comprises of three variables reporting the prevalence of the different existing types of participative political institutions between 800 and 1800 AD in 104 cities in the Holy Roman Empire. According to historical studies, the three included measures (guild participation in the city council, participative election procedures and the existence of institutionalized burgher representation) represent the universe of political institutions in cities in this era.

Based on this data, the next chapter of the thesis investigates the origins of guild revolts and participation in the government of late medieval central European cities. It finds that structural factors, i.e. the prosperity of proto-industry and exogenous events like the agricultural crisis were factors triggering the revolts. Medieval trade cities had a lower probability of guild participation indicating that not economic prosperity per se is decisive but rather that formerly poor groups of citizens like craftsmen profited from the economic upswing. The study also finds evidence for the existence of spatial spillovers implying that strategic considerations played a role in the spread of the revolts.

Finally, I investigate the effect of the rise of participative political institutions in late medieval central European cities on city development. The results show, that the enlargement of political participation is not always conducive to city development. The participation of guilds in the city council, for example had an overall neutral or negative effect. Furthermore,

the effect of guild participation is declining over time, implying that this form of PPI is prone to institutional degeneration and increased rent-seeking. Election of city government by the citizens, in contrast, shows a stable and robustly positive effect on city development. Hence, the decisive point for more political participation being conducive for economic development is that the increase in participation is accompanied by increased accountability of the politicians and a politics that is oriented toward public welfare than the special interests of particular groups.

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Stuttgart, January 2016 Fabian Wahl

"[...]The master-economist must[...]study the present in the light of the past for the purposes of the future."

John Maynard Keynes

1

Introduction

Why some regions in Europe are poor and others are rich? Why it happened that even within the same country there are enormous and apparently persistent differences in the prosperity of cities and regions?[1] Why it is the case that the GDP per capita of Munich, the richest district in Germany (82800 €) is more than six times larger than GDP per capita of the poorest German district "Südwestpfalz" (13100 €)?[2] And can one trace back a significant part of

[1] Studies documenting the persistence of regional development differences in Europe are—among others—Guiso et al. (2013), Maseland (2014),Putnam (1993) or Tabellini (2010). A study that finds, to the contrast, that in recent years there was significant political success in reducing regional development differences is Becker et al. (2010).

[2] The GDP per capita values are for the year 2009 and originate from the Eurostat regional statistics data base (see Appendix A). France, for example, shows a similar inequality in regional economic development with the poorest (the department Creuse) having a GDP per capita of 18300 € and the richest district (the department Haute-de-Seine) having one of 82400 Euros.

these different regional fortunes to developments in the late medieval period? While there is a sizable literature on the determinants of regional development that also sometimes looks on historical determinants (e.g., Gennaioli et al. 2014, Tabellini 2010, von Ehrlich and Seidel 2015, Becker et al. 2015) the late medieval period is most often overlooked as possible source of variation in regional development across Europe. However, the late middle ages were a period were many technological, political and social innovations occurred that could possible have long-lasting impacts on the development of cities and regions, e.g. the foundation of universities, the printing press, participative political institutions, the discovery of the New World etc. Nevertheless, among all those innovations, only the effect of the printing press on long-run city growth was recently analyzed by Dittmar (2011) and recently also the impact of the spread of the mechanical clock on city development is studied by Börner and Severgnini (2015).[3] Hence, there are still a lot of phenomena and events to study that are promising candidates for significant historical determinants of regional development.

This thesis studies two of these events, namely medieval trade activities during the so called "Commercial Revolution" (chapter 2) and the emergence of participative political institutions in the cities of the late medieval Holy Roman Empire (HRE) (chapters 3–5). Both are expected to have potentially long-lasting impacts on the development of cities and regions in Europe. However, it does not only study the consequences of these events for long-run city and regional development, it also explores the origins of these institutions in more detail. The origin of historical political innovations is of importance in its own right and can tell important lessons for today. Furthermore, while all thee studies in this thesis are concerned with

[3]Cantoni (2014) also studies the impact of the foundations of new universities during the late medieval period on market establishment and the commercial revolution. However, his time horizon is much smaller and basically limited to the medieval period itself. Hence, his paper is not a study of the long-run impacts of early university foundation on long-run regional development.

historical determinants of regional economic development and their origins, they contribute to several other scholarly debates and research areas.

Chapter two introduces a new and—with respect to its spatial coverage—uniquely comprehensive data set on medieval trade activities that could be worthwhile to use also in other empirical studies on urban and regional development. Moreover, showing that centers of medieval trade activities are still richer today, it also investigates the channel through which the initial economic advantages provided by trade activities in the medieval period translated to a long-run, persistent advantage still visible today. It suggests that medieval trade activities crucially influenced agglomeration and industry concentration patterns in Europe because they enabled medieval trade cities to grow faster and larger thereby becoming the industrial core areas of a country. Therefore, the analysis in chapter two expands the existing knowledge on the determinants and persistence of agglomeration and industry concentration patterns and underlines the importance of second nature ("man-made") causes of agglomeration as highlighted by the "New Economic Geography" literature. In consequence, this chapter does not only uncovering the medieval roots of contemporary regional development it also does suggest why medieval trade plausibly could have a persistent effect—something that especially in historical research is not considered to be trivial.

The data set on political institutions in late medieval cities in the HRE that is introduced in chapter three does complement already existing data on political institutions (like parliaments) and regime types on the level of territorial states. Furthermore, the data set provides information on the universe of political institutions in cities and thus enables more detailed and specific analyses that will yield more precise results than existing data sets (like e.g., that on the existence of city councils introduced by Bosker et al. 2013). Examples of such analyses are

the investigation of the causes of the late medieval guild revolts in chapter four and the study of the impacts of the rise of participative political institutions on the long-run development of cities in chapter five.

The research in chapter four is the first empirical analysis of the late medieval guild revolts the author is aware of and hence brings data to a previously purely qualitative historical discussion. Finally, the studies also sheds new light on current debates in development economics on the determinants of successful political change as it shows that to be successful economic growth has to be "inclusive", i.e. has to enrich formerly poor groups of the society like craftsmen.

Chapter five finally, is the first study on the long-run evolution of political institutions over 1000 years. Thus, it enables to empirically test hypotheses about institutional degeneration processes and political regime cycles as prominently proposed by Olson (1982) and recently studied by Puga and Trefler (2014). Its finding that an increase in political participation, that is not accompanied by a democratization of other aspects of the political system (e.g., equality before the law or universal suffrage) has no long-lasting effects or even negative effects in the long-run does not only support the notion of institutional degeneration as outlined by Olson but also provides and example of institutional changes in the medieval period that did not lead to persistent positive effects. Therefore, it is another contribution of this thesis to show that sometimes, historical events can have persistent effects and sometimes not and to identify the conditions and channels necessary for path-dependent developments. Furthermore, chapter five adds to the literature on the impacts of democratization and the conditions for its success (e.g., Acemoglu et al. 2014, Papaioannou and Siourounis 2008). Finally, as participation of guilds in the city council of late medieval cities was one of the major increases in political

participativness in late medieval cities, chapter five contributes to the controversial debate about the impact of guilds on economic outcomes (e.g, Epstein 1998, Ogilvie 2004). The results of the empirical analysis suggest that the impact of guilds on economic development was negative and not very large in general, supporting the more negative view of guilds.

All the studies in this thesis share a common methodological approach. All studies are empirical studies and use quantitative methods to identify the effects of the studied variables. However, the tested hypotheses are derived from established economic theories like New Economic Geography or agglomeration economics or based on concepts from institutional and public economics (like rent-seeking, inclusive and exclusive institutions etc.). Each chapter includes an informal section that derives the hypotheses and discusses the relationship between them and the underlying theoretical reasoning.

As this is a dissertation in economic *history*, I also take into account the findings and discussions of historians. I attempt to connect the historical arguments to theoretical economic concepts and analyze historical phenomena by applying modern economic theory to understand their effects and origins. This synthesis of qualitative historical arguments, modern economic concepts and empirical methods tries to combine the best of both "worlds".

All the studies are based on city or regional (NUTS-3) level data sets. I rely on cross-sectional as well as panel data sets. Microeconometric and estimation techniques (OLS, FE estimation) are used to empirically identify the effects of the respective variables of interest. The regional focus of the studies is central Europe (the Holy Roman Empire and its neighbor states). The focus on this area has two reasons. First, the studied events, like the guild revolts or the rise of participative political institutions, only took place there. Second, the limitation to this area reduces the amount of unobserved heterogeneity that could bias the results.

Although still a heterogeneous area, central Europe is a more homogeneous study area than the whole of Europe. The HRE, for example was characterized by a unique institutional and political framework different from that in other European countries at that time (e.g. the existence of Free and Imperial cities, archbishops and monasteries acting as secular rulers over their own territory or an elected king). Therefore, comparisons between the HRE and other medieval European kingdoms like France or Great Britain are not an easy task—and would not always be historically meaningful.

However, the regional focus does also necessitate to cope with spatial autocorrelation, spillovers between cities/ regions and other problems typically arising in empirical spatial economics. Moreover, the hinterland of a city or the neighborhood of a region are important for understanding the develop within the considered city or region. Hence, spatial econometric techniques like spatial lag models, standard errors accounting for spatial correlation and the characteristics of the area around a city/ region as well as its position in the city network (market potential etc.) have to be taken into account in the empirical analyses.

The focus on regions or cities enables to identify empirical effects using variation within comparatively small geographic areas (e.g., within a NUTS-2 region) that are less heterogeneous than countries or continents. Hence, concerns about unobserved heterogeneity are further diminished by studying the regional level. Nevertheless, in all the studies endogeneity issues are addressed using several different strategies (use of extensive set of controls, fixed effects, time trends, lag variables, matching etc.) that should ensure that the results are not driven by omitted variables or reverse causality.

Finally, much of the recent economic development literature focused on using exogenous variation often coming from natural experiments like historical accidents (e.g. Bleakley and

Lin 2012, Cantoni and Yuchtman 2014, Iyer 2010) or randomly drawn borders (e.g, Dell 2010, Michalopoulos and Papaioannou 2014, Wahl 2015b) . As it maximizes internal validity of the results, this quasi-experimental identification of causal effects substantially improved the quality and credibility of empirical economic research (Angrist and Pischke 2010). However, this type of identification is often associated with a *lower external validity* of the estimated results.[4] This means that the generalization of the results of those studies is often not or only partly possible. However, one important goal of investigations in economic history is to show what we can learn from historical developments and events for better political and economic decisions in the future. This is what Keynes meant with his statement that a good economist has to "...study the present in the light of the past for the purposes of the future..." (Keynes 1933, p. 170). Of course, comparing the present with the past to draw conclusions for a better future is a heroic challenge as it requires many assumptions to hold. In any case, it necessarily requires that we can generalize the result of economic history studies to other than the particularly studied cases in the past as well as to the present. Studies using natural-experiments do oftentimes not fulfill this condition. Furthermore, limiting economic history to studies identifying effects from natural-experiments often limits it to the study of historical accidents, idiosyncratic shocks or highly specific circumstances.

Yet, history is not only a series of random, unrelated events or determined only by fortune or misfortune. It also consists of endogenous developments that are caused by and connected to other historical events and yet, can still have significant direct impacts on economic outcomes. And more often than not, historical events relevant for economist are caused by the interplay of exogenous shocks and more systematic, structural factors. This type of events

[4] An extensive discussion of the weaknesses and limits of quasi-experimental identification strategies are Deaton (2010) and Leamer (2010).

and developments cannot be neglected by economic historians, but are clearly less studied in the economic development literature as for the explanation of such developments and phenomena often no satisfying source of exogenous variation is available.[5]

That's why this thesis—while clearly addressing exogeneity issues and aiming at identifying causality—is focused on such phenomena and developments. This is also why each of the empirical studies tries to understand or to explicitly test the historical factors and determinants of the studied phenomena, like medieval trade or participative political institutions. If one understands by which factors historical phenomena are determined and how their relation to other events and developments in the same period was, one should be able to separate the direct effect of those activities from the indirect effect of their determinants—at least if one can empirically measure these determinants. Credible identification of empirical effects should then be possible even without exogenous variation. This is particularly true, as in most of the cases one can sufficiently account for time-invariant unobserved heterogeneity—the most likely type of unobserved heterogeneity in historical contexts—by using certain types of fixed effects or by comparing only similar treated and non-treated observations (matching approaches). This methodological choices reflect the guiding principle of the research in this thesis, that good empirical research in economic history combines profound knowledge about history with a thorough understanding of empirical methods and economic theory.

[5] Another reason for why the use of exogenous shocks or historical accidents is often not possible, especially when focusing on periods prior to the 19th century, is that data e.g. on city populations is not available in such a high temporal frequency (e.g. yearly) as it would be necessary to exploit the exogenous variation caused by them. To make an example, if a promising accident affecting some of the cities in my sample and others not—and that is related to the probability of being treated or not—happened in 1245 (like the breakdown of the Staufer dynasty) and I have population data for 1300 only, how much of the possibly existing effect of the accident I will still be able to detect in 1300 AD? And if I detect one how I can be sure that it is actually the effect I wanted to identify and not something that happened in between and is incidentally related to both my Staufer variable and city growth?

"The farther back you can look, the farther forward you are likely to see."

Winston Churchill

2

Does Medieval Trade Still Matter? Historical Trade, Agglomeration and Contemporary Economic Development.*

There is ample evidence that that trade is an important determinant of both long- and short-run economic development. However, most of the existing literature focuses on the impact of 19th century trade on market integration or the "Great Divergence" (e.g., Galor

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and Mountford 2008 or O'Rourke and Williamson 2002, Pascali 2013), or on the impact of contemporary, Post-World War II trade activities on recent economic growth and development performance across countries (Dollar and Kraay 2003, Frankel and Romer 1999). There are few studies (e.g., Acemoglu et al. 2005b) considering the effect of cross country trade in periods earlier than the 19th century. In this study, the authors investigate the impact of long-distance overseas trade for institutional developments and the pre-industrial development process across European countries.

Hence, until now there is no study exploring the long-lasting effects of trade and commerce in European cities during the High and Late Middle Ages. The importance of medieval trade for the development of cities and regions in the Middle Ages and the following centuries is widely accepted. Apart from this, no research has acknowledged the fact that medieval trade might also have long-term influences on regional development persisting until today; this despite the fact that medieval trade, through its potential impact on agglomeration and spatial concentration of industry, could have led to path-dependent regional development processes resulting in developmental differences surviving over the centuries.

The aim of this study is to provide evidence that medieval trade, as a result of its impact on agglomeration, has caused differences in regional development that remain visible today. It therefore provides a new explanation for the uneven distribution of economic activity and significant spatial concentration of industries throughout Europe (e.g., Chasco et al. 2012, Koh and Riedel 2014, Roos 2005). It also contributes to the understanding of the still puzzling persistent differences in regional economic development (Becker et al. 2015, Maseland 2014 or Tabellini 2010). Furthermore, the study offers an additional explanation for the rapid central European urbanization process that started off in the Middle Ages, continues until today and

led to the so called "Rise of the West" (Bosker et al. 2013). Why was the urban development in central Europe since the Middle Ages not characterized by reversal of fortunes and stagnatory phases like that in the Near and Middle East? Bosker et al. (2013) highlight the role of local participative political institutions. I aim on showing that also medieval commercial activities constitute a important corner stone of this development. Finally, this study contributes to a growing literature reporting on the persistence and path-dependent nature of spatial equilibria and city growth processes (Bosker et al. 2007, Bleakly and Lin 2012, Davis and Weinstein 2002, Davis and Weinstein 2008, Michaels and Rauch 2014, Miguel and Roland 2011 and Redding et al. 2011).

To establish a link between medieval trade, agglomeration and contemporary performance I link the typical characteristics of medieval trade and cities to the determinants of agglomeration suggested by New Economic Geography (NEG) and agglomeration economics (e.g., Krugman 1991, Glaeser et al. 1992). In a second step, based on studies combining NEG, endogenous growth models, and the theory of path-dependence, I propose a positive connection between agglomeration, industrial concentration and contemporary development. The underlying idea is the following: While medieval trade activities clearly reflect the effect of the determinants of medieval trade like e.g. location fundamentals and second nature geography on development I argue that trade activities themselves had a significant additional effect through their direct influence on agglomeration patterns.

Afterwards, I test the causal chain from medieval trade through agglomeration and on to contemporary regional economic development by using rich regional and city level data sets and a wide range of empirical methods. In this empirical investigation I use three variables to capture medieval trade activities. First, based on several historical sources and trade route

maps, I construct a dummy variable identifying cities that were important centers of trade during the medieval period. Second, I calculate a variable that shows the distance between each region or city and the closest of these trade cities. This variable enables to test whether trade activities lead to the emergence of spatial core-periphery patterns as implied by theoretical considerations. Third, I compute a variable reporting the number of centuries a city can considered to be an important trade city.

The results of the empirical estimations provide strong evidence for a significant relationship between medieval trade and contemporary regional economic performance. Furthermore, a detailed empirical investigation on city level shows that medieval trade activities are robustly positively associated with city development both during the medieval period and in the long run. Therefore, the observed path-dependent development process of European cities is partly rooted in the persistent effect of medieval trade activities. Moreover, I also find that the effect of medieval trade on contemporary regional development can be explained by its influence on agglomeration patterns. This is shown by the fact that medieval trade activities are strong direct predictors of today's spatial distribution of economic activity.

Importantly, I show that the results are robust to the inclusion of many geographic, political, economic and historical covariates of development and medieval trade, as well as different samples, data sets and medieval trade measures. I also show that a bias arising from unobserved heterogeneity is unlikely as the results hold also when considering only regions that were historical urban centers. Even among this homogeneous group, historical urban centers that also were centers of medieval trade show a higher contemporary GDP per capita than urban centers that were not important in medieval trade.

The remainder of the article proceeds as follows. First, I theoretically establish the link

between medieval trade, agglomeration and the present-day's economic development. Afterwards, I introduce and discuss the most important variables and data and explain the empirical setting. Next, I conduct the empirical analysis and interpret and discuss the results in detail. Finally, I conclude and summarize the main findings.

2.1 Theoretical Considerations and Related Literature

It is a well established idea that trade was a decisive factor in the development of medieval cities and the revival of city growth during the period of the so called "Commercial Revolution" (e.g., Lopez 1976, Cantoni and Yuchtman 2014). History provides many examples of cities owing their importance primarily to their function as centers of trade, such as the German cities of Nuremburg (Nicholas 1997), Frankfurt (Holtfrerich 1999), Cologne (King 1985) or the Polish city of Gdansk.[1]

Using concepts developed by NEG (Krugman 1991) and agglomeration economics, one can explain why medieval trade was important for the rise of cities in medieval Europe. This is achieved by linking the characteristics of medieval trade and trade cities to second nature causes of agglomeration (for an overview of these see, e.g., Glaeser et al. 1992, Henderson et al. 2001). In medieval times, the economy, especially the urban economy was characterized by a high degree of regional specialization (e.g., Postan 1952 or Pounds 2005). For instance, the Southern German cities that became important trade centers in the later medieval era specialized in textiles (Barchent etc.) and paper production. The different regions exported what they specialized in—or had a comparative advantage in, e.g., due to natural resources—and

[1] Obviously, there are exceptions to this story, i.e. cities and regions becoming large and important agglomerations without being important centers of medieval trade. Some of these exceptions are discussed in detail in Appendix A.3.

imported what they did not have themselves. This specialization of trade cities on a particular industry or sector gave rise to the existence of technological (non-pecuniary) externalities like Marshall-Arrow-Romer (MAR) externalities (Marshall 1890, Romer 1986) or Porter externalities.[2]

A second important characteristic of medieval trade cities was the comparatively high variety of goods that were available. Those assortments of goods were available first at the local markets, then at the large trade fairs in the Champagne region and other important trade cities (such as Frankfurt, Cologne, Ulm, etc.), and then, in the late medieval age, in the branches and kontors of the Hanseatic League and trading companies ("super-companies") like the Fugger in Augsburg. The latter two in particular also supplied luxury goods and exotic commodities from the Far East, as long-distance trade was reestablished at the beginning of the Late Middle Ages. I can consider this high variety of goods as an important demand-side driven agglomeration force, as it makes a city more attractive to settle in.

Additionally, the large variety of goods and prospering industry gave rise to the self-reinforcing circular causation caused by backward and forward linkages and leading to agglomeration and core-periphery patterns in NEG models (Krugman 1991, Ottaviano and Thisse 2004). These forward and backward linkages constitute the virtuous circle that generates agglomeration and uneven spatial distribution of population and economic activity.[3]

However, the main argument of this paper is that medieval trade had significant consequences for economic development today. Reassuringly, the self-reinforcing nature of the

[2]Nicholas (1997) additionally points to the fact that over the course of the Middle Ages the industry dominating in a city, e.g. the textile industry, increasingly diversified. This intra-industry diversification could be an additional channel through which technological externalities could have arisen.

[3]For these arguments to hold, it is crucial that there medieval markets showed a certain degree of integration and that I actually observed a urban-rural wage differential. Evidence on these aspects is provided in Appendix A.3.2.

described agglomeration and concentration processes implies a path-dependent process of city development. This path-dependent development process resulted in differences in concentration of economic activity and population that remain evident today. Cities that were involved in medieval trade activities over a sufficient period of time became locked onto a superior development path by comparison to other cities without that history. This is a typical characteristic of processes caused by increasing returns or positive feedback (David 2007). Several studies (e.g., Bosker et al. 2007 and Davis and Weinstein 2002, 2008) show that city growth is characterized by a long-run persistence that is immune even to such shocks as the Second World War. Thus, there is a fair amount of empirical evidence pointing towards the path-dependent character of agglomeration processes and city development. In addition, there are numerous examples of historical events and phenomena with long-run impacts on economic development (e.g., Acemoglu et al. 2001, Nunn and Wantchekon 2011, Alesina et al. 2013, Comin et al. 2010) I argue that medieval trade can be added to this list of events.

If this reasoning is correct it would mean that medieval trade—through its effect on agglomeration patterns—affected development over and above the effect of location fundamentals and second nature geography that is also reflected in medieval trade activities. Furthermore, it would be in line with evidence found by Roos (2005) and the predictions from NEG. However, this contrasts the papers of Ellsion and Glaeser (1999) and Wolf (2009), which emphasize the significance of first nature causes of agglomeration. Furthermore, I trace back significant parts of today's differences in regional economic development to the differences in involvement in trade activities during the medieval period. Hence, if I find empirical support for my conjectures, this shows that historical events (like e.g., the division of Germany or World War 2) or political measures in more recent times are not the main deter-

minants of regional economic prosperity—despite the fact that these events have influenced, for example, the location of airports in Germany (Redding et al. 2009). Instead, the theoretical reasoning and its empirical confirmation would support the findings of Maseland (2014) who demonstrates that regional development disparities in Germany are persistent and are largely explained by increasing differences between core areas and the periphery and not by an "east-west divide" originating from the division of Germany or other relatively recent population shocks (e.g. Schumann 2014).

2.2 Data and Setting

2.2.1 Setting and Level of Analysis

Because medieval trade took place in cities the empirical analysis should be based on city-level data. However, until now, data on communal and local level is scarce and important measures (e.g., GDP per capita) are still not available on these level of aggregation. Hence, I base the empirical analysis on regional level data. I adhere to the NUTS ("Nomenclature of Units for Territorial Statistic") regional classification, the official regional reference unit systematic used in the European Union (EU). I choose to conduct the analysis on the most disaggregated level for which the essential data (e.g., GDP per capita) is available. Therefore, I conduct the analysis with a NUTS-3 region as observational unit.

2.2.2 Dependent Variables and Agglomeration Measures

As dependent variable I use the natural logarithm (ln) of GDP per capita in a NUTS-3 region, originating from the Eurostat regional statistics database. I take the latest available values from the year 2009. All other time-variant variables also come from the year 2009 to enable

comparability.

As measure of spatial industry agglomeration I follow Roos (2005), Chasco et al. (2012) and others in using the ln of the relative GDP density as measure for the spatial distribution of economic activity. The measure is calculated by dividing a region's share of a country's total GDP through its share of the country's total area. This means it shows whether the concentration of economic activity in a region is below or above the country's average. Additionally, I also will present results using population density as agglomeration measure. Table A.1 in the Data Appendix gives a descriptive overview of all variables used in the following empirical analysis.

2.2.3 Independent Variables

This study aims to investigate the impact of trade between cities during the medieval age. To be able to identify the effect of medieval trade on agglomeration I collect data on important trade cities in until 1500 AD. In the cross-sectional analysis I only consider the situation in 1500 AD, at the end of the medieval period while I take into account the date at which a city became a trade center in the subsequent panel data analysis.

The main sources of information on important medieval trade activities are maps printed in historical atlases (primarily Davies and Moorhouse 2002, King 1985, Magocsi 2002 and Stier et al. 1956) and monographs (e.g., Spufford 2002).[4] I collect information about cities prominently involved in trade from four historical maps providing information about cities located on "major" or "important" trade routes in around 1500 AD.

Because there is no consensus about the exact importance of trade cities and trade routes

[4] More information about the kind of information and the geographical and temporal scope of those maps is provided in the Data Appendix.

during the medieval period I consult several different sources to gather sufficiently reliable data. Furthermore, I use other qualitative information in my judgment of the importance of the trade cities included. For example, I look at whether a city was an important member of the Hanseatic League or the capital of a quarter or a third (like, e.g. Dortmund or Cologne). Information on this is provided by Dollinger (1966). Additionally, especially for less prominent trade cities (Paderborn, Soest, Harfleur, Tarent etc.), I also look at whether they were situated along well-known trade routes like the "Hellweg" in Germany (as is the case, e.g., for Soest). Moreover, I consult several standard historical sources on medieval trade activities in different Central European regions (e.g., Dietze 1923, Hunt and Murray 1999, Schulte 1966, Spufford 2002 etc.) and look at whether they mention a city as being prominently involved in trade or as having over-regional importance as a market, fair, or trading city. Finally, I also draw on other historical atlases—such as that of Kinder and Hilgemann (1970)—and other regional trade route maps (e.g., Schulte 1966) as sources for validating the information in the primary maps. In the Data Appendix I report and discuss all these sources and provide information about which city is mentioned by which sources.

Overall, these sources have left me with 119 trade cities located in 10 European countries. The data set encompasses all 839 NUTS-3 regions in these countries.[5] The Data Appendix offers a detailed description of how the database of important late medieval trade cities is constructed.

[5] I exclude the islands of Elba, Corsica and Sicily from the sample because they are not comparable with regions on the continent with respect to trade flows. Furthermore I do not consider Spain or Denmark. The reason for this is, that at first, I am not able to find enough sources about trade routes and activities in these countries. Moreover, Spain was no major player in medieval trade. It became a leading trade nation not before the early 16th century when over-seas trade began to rise. At last, the institutional and political environment of Spain was considerably different from that in central Europe as parts of Spain were under Muslim rule until the later 15th century.

Predominantly, I use three different variables as measures of late medieval trade and its impact on contemporary regional development. First, I use a dummy variable "Trade Center" that is equal to one if a region includes at least one medieval trade city. The lack of quantitative information and the limited availability of qualitative judgments led me to use a simple dummy variable coding important trade cities. Second, the theoretical reasoning implies that medieval trade affected city development through agglomeration. Because agglomeration is a process that takes place over centuries, cities that became an important trade center might therefore today be larger and richer on average because they were subject to agglomeration forces for a longer time. Thus, I create a variable that reports the number of centuries since a city in a region was recognized as an important trade city in my sources (see Data Appendix Table A.4).

Finally, the construction of a dummy variable also allows for the construction of a third variable "Distance to Trade Center" representing the distance (in degrees) between a region and the closest medieval trade city. This variable offers a useful direct test of my hypothesis that medieval trade contributed to the emergence of time persistent core-periphery patterns and therefore can act as an explanation for contemporary regional income differences.[6]

Table 2.1 provides a summary of the trade city data. For each country, the total number of NUTS-3 regions, the number of regions with trade cities, the share of trade center regions, the average distance of a region to the closest trade city and the average number of centuries since a region is coded as trade center is listed.

[6] It is no alternative to construct the variable as distance to nearest trade route instead of distance to nearest trade city since on trade routes and smaller places along them no activity or economic transaction took place, they simply were transit routes leading from one commercial center to another. Furthermore, there seems to be a noticeable amount of uncertainty about the exact course of the trade routes. Hence, using distance to trade routes would possibly create another source of bias.

Table 2.1: The Data on Medieval Trade Centers

Country	No. of Regions	No. of Trade Centers	Share Trade Centers	Mean ln(Distance to Trade Center)	Mean Centuries of Trade
Austria	35	7	20	0.36	7.29
Belgium	44	3	6.8	0.41	7.67
Czech Republic	14	4	28.6	0.43	11.25
France	94	20	21.3	0.53	7.5
Germany	429	37	8.6	0.39	8.57
Hungary	20	2	10.0	0.69	6.5
Italy	90	25	27.8	0.41	7.46
Lithuania	7	2	28.6	0.56	6
Netherlands	40	7	17.5	0.29	6.29
Poland	66	12	18.18	0.55	6.58
Total	839	119	14.8	0.425	7.74

As reported in the table, the average distance to a medieval trade center is about 1.5 degrees ($e^{0.432}$) which is approximately 170 km. Overall, around 14% of all regions are considered as containing medieval trade centers. On average, a trade city became an important trade center around 800 years ago (i.e, somewhere in the 14th century). Furthermore, Figure 4.1 shows a map that depicts all included NUTS-3 regions and the regions with medieval trade centers (reddish colored).

Finally, with this data it is possible to have a look at the determinants of medieval trade. This is of interest as for empirical identification of the effect of medieval trade activities it is necessary to control for the determinants of medieval trade in general and especially those determinants, that could also affect agglomeration. In Appendix A.4.1 I therefore run probit regressions where I make use of a city-level time-variant version of the medieval trade city variable (as it is used in section 4.3) and the Bosker et al. (2013) data set to investigate the

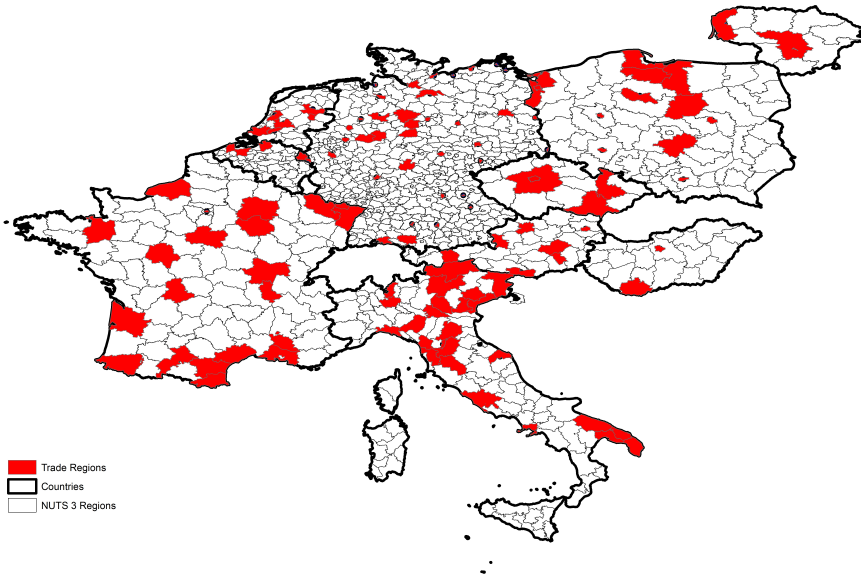

Figure 2.1: NUTS-3 Regions with Medieval Trade Cities

determinants of medieval trade.[7] The results are reported in Table A.11. The results highlight the role of location fundamentals and second nature geography (urban/ market potential, number of trade cities in the neighborhood of a city) and of archbishops and bishops as well as the existence of institutions of communal self-governance and the absence of a powerful territorial ruler. These insights serve as basis for the further empirical analysis, in particular for the panel data analysis using the Bosker et al. (2013) data set later.

[7] To get a cross sectional data set which reflects the different centuries in which the cities became trade cities, I employed the following construction procedure to create the data set. Basically, I take the Bosker et al. (2013) data set and supplement it with time-variant versions of the three medieval trade variables. The final data set used for the regressions is then constructed as follows: First, for each city the century in which it became a trade city is recognized. Next, the values of the variables before this century are included in the data set to circumvent reverse causality issues. For Cities that did not become trade cities the values of 1500 AD are included in the data set.

2.3 Empirical Analysis

2.3.1 Medieval Trade and Contemporary Regional Development

2.3.1.1 Empirical Specification

To test the main hypothesis, that regions with cities involved in medieval trade exhibit higher levels of economic development today, I estimate the following regression using Ordinary Least Squares (OLS):

$$ln(GDP)_{cijk} = \alpha + \beta TC_{cijk} + \gamma_1' \mathbf{X}_{cijk} + \gamma_2' \mathbf{X}_{cij} + \theta_i + \lambda_j + \epsilon_{cijk} \qquad (2.1)$$

Where $ln(GDP)_{cijk}$ is the natural logarithm of GDP per capita in NUTS-3 region k NUTS-2 Region j in NUTS-1 region i of country c. TC_{cijk} is a dummy variable "Trade Center" that is equal to one if a NUTS-3 region includes a medieval trade city and zero otherwise. Alternatively, TC_{cijk} represents a variable reporting the number of centuries since a trade city in a region became an important center of trade. X_{cijk} and X_{cij} are vectors of NUTS-3 or NUTS-2 level covariates, controlling for the determinants of development and medieval trade, respectively. θ_i and λ_j are NUTS-1 and NUTS-2 region fixed effects. As NUTS-2 region's are perfect subsets of NUTS-1 regions I include either NUTS-1 or NUTS-2 region fixed effects. At last, ϵ_{cijk} is the error term capturing all unobserved factors. Equation (1) is a straightforward way to establish a significant direct link between late medieval trade activities and contemporary economic performance. My expectation is that $\beta > 0$ and significantly different from zero implying that there is a significant positive effect of medieval trade on contemporary regional development even after controlling for the determinants of medieval

trade and development originating from its effect on agglomeration.

Yet, even when medieval trade still matters today, does its impact transmit via agglomeration and concentration of economic activities in the places it took place historically? A simple way to test this additional hypothesis is to look at whether GDP per capita lowers when the distance to medieval trade centers increases. Expressed differently, if the effect of trade works through agglomeration a core-periphery pattern should emerge, with the medieval trade center regions as core and the other regions as periphery. One can therefore modify equation (1) by substituting the trade center dummy through a variable representing the distance between a region's centroid and the closest trade city. Equation (1) then becomes:

$$ln(GDP)_{cijk} = \alpha + \rho ln(Dist\_TC)_{cijk} + \gamma_1' \mathbf{X}_{cijk} + \gamma_2' \mathbf{X}_{cij} + \theta_i + \lambda_j + \epsilon_{cijk} \quad (2.2)$$

Where $Dist\_TC_{cijk}$ is the natural logarithm of the distance from a region's centroid to the closest trade city measured in degrees.[8] I expect ρ to be negative and significant.

2.3.1.2 Controlling for Determinants of Medieval Trade and Regional Development

To ensure that the significant positive relationship between medieval trade and contemporary economic development is not driven by omitted variables bias I control for relevant determinants of both medieval trade and economic development. The choice of the control variables is inspired by the insights about the determinants of medieval trade, as outlined in section 3.2

[8] I use logarithmized values of the distance variable to get a regression coefficient that is an elasticity and therefore easy to interpret and comparable to the coefficient of the dummy variable. However, none of the results depend on this choice as the results would be virtually identical if I instead would use the original distance values. Results not reported but available from the author upon request.

and existing research on these topics. Since some of the control variables vary on NUTS-2 level I will regularly include NUTS-1 dummies instead of NUTS-2 fixed effects. However, I will also run a specification with NUTS-2 dummies and exclude the variables defined at NUTS-2 level.[9]

At first, I add a set of basic geographic controls, including latitude, longitude and altitude of a NUTS-3 region. This set of variables should capture the general geographic pattern of development in central Europe. This means, that economic development roughly increases from South to North (i.e., with increasing latitude) and decreases, in the sample, from West to East (i.e., with increasing longitude). Furthermore, it is widely acknowledged that regions with higher altitude are more difficult to reach—which seems especially relevant for trade—and have less favorable climates.

The second set of variables controls for the "Regional Environment and Location" of regions. It includes variables measuring the distance of a region to the closes physical geographic features that are important first nature determinants of agglomeration (coastlines and major rivers) and medieval trade (Börner and Severgnini 2014, Bosker and Buringh 2015, Ellison and Glaeser 1999 and Wolf 2009). Additionally, the ln of the distance of each region to the contemporary border of a country is included.[10] Furthermore, I include the average GDP per capita of regions within a 150–kilometer radius around the considered region (the GDP

[9] In Appendix A.4.2 I present estimates of a baseline specification including only latitude, longitude, altitude and NUTS-1 or NUTS-2 dummies as controls. As Moran's I indicates the presence of spatial autocorrelation, there I also present stand errors estimated according to Conley's (1999) method. In general, those standard errors do not vary substantially from the heteroskedasdicity robust version. In view of this, heteroskedasdicity robust standard errors are reported in all remaining estimations.

[10] These variables are also included to ensure that the distance to trade center variables does not actually capture the effect of maybe correlated distances to other important agglomeration factors, like e.g. rivers. I also run regressions including distance of a region's centroid to railroads and major roads. These are not shown because these variables are probably bad controls but the results do not change when including this additional variables. Results are available upon request.

of the neighboring regions is inversely weighted by distance).[11] Finally, this set of controls also incorporates four variables measuring the number of trade centers within four different distance bands (0–50km, 50–100km, 100–150km and 150–250km) around a city.[12] These variables are intended to capture possible positive or negative spatial spillovers from nearby trade centers and the economic development of neighboring regions. Thus, they account for a regions second-nature geography and simultaneously allow to directly control for spatial dependence.[13]

A third set of variables controls for relevant contemporary characteristics of the included regions. It comprises dummy variables for for the regions that include a country's capital and additionally a categorical variable identifying the degree to which a region may be considered a "mountain region" is included. Furthermore, the set includes dummies for regions with coal or ore mines (or mining firms).[14] Finally, it includes the ln of a region's area and suitability of it's soil for agriculture.

In consequence, the first two sets of controls accounts for important first and second nature causes of agglomeration and medieval trade.

The next set of controls captures the historical characteristics of regions that could be relevant for both present day's agglomeration and economic performance. Here I consider

[11] I tested several other distance bands from 50km to 2500 km. They are all highly correlated with each other and the results will not change substantially when these alternative measures are used.

[12] As before I tried several additional distance bands (250–350km and so on) and found that they are usually insignificant when added to the specification and have virtually no impact on the results).

[13] Alternatively, I estimated regressions using a variable representing the sum of the inhabitants of all other cities apart from the considered one (again weighted by the inverse distance). This measure is analogously defined as the "urban potential" measure used to represent a city's second-nature geography e.g., in Bosker et al. (2013). Using this variable leaves the coefficient of the trade variables virtually unchanged (results not shown but available from the author).

[14] This variable is also defined at NUTS-2 level and therefore only included in the specifications with NUTS-1 fixed effects.

dummy variables indicating regions with a university founded before 1500 AD and regions that adopted printing technology before 1500 AD. As Cantoni and Yuchtman (2014), Dittmar (2011), and Rubin (2014) have demonstrated, both universities and printing technology are important factors in explaining the late medieval commercial revolution and city growth. What is more, I include a dummy variable reporting regions with a city acting as seat of a bishop or archbishop in 1500 AD. Furthermore, I also incorporate dummies for regions containing at least one imperial city, at least one city that was member of the Hanseatic League or a residence of a secular ruler. Finally, I also control for the possible long-lasting effect of a Roman Empire legacy and low transport costs for trade by including a dummy for cities located along an important imperial road and a variable reporting the distance of a city to the closest Roman road.

The fifth set controls for the most important covariates of economic growth and development. Here I use the share of people aged between 25 and 64 with tertiary education (on NUTS-2 level) as a measure for regional human capital. As a variable to measure the quality of regional economic and political institutions I use the quality of government index developed by the Quality of Government Institute at the University of Gothenburg, which provides a measure for regional institutional quality design similar to the World Governance Indicators (WGI) of the World Bank. To measure for regional inequality I construct the ratio of average workers compensation to GDP per capita. As measure of innovative activity within a region I use the number of patents registered by a region's firms at NUTS-2 level. Furthermore, I include a region's unemployment rate, ln of the average workers compensation and the ln of the average fixed capital of a region's firm (all on NUTS-2 level).[15] The inclusion of these

[15] When including these variables to the regression specification I lose several observations since they are not or not completely available for some countries. The unemployment rate for example is only available for 518 of

controls might cause a "bad controls problem" (Angrist and Pischke 2009) as they are measured after the variables of interest and can additionally be considered as likely outcomes of medieval trade activities. Thus, I only use them in one estimation and in all the other cases I present estimates without these control variables. Nevertheless, as most of them turned out to be significant it could be useful to explore how the coefficient of the medieval trade variables changes when considering them.

The results of the regressions are shown in Table 2.2. First, I add the four sets of controls separately to the baseline specification and then I include all set of controls jointly in one regression. I see that the coefficient of the trade center dummy and the distance variable remain significant in each of the specifications, although the sizes of the coefficients are reduced considerably when compared to the baseline estimates.

The coefficient is smallest (e.g., around 0.09 in the case of the trade center dummy) in the specification with all covariates added jointly to the baseline geographic controls and NUTS-1 dummies or alternatively, when the variables defined on NUTS-2 levels are removed and instead NUTS-2 fixed effects are added. It suggests that medieval trade center regions today have a GDP per capita of some 10% higher than other regions. Based on the average regional GDP per capita in the sample this corresponds to a GDP per capita that is approximately 1900 Euros higher. Doing the same exercise for the centuries since importance in trade variable, a region that is a trade center for the minimum number of centuries (i.e., since 1500 AD) has a GDP per capita around 7% higher ([0.012*6]*100).

Overall, I see that the relationship between medieval trade and contemporary regional development is robust to the inclusion of a wide range of control variables and other important

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the 839 regions.

Table 2.2: Medieval Trade and Contemporary Regional Economic Development

Dep. Var.	ln(GDP per capita)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Trade Center Dummy					
Trade Center Dummy	0.222***	0.167***	0.178***	0.130***	0.0938***	0.105***
(0.024)	(0.021)	(0.029)	(0.021)	(0.019)	(0.025)	
Adj. R^2	0.787	0.843	0.79	0.878	0.904	0.853
	Panel B: Distance to Nearest Trade Center					
ln(Distance to Trade Center)	-0.243***	-0.125***	-0.128***	-0.138***	-0.106***	-0.107***
(0.038)	(0.32)	(0.04)	(0.0317)	(0.029)	(0.041)	
Adj. R^2	0.777	0.834	0.782	0.872	0.902	0.852
	Panel C: Centuries of Trade					
Centuries of Trade	0.0285***	0.0212***	0.0235***	0.0169***	0.012***	0.0131***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)
NUTS-1 Dummies	Yes	Yes	Yes	Yes	Yes	No
NUTS-2 Dummies	No	No	No	No	No	Yes
Basic Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Regional Environment and Location	Yes	No	No	No	Yes	Yes
Region Characteristics	No	Yes	No	No	Yes	Yes
Historical Region Characteristics	No	No	Yes	No	Yes	Yes
Growth Covariates	No	No	No	Yes	Yes	No
Obs.	839	839	839	518	518	839
Adj. R^2	0.789	0.843	0.791	0.878	0.904	0.853

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region. The basic geographic controls include a region's latitude, longitude and altitude. The "Regional Environment and Location" controls include the ln distances of a region's centroid to the nearest border, coast point or river as well as the distance weighted sum of the GDP per capita of all NUTS-3 region in a radius around 150 kilometers around the considered NUTS-3 region and four variables indicating the number of medieval trade regions 0–50,50–100, 100-150 and 150–250 kilometers away. Region characteristic controls include dummies for regions including a country's capital, are classified as mountain regions and with ore or coal mines (this latter variable is not included in column (6) as it would be collinear with the NUTS-2 fixed effects). Furthermore, it encompasses the ln of a regions area and the ln of a regions agricultural suitability. The historical region characteristics consist of a dummy variables indicating regions with a city serving as seat of a bishop in 1500 AD, with a university founded before 1500 AD, that adopted printing technology before 1500 AD, contain cities that were members of the Hanseatic League, with former imperial cities, that were residence cities of a secular ruler or were located on an Imperial road. Moreover it includes the ln of the distance of a regions centroid to the closest Roman road. The growth covariates encompass a region's unemployment rate, number of registered patents, average firm ln fixed capital stock, average worker compensation. Furthermore, it includes the share of people aged between 25-64 with tertiary education on NUTS-2 level, the quality of government index on NUTS-1/ NUTS-2 level and the ratio of an average workers compensation to a region's GDP per capita as inequality measure. Each regression includes a constant not reported.

determinants of agglomeration and economic performance.

2.3.1.3 Accounting for Unobserved Heterogeneity

The biggest obstacle for the identification of the causal effect of medieval trade on contemporary economic development is unobserved heterogeneity. In particular, a third, unobserved fundamental factor of development could have influenced both the location of medieval trade centers as well as contemporary economic prosperity.

To furhter mitigate this possiblitiy I will focus on a sub-sample of cities that were important urban centers around 1500 AD. The crucial idea here is, that I will identify urban centers based on criteria like political importance or ecclesiastical importance. Hence, not all—but some—important urban centers will also be centers of trade. One can expect these cities to be a comparatively homogeneous group, in particularly with respect to an unobserved historical factor of development responsible for their status as urban centers. If I found a significant positive effect of being a medieval trade center (i.e. not only being a political and/or ecclesiastical center but also a commercial center) this would provide evidence that the effect of medieval trade is not due to unobserved heterogeneity or captures a general developmental advantage of important urban centers.

To build the sample of historical urban centers I first construct an urban centrality index in the spirit of Escher and Hirschmann (2005). I create the index by simply summing up seven proxy variables for the strategic, political or administrative and ecclesiastical importance of a region in the later medieval period (i.e., if a city is of strategic importance). The selection is based on insights from existing studies on the determinants of city development and the determinants of urban centrality (e.g., Bosker et al. 2013, Bosker and Buringh 2015, Cantoni and

Yuchtman 2014, Dittmar 2012, Escher and Hirschmann 2005 and Roos 2005) I do not include proxies for the economic or commercial importance of the city as cities that were important ecclesiastical and or political centers but not commercial centers constitute my control group. Those seven variables are a dummy variable reporting the presence of a bishop or archbishop in 1500 AD as proxy for ecclesiastical importance; dummy variables reporting imperial and residence cities around 1500 AD as proxies for the political and strategic importance; the ln of a region's centroid to the closest major river or Roman road and a dummy equal to one in regions with access to the sea representing a city's geographic fundamentals, strategic importance and Roman heritage.[16] The resulting index is significantly positively correlated with contemporary population density and relative GDP density and GDP per capita.[17] This once again documents the persistence of urban centrality over centuries. If I still find a significant and persistent effect of medieval trade for these group of cities it can probably be attributed to medieval trade and not to other causes of persistence of urban centrality.

In the next step, I re-estimate the specifications in Table 2.2 column (6) for each of the three medieval trade measures and three different sub-samples. The results are reported in Table 2.3. In columns (1)–(3) of Table 2.3 I report the results when using the sub-sample of regions with an above average index of urban centrality. In columns (4)–(6) I only consider regions in the 4th quantile of the urban centrality index and in columns (7)–(9) finally I run the regressions on the regions in the 90th percentile of the urban centrality index, i.e. the 83 regions with the highest urban centrality scores. In the latter case, it is not possible to include

[16] The distance variables are rescaled so that they are positively correlated with urban centrality and take values between 0 and 1. Hence, the index can have a maximum value of seven and a minimum value of zero. However, the actual mean of the index is 1.066, with a minimum of 0.20, a maximum of 4.438 and a standard deviation of 0.702.

[17] The correlations with relative GDP and population density are 0.17 and 0.18, respectively. Additionally, the correlation with regional GDP per capita is around 0.21

all the control variables used in Table 2.2 column (6) due to the substantially lower number of observations. To safe degrees of freedom I therefore include NUTS-1 fixed effects instead of NUTS-2 fixed effects and only three additional control variables (district-free city and capital dummies as well as the agricultural suitability measure).[18]

Regardless of which sub-sample is used, the three medieval trade measures remain significant. Furthermore, they actually show larger coefficient values implying that if unobserved heterogeneity biased the estimated effect of medieval trade it downward biased it. Nevertheless, all the coefficients remain within the range of Table 2.2 and especially the coefficient of the centuries of trade variable turns out to be stable across different samples and specifications.

All in all, these results provide suggestive evidence that even within a relatively small group of historical urban centers, those urban centers that were also commercial centers had an additional and persistent development advantage. This advantage is possibly not caused by one or more unobserved historical factors making some places "big and rich" and others "small and poor" but actually by medieval trade activities.

2.3.2 Medieval Trade and Contemporary Agglomeration and Industry Concentration Patterns

The next step is to establish the relationship between medieval trade and contemporary economic agglomeration.

I will achieve this by conducting regressions relating the medieval trade variables to mea-

[18] These additional controls are selected based on the following procedure: First, I include each set of control variables separately to the NUTS-1 dummies. Next, I include all the variables that were significant in the first step jointly. Finally, I retain only the variables that remain significant in step two, which are those three variables.

Table 2.3: Medieval Trade and Contemporary Economic Development—Historical Urban Centers as Control Group

Dep. Var.	ln(GDP per capita)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Urban Centrality Index > Average			Urban Centrality Index 4th Quantile			Urban Centrality Index 90% Percentile		
Trade Center	0.118***			0.174***			0.181***		
	(0.04)			(0.038)			(0.063)		
ln(Distance to Trade Center)		-0.161**			-0.244***			-0.197**	
		(0.072)			(0.076)			(0.097)	
Centuries of Trade			0.0147***			0.0202***			0.0216***
			(0.005)			(0.005)			(0.006)
NUTS-1 Dummies	No	No	No	No	No	No	Yes	Yes	Yes
NUTS-2 Dummies	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Basic Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
City Environment and Location	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Region Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Historical Region Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Growth Covariates	No	No	No	No	No	No	No	No	No
Robust Controls	No	No	No	No	No	No	Yes	Yes	Yes
Obs.	338	338	338	210	210	210	84	84	84
Adj. R^2	0.855	0.854	0.856	0.85	0.845	0.849	0.848	0.833	0.859

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region. The basic geographic controls include a region's latitude, longitude and altitude. The "Regional Environment and Location" controls include the ln distances of a region's centroid to the nearest border, coast point or river as well as the distance weighted sum of the GDP per capita of all NUTS-3 region in a radius around 150 kilometers around the considered NUTS-3 region and four variables indicating the number of medieval trade regions 0–50,50–100, 100-150 and 150–250 kilometers away. Region characteristic controls include dummies for regions regions including a country's capital and are classified as mountain regions. Furthermore, it encompasses the ln of a regions area and the ln of a regions agricultural suitability. The historical region characteristics consist of a dummy variables indicating regions with a city serving as seat of a bishop in 1500 AD, with a university founded before 1500 AD, that adopted printing technology before 1500 AD, contain cities that were members of the Hanseatic League, with former imperial cities, that were residence cities of a secular ruler or were located on an Imperial road. Moreover it includes the ln of the distance of a regions centroid to the closest Roman road. The set of robust controls is selected according to the procedure described in the text. It comprises of the capital dummy, the ln of a region's area and the number of trade cities 50–100kms around a city. Each regression includes a constant not reported.

sures of present-day agglomeration and industry concentration. Namely, I will estimate the following cross-sectional equation using OLS:

$$AGG_{cijk} = \alpha + \beta TRADE_{cijk} + \gamma_1' \mathbf{X}_{cijk} + \gamma_2' \mathbf{X}_{cij} + \theta_i + \lambda_j + \epsilon_{cijk} \qquad (2.3)$$

Where AGG_{cijk} represents the agglomeration measures,i.e. either the ln of the relative GDP density of a region or the ln its population density. $TRADE_{cijk}$ represents one of the three medieval trade measures and the remaining terms of the equation are identically defined to equation (1) and (2). [19] The results are presented in Table 2.4.

I see that all three medieval trade measures are highly significant and show the right signs in for both the case of population density as well as relative GDP density. The reported coefficients are large implying economic relevance of the estimated statistically significant effects. The results indicate that, as proposed by my theoretical hypotheses, medieval trade is positively associated with contemporary agglomeration and industry concentration measures.

In Table 2.5 I additionally see that the significant impact of medieval trade on agglomeration exists even when I consider only the sub-sample of urban centers in 1500 AD, i.e., only cities in the 90th percentile of the Urban Centrality Index. Hence, even in the group of important urban centers, those urban centers that additionally were prominently involved in medieval trade show a higher degree of agglomeration today. This makes it more unlikely, that the results are driven by unobserved heterogeneity and primarily reflect unobserved differences between large cities and the countryside. In fact, I found even larger effects indicating that whatever speculative unobserved heterogeneity exists in the overall sample it downward

[19] As there is a mechanical correlation between the a region's area and both its population and relative GDP density I do not control for a region's area in these regressions.

Table 2.4: Medieval Trade and Contemporary Agglomeration Patterns

Dep. Var.	ln(Population Density)			ln(Relative GDP Density)		
	(1)	(2)	(3)	(4)	(5)	(6)
Trade Center	0.514***			0.924***		
	(0.124)			(0.278)		
ln(Distance to Trade Center)		-0.669***			-1.261***	
		(0.164)			(0.367)	
Centuries of Trade			0.0666***			0.118***
			(0.015)			(0.033)
NUTS-2 Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Basic Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
City Environment and Location	Yes	Yes	Yes	Yes	Yes	Yes
Region Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Historical Region Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	839	839	839	839	839	839
R^2	0.596	0.593	0.598	0.431	0.429	0.432

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region. The "Regional Environment and Location" controls include the ln distances of a region's centroid to the nearest border, coast point or river as well as the distance weighted sum of the GDP per capita of all NUTS-3 region in a radius around 150 kilometers around the considered NUTS-3 region and four variables indicating the number of medieval trade regions 0–50,50–100, 100-150 and 150–250 kilometers away. Region characteristic controls include a dummies for regions including a country's capital and are classified as mountain regions. Furthermore, it encompasses the ln of a region's agricultural suitability. The historical region characteristics consist of a dummy variables indicating regions with a city serving as seat of a bishop in 1500 AD, with a university founded before 1500 AD, that adopted printing technology before 1500 AD, contain cities that were members of the Hanseatic League, with former imperial cities, that were residence cities of a secular ruler or were located on an Imperial road. Moreover it includes the ln of the distance of a regions centroid to the closest Roman road. Each regression includes a constant not reported.

rather than upward biases the estimated effect of medieval trade.

In Appendix A.4.3 I additionally conduct a mediation analysis using night light intensity as proxy for regional GDP per capita and population density as variable mediating the relationship between medieval trade and present days economic development. As night light intensity is not mechanically correlated with the agglomeration measures—as GDP per capita

Table 2.5: Medieval Trade and Contemporary Agglomeration Patterns—Subsample of Historical Urban Centers

Dep. Var.	ln(Population Density)			ln(Relative GDP Density)		
	(1)	(2)	(3)	(4)	(5)	(6)
Trade Center	0.632***			0.813***		
	(0.172)			(0.184)		
ln(Distance to Trade Center)		-1.035***			-1.232***	
		(0.278)			(0.304)	
Centuries of Trade			0.0727***			0.0943***
			(0.018)			(0.018)
NUTS-1 Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Robust Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	83	83	83	83	83	83
R^2	0.855	0.866	0.867	0.954	0.955	0.86

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region. The set of robust controls is selected according to the procedure described in the text. It comprises of the capital dummy, the ln of a region's area and the number of trade cities 50–100kms around a city. Each regression includes a constant not reported.

is—the use of this variable allows to directly relate the agglomeration measures to a proxy for economic development. Moreover, this provides a robustness check for whether the results are sensitive to a different measure of economic development. The results of the mediation analysis fully support my theoretical reasoning and show that the effect of medieval trade on economic development is significantly mediated by its influence on agglomeration patterns.

2.3.3 Medieval Trade and City Development—Panel Data Evidence

Until now I found evidence that medieval trade activities significantly affect today's regional GDP per capita via their impact on agglomeration patterns. However, the observed relation-

ship could be incidental. To show a persistent effect of medieval trade explicitly leading to a path-dependent regional development process I have to document that the positive relationship exists over a longer time period. Thus, I have to show the positive relationship between medieval trade and economic development in a panel data set. This also enables me to estimate the effect of trade more precisely since I can allow for the fact that some cities became important trade centers earlier or later in a more direct way than with the centuries of trade variable. Furthermore, it allows to show that the relationship actually existed in the medieval period itself.

Hence, I run regressions using the Bosker et al. (2013) city level panel data set supplemented by time-varying versions of the three measures of medieval trade. The Bosker et al. (2013) data set spans the period from 800–1800 AD and provides data for every one-hundred years (i.e., 800, 900, 1000, 1100 etc.) and European cities for which Bairoch et al. (1984) provide city figures. I include every city in the Bosker et al. (2013) data set that is located in one of the ten countries I considered in the previous analysis. This leaves me with a sample of 362 cities of which 91 are coded as trade cities.[20] This leads to 3982 city-century pairs and—as city population data is not available for each period in many cities—an unbalanced panel of 1533 observations I will use for the subsequent empirical analysis.

To uncover the long-run relationship between medieval trade and city development in a first step I estimate the following regression equation:

$$ln(POP)_{cit} = \alpha + \rho TRADE_{cit} + \gamma_1' \mathbf{X}_{cit} + \gamma_2' \mathbf{X}_{ci} + \theta_c + \lambda_t + \epsilon_{cijk} \qquad (2.4)$$

[20] The Data Appendix reports every city coded as trade city and also reports the date since it is considered as important trade center. Table A.2 in the Data Appendix provides a descriptive overview of the variables employed in these panel data estimations.

Where $ln(POP)_{cit}$ is the natural logarithm of a population of city i in country c in year t (with t being 800,900,1000...). $TRADE_{cit}$ represents time variant versions of the three measures of medieval trade. X_{cit} is a set of time-varying control variables. Among them are dummy variables indicating whether a city was plundered in the previous century, had a university, held the status of a capital of a territorial state, was located in or surrounded by a state with a large territory (i.e., no city state), was located in a territory ruled by a non-absolutist monarch, residence of a bishop or archbishop and a variable representing the presence of a local participative government (dummy variable equal to one if a city had a city council and zero if not). Furthermore, a variable of a city's urban potential according to the definition of De Vries (1984) is used. This variable represents the distance weighted sum of the size of all Christian cities around a particular city additionally taking into account the accessibility of a city by sea or navigable river. The variable accounts for the urban environment in which a city is embedded. All these variables are taken from the Bosker et al. (2013) city-level data set. Three supplementary variables are included capturing the number of trade cities 0–50km, 50–100km and 100–150km around a city. Both the urban potential measure and the number of neighboring trade cities capture the second-nature geography of a city and spatial spillovers arising from nearby trade activities. X_{ci} is a vector of time-invariant control variables primarily encompassing geographic and biogeographic features of a city and the surrounding region (i.e., first-nature geography). Those variables include a city's latitude, longitude and altitude, the standard deviation of elevation in the region 10km around the city, as well as dummy variables indicating location at a navigable river, sea, Roman road or hub of a Roman road. Additionally, a variable indicating whether a city belongs to one of four different ecozones is included (see Bosker et al. 2013 for more details). Those controls are chosen because they

are correlated with both city development and medieval trade (Bosker et al. 2013, Cantoni and Yuchtman 2014, Börner and Severgnini 2014 among others). θ_c are country fixed effects and λ_t are century fixed effects absorbing temporal shocks which affected all countries (such as the Black Death). All control variables and the city population figures originate from the Bosker et al. (2013) data set.

I estimate equation (4) for the whole sample period from 800–1800, for the medieval (800–1500) and the early modern period (1600–1800) separately. This tests whether the effect of medieval trade differs remarkably between different historical eras and whether there is an effect of trade on city development during the medieval era. If the latter is not the case, I cannot in fact attribute the effect of the medieval trade variables to medieval trade activities but to something else. Because after 1500 the trade measures (apart from the centuries of trade measure) are time-invariant I estimate equation (4) using random effects for reasons of comparability.

Nevertheless, I also estimate equation (4) using fixed effects (FE) estimate, i.e. I add city fixed effects to the specification and remove all time-invariant variables. Equation (5) then becomes:

$$ln(POP)_{cit} = \alpha + \rho TRADE_{cit} + \gamma' \mathbf{X}_{cit} + \delta_i + \lambda_t + \epsilon_{cijk} \tag{2.5}$$

With δ_i being the city fixed effects and everything else identical to equation (4). I run FE regressions for the whole observation period, but this time also using first and second order lags of the trade variables to account for reverse causality problems, i.e. equation (5) is modified to:

$$ln(POP)_{cit} = \alpha + \rho TRADE_{ci,t-j} + \gamma' \mathbf{X}_{cit} + \delta_i + \lambda_t + \epsilon_{cijk} \tag{2.6}$$

Where $TRADE_{ci,t-j}$ with $j = 100, 200$ stands for first and second order lags of the medieval trade measures. Hence, in this specification I account for both reverse causality and unobserved time-invariant heterogeneity. The results of these regressions are shown in Table 2.6.

All three trade measures are statistically and economically significant in all estimations. The coefficient in column (4), i.e. the FE regression using contemporary values of the trade city dummy implies that throughout the complete sample period, trade cities on average had a population about 26 % larger than non-trade cities. This effect is larger than in the cross-sectional estimations conducted in the previous sections. However, the obtained coefficients are more or less identical regardless of whether random or fixed effects are used for the estimation or which observation period is considered. The coefficient of the first order lags is larger than that of the contemporary values. However, the coefficient of the second order lags is lower. Since there are 200 years between the values of the medieval trade variable and the city population this is nevertheless a strong effect. These conclusions also hold true for the other two trade variables although the negative effect of distance to a trade city is lower than in the cross-sectional analysis.

The results are in line with a persistent effect of medieval trade on city development and they additionally show that trade did influence city development in the medieval period.

To further illustrate the persistent temporal effect of medieval trade on city development, I interact the trade city dummy with the century dummies and re-estimate the FE specification in column (4) of Table 2.6 including the interaction terms. Therefore, I estimate this

Table 2.6: Medieval Trade and City Development—Panel Data Estimations

Dep. Var.	ln(Population)					
	(1)	(2)	(3)	(4)	(5)	(6)
Method	RE				FE	
Period	800–1800	800–1500	1600–1800		800–1800	
					1st lag	2nd lag
			Panel A			
Trade City	0.331***	0.269***	0.383***	0.230**	0.261***	0.199***
	(0.056)	(0.065)	(0.075)	(0.094)	(0.08)	(0.076)
R^2	0.453	0.426	0.523	0.368	0.369	0.358
			Panel B			
ln(Distance to Trade City)	-0.0718***	-0.0553***	-0.0867***	-0.0477**	-0.0524***	-0.0329**
	(0.012)	(0.014)	(0.018)	(0.02)	(0.017)	(0.016)
R^2	0.45	0.424	0.518	0.368	0.367	0.355
			Panel C			
Centuries of Trade	0.0581***	0.0734***	0.0486***	0.0514**	0.0518**	0.0458**
	(0.011)	(0.017)	(0.01)	(0.021)	(0.022)	(0.022)
Country Dummies	Yes	Yes	Yes	No	No	No
Century Dummies	Yes	Yes	Yes	Yes	Yes	Yes
City Dummies	No	No	No	Yes	Yes	Yes
Geography Controls	Yes	Yes	Yes	No	No	No
City Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,533	709	824	1,533	1,512	1,488
R^2	0.457	0.432	0.522	0.372	0.366	0.356

Notes. Standard errors clustered on city level in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The geographic controls include a city's latitude, longitude and altitude, the standard deviation of elevation in the region 10km around the city, as well as dummy variables indicating location at a navigable river, sea, Roman road or hub of a Roman road. Additionally, those controls include a variable indicating whether a city belongs to one of four different ecozones (see Bosker et al. 2013 for more details). City characteristics incorporate dummy variables indicating whether a city was plundered in the previous century, harbors a university, had the status of a capital, was located in a state with a large territory and was located in a territory ruled by a non-absolutist monarch. Furthermore, they include a cities urban potential according to the definition of De Vries (1984) and three variables capturing the number of other trade cities 0–50km, 50–100km and 100–150km around a city. In the case of random effects estimation (column (1)–(3)) the overall R^2 and in the case of the fixed effects estimation the within R^2 is reported. Each regression includes a constant not reported.

equation:

$$ln(POP)_{cit} = \alpha + \sum_{t \in T} \beta_t' TRADE_{cit} \cdot \pi_t + \gamma' \mathrm{X}_{cit} + \delta_i + \lambda_t + \epsilon_{cijk} \qquad (2.7)$$

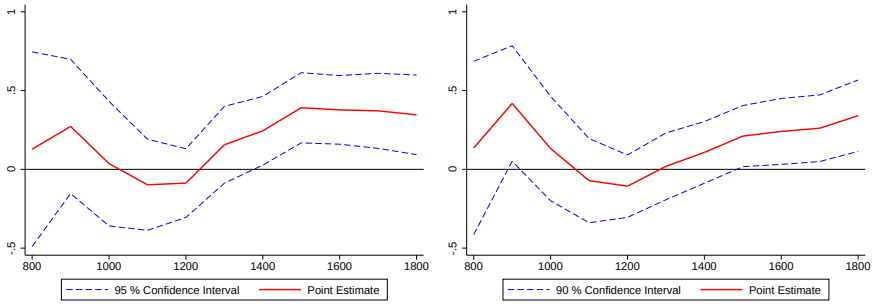
With $t = 800, 900..., 1800$ and $TRADE_{cit} \cdot \pi_t$ representing the interaction term. All remaining elements of equation are identically defined as in equation (5). At first, I estimate this equation for all cities in the sample. Additionally, for the purpose of constructing a more valid control group, I construct a city-level, time-varying version of the urban centrality index. The index is constructed in a similar way than its cross-sectional counterpart. This is, I add up nine variables representing the centrality/ importance of a city with respect to different aspects like politics or the church—but *not* trade or commerce. These nine variables are the archbishop, bishop, capital, communal institutions, imperial city, sea, river, hub of a Roman road and university dummies.[21] I then also estimate equation (7) for all cities with more than 10000 inhabitants in 1500 AD, for all cities with above average urban centrality in 1500 AD (i.e., the sub-sample of historical urban centers) and for all cities in the 90 % percentile of the urban centrality index in 1500 AD (87 cities remain).[22] The estimated coefficients of the interactions terms and the confidence intervals are depicted in Figure 4.2.[23] The general pattern is the same for all four samples: Until 1300 the coefficient of the interaction term is insignificant and declining, afterwards it increases until around 1500 AD and then stays roughly constant until 1800 AD. The coefficients are a little bit lower in the case of the sample of cities with

[21] Those variables are significant predictors of city population ensuring that the variables actually are relevant predictors of the importance of a city.

[22] The average of the urban centrality index in 1500 AD is around 2.7 meaning that I consider all cities with more than 3 of the included characteristics. In the case of the 90 % percentile I consider all cities with four or more of those characteristics.

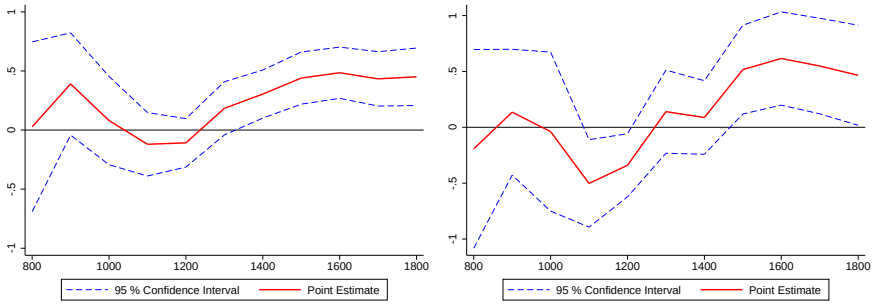
[23] The coefficients are not reported. However, the are available from the author upon request.

above average historical centrality but nevertheless are at least marginally significant. All in all, the temporal evolution of the coefficient of the trade center dummy shows a meaningful pattern that is in line with the hypotheses of a persistent effect of medieval trade, an effect already during the medieval period and an insignificant effect before. The latter confirms the idea that it takes some time until trade unfolding its effect. Furthermore, it is probably due to the overall small number of important trade centers in these earlier periods.[24]



(a) Whole Sample

(b) Cities with >10000 Inhabitants in 1500 AD



(c) Urban Centrality Above Average

(d) Urban Centrality 90 % Percentile

Figure 2.2: Temporal Heterogeneity of the Impact of Medieval Trade on City Development

[24] An alternative strategy would be to use a time-invariant trade city dummy and to interact this with the century dummies. In this case, the results would be similar to those shown in Figure 4.2. This results are not reported but are available from the author.

2.3.4 Additional Robustness Checks

The results have proved to be robust to the inclusion of many important covariates and to endogeneity issues. However, there remain some additional concerns about the robustness of the obtained estimates. To account for these issues, I conduct various robustness checks. The results of these tasks are reported in Appendix A.2 (Tables A.5 to A.9). In Table A.5 I show that the results remain intact when I use alternative samples of trade cities, accounting for the uncertainty of the historical information on which the original coding is based.

In Table A.6 I account for the considerable differences in the size of NUTS-3 regions in various ways. First, I additionally include a country's average NUTS-3 region area as control variable. Second, I run regressions excluding Germany, Belgium and the Netherlands (the countries with much smaller NUTS-3 regions) and third, I run regressions inversely weighting the observations by their area (weighted least squares). And finally, I present estimates only considering regions that are comparatively homogeneous with respect to their size (i.e., have an area that is located within the 40th to 80th percentile of the region size distribution).

In Table A.7 and A.8, I estimate the regressions including neighbor GDP per capita and urban potential measures (in the panel data case) using a spatial lag, a spatial error and a mixed spatial model. These are employed to show that spatial autocorrelation (whether explicitly modelled or in the error term) does not bias the estimates and also that simultaneity arising from the spatial lag variable does not lead to a distortion of the results.

In Table A.9, finally, I account for the fact that I do not include trade cities in some of the neighbors of the considered countries (e.g., I do not include Spain in the analysis, but France is included). For the border regions to these not included countries the distance variable might therefore be biased as the closest trade center is actually located in Spain and not in France

(but I have not included cities in Spain). To overcome this issue, I delete the 50 regions that are located at a border to a country that is not included in the analysis and re-estimate the specifications in Table 2.2 Panel B.

It turns out that all the results remain valid when using alternative samples of trade cities and accounting for systematic differences in the area of the observational units.

2.4 Conclusion

This paper argues that medieval trade led to agglomeration and a concentration of economic activities within the region it took place. It further postulates that the observed spatial distribution of population and economic activity across Europe today is still shaped by the self-reinforcing and long-lasting agglomeration processes that have their origins in medieval trade activities.

Empirical tests of these hypotheses confirmed, as expected, that there is a statistically and economically significant positive relationship between medieval trade activities and contemporary regional economic development. The analysis further provides evidence that this relationship is indeed caused by the influence that medieval trade exerted on the emerging patterns of agglomeration and spatial concentration of industrial activities throughout European regions. Based on the result of this paper, I found evidence for a causal chain running from medieval trade activities through medieval city growth to contemporary industry concentration and regional economic development. Medieval trade can therefore be considered as an important determinant of modern economic development and long-run city development. Further quantitative analyses of medieval trade activities based on detailed historical data will clearly improve the understanding of the sources of long-lasting economic and social

prosperity—a subject that is of interest to researchers in a number of academic fields.

3

Participative Political Institutions in Pre-Modern Europe. Introducing A New Database*

Until now there has been no systematic data about political institutions in pre-modern European cities. This is somewhat surprising given that there is a large and growing literature on the impact of political institutions and regimes on economic outcomes (e.g., Acemoglu et al. 2005a, Acemoglu 2008, Bosker et al. 2013, De Long and Shleifer 1993, Stasavage 2007,

*This chapter is forthcoming in Historical Methods: A Journal of Quantitative and Interdisciplinary History. It is printed with kind permission of Taylor & Francis.

Van Zanden et al. 2012). However, these debates have focused on differences in political institutions and regimes at the regional or national level, or are concerned with differences in institutions between city and territorial states (Stasavage 2007,2011). What have been missing are systematic empirical investigations on the origins and consequences of differences in political institutions and regimes in cities. Cities were the centers of the pre-modern economy and the germ cells of societal and economical innovations. Hence,the study of the emergence, evolution and consequences of their political institutions provides valuable insights and advances the literature with respect to several aspects.

Recently, Bosker et al. (2013) were the first to present a measure for the existence of institutions of self-government ("local participative government") in European cities from 800 AD until 1800 AD. Their measure constitutes a useful starting point for analyses of historical political institutions in cities. However, more detailed and comprehensive data about the different features and types of political institutions is necessary for the study of more specific questions.

The aim of this paper is to introduce and describe a data base on political institutions in 104 central European cities in the German-speaking area of the Holy Roman Empire and the Low countries for the period from 800 to 1800 AD. This database is an attempt to provide measures for political institutions in the pre-modern central European city and their characteristics. Based on the review of more than 100 historical sources and studies, I coded three variables that report the existence and characteristics of political institutions in the selected cities. These variables measure the existence and degree of guild participation in the city council, the existence of participative election procedures of the city government and the prevalence of institutionalized burgher representation. Thus, the database allows to assess

many research questions concerning the origin and evolution of political institutions and their impact on economic institutions and development. For example, the data enable the assessment of the impact of guilds on city development, a question that is intensely debated among scholars (e.g., Epstein 1998, Ogilvie 2004). In this context, the subsequent chapters represents a first application of the database on the question of the origins of the late medieval guild revolts. Furthermore, the database allows to closer investigate the interaction between economic and political institutions (as e.g., in Puga and Trefler 2014). The data can be fully integrated into the comprehensive city-level data set of Bosker et al. (2013) and therefore enables the use of an extensive set of control variables to assess the research question at hand in an elaborate way by simultaneously ensuring comparability to other studies.

In what follows, I first give a general overview of the evolution of city governance in premodern Europe. Next, I define the term "participative political institutions" and provide an overview of the different types and characteristics of those institutions. Afterwards, I explain the construction procedure and the sources on which the coding of the measures is based. Next, I provide an overview of the spatial distribution and temporal evolution of the different participative political institutions. This should provide a first idea about the data, the underlying patterns and possible determinants. Furthermore, I discuss bivariate correlations between the participative political institutions measures and economic outcomes. These correlations offer preliminary insights into the relationship between the different participative political institutions, as well as their consequences. Finally, section six concludes.

3.1 The Evolution of City Governance in Pre-Modern Europe

The existing knowledge on city governance in pre-modern Europe (as summarized by e.g. Planitz 1966 or van Werveke 1963) suggests that in the early middle ages until the 9th century, there existed almost no legal difference between the countryside and the city (the so called "pre-constitutional period"). From the middle of the ninth century onward the urban independence movement slowly gained momentum, beginning in Northern Italy and then spreading to Germany and the Netherlands with increasing pace after the "Great Interregnum" in the 13th century. With the autonomy, city constitutions appeared (so called "constitutional period") and with them the first political institutions (like e.g. city councils) emerged and replaced the older community assemblies in the cities. These newly independent cities were ruled by a class of merchants or land owners that became rich and powerful because of the economic and industrial upswing of the medieval commercial revolution.

Over time, the renewed economic prosperity enriched not only the ruling merchant elite but also the craftsmen that produced export goods trade by the merchants. Furthermore, the ruling class became more and more an enclosed patriciate consisting of a relatively fixed number of families that exclusively had the political power in the city. Beginning in the 13th century, these developments—together with external events like the Black Death or the late medieval agrarian crisis—lead to burgher and guild revolts. If such a revolt was successful it often resulted in participation of craftsmen (and sometimes also other groups of citizens) in the government of the city.[1] Hence, while cities previously were exclusively ruled by the patriciate the government of the late medieval city often saw political participation of broader

[1] For more information on the guild revolts in the German-speaking area the reader is referred to Luther (1968). Information on guild uprisings in the Low Countries is summarized by Dumolyn and Haemers 2005).

groups of the city population.

In the early-modern period, the institutions and government of the cities, remained more or less stable, at least de jure. De facto, however, the independence of the cities was increasingly diminished by the renewed power of absolutist rulers, that sometimes intervened to abandon the participation of craftsmen in the city government or succeeded in regaining the control over a city. Even more, structural changes in the nature of trade and internal conflicts further weakened the position of the guilds (e.g. Haupt (ed.) 2002).

3.2 Participative Political Institutions in Pre-Modern Central Europe

3.2.1 Types of Participative Political Institutions in Pre-Modern Europe

I define participative political institutions as those political institutions that are open to one or more groups of citizens. Alternatively, participative political institutions can constitute rules or constitutional procedures (like e.g. electoral procedures) ensuring that citizens have an influence on the composition and/or political decisions of the government.

A review of the existing literature on city histories (e.g. Keyser and Stoob 1939–1974, Planitz 1966, Isenmann 1988) and studies on the constitutional and institutional history of pre-modern cities and countries (e.g., Blockmans 1978, Bolland 1977, Borck 1988, Bräuer 1994, Endres 1994, Fritze 1994, Göldel 1999, Hegel 1882, Hegel 1891, Herborn 1994, Maschke 1959, Pounds 2005, Posse 1876,Prak 1994, Schlotterose 1953 and Van Zanden and Prak 2006) suggest the existence of three types of participative political institutions in pre-modern central European cities:

- City Councils with Guild Participation. As a result of the guild and burgher revolts of the late middle ages (e.g., Blickle 1988, Boone and Prak 1995, Czok 1966, Dumolyn and

Hamers 2005, Jecht 1908, Kluge 2009, Luther 1968, Prak 1994 and Schubert 2008) in many cities craftsmen or guild representatives became electable for the city council—often called "Kleiner Rat" (small council) or "Innerer Rat" (inner council))—and were also granted a certain number of fixed seats in the council. Sometimes, successful revolts resulted in a complete takeover of the city governments by the guilds (i.e., a "guild constitution" was implemented in these cities) and a displacement of the old patricians from political power. Example of such cities are Ulm, Magdeburg and also Zurich and Bruges. Successful revolts resulted in a kind of "turn towards more inclusive institutions" and brought the political emancipation of larger groups of the population that were previously excluded from the political process. In some cases, successful revolts were accompanied by the enlargement of political rights in other areas, for example, sometimes the city councils dominated by the guilds replaced the usual co-optive election mode of the council by election procedures that allowed at least some groups of citizens to elect the members of the council (Schlotterose 1953, Planitz 1966).

- Institutionalized Burgher Representation. A relatively early form of political participation of the citizens was institutionalized burgher representation, e.g. through a regularly meeting community assembly or the so called "Große Rat" (great council) or "Äußere Rat" (outer council). These institutions were usually a compound of a comparatively broad cross-section of different groups of citizens. This also included groups of citizens that where not part of the ruling elite (e.g. no only merchants or guild masters). Hence, they ensured relatively broad public participation on the city government. Often these institutions met only once or twice a year, but sometimes they met more frequently or, alternatively, they came together in extraordinary circumstances

when an important decision was pending. In many cities, these kinds of institutions did not meet on a regular basis or have fixed or constitutionally granted rights. In these cases, it can be assumed that their actual political influence was even more limited than that of the institutionalized assemblies or burgher councils. I therefore do not consider such "un-institutionalized" burgher representation as a serious form of political participation. In some instances, these community assemblies or burgher councils were implemented as a result of an unsuccessful guild revolt or to prevent such guild uprisings. In contrast to this, when a guild revolts was successful burgher representation was sometimes even limited or completely abandoned, especially in the cities where the guilds gained complete control of the government.[2]

- Participative Election Procedures. The last kind of participative institutions are "participative elections", i.e. an electoral procedure, where the city council or the magistrate of the city was not elected by the ruler or by the members of these institutions themselves. In the early middle ages, the election of city officials by the citizens was the norm. With the development of city constitutions and the installation of city councils these elections were usually replaced by co-option.[3] The election procedures of council and magistrate differed widely between cities. On the one hand, these differences arose due to the different legal families the respective city constitutions belonged to.[4] On the other hand, there were also differences between the south and the north of Germany.[5]

[2] Although there are exceptions to this rule like, e.g. Cologne in which institutionalized representation of the citizens was maintained and even enlarged after the successful guild revolt (Isenmann 1988).

[3] This holds true at least for city councils. The magistrate of the city was still elected more often (especially in the Low Countries , see Prak 2006a,b)

[4] There was the "Magdeburger Recht" (the family of city constitutions for which the constitution of Magdeburg acted as blueprint) or the "Lübecker Recht" etc.

[5] In the south of Germany it was usual that people elected representatives or electoral delegates that be-

As already mentioned, in some cases, participative election procedures were the result of guild revolts (Isenmann 1988). In most of these cases however, the guild council eventually returned to co-option after a while (Schlotterose 1953).

3.3 Construction Procedure and Descriptive Overview

3.3.1 Sources and Construction Procedure

The variables for late medieval, early modern participative political institutions are measured on city level. I focus on countries in the German speaking areas of the Holy Roman Empire and the Low Countries (Belgium and the Netherlands) that were part of the Holy Roman Empire in the period around 1500 AD (the Dutch Republic became an de facto independent state in the 16th century) and are relatively similar with respect to their institutional setting (e.g., Luther 1968). I also include Geneva despite the fact that it is located in the French speaking part of Switzerland. This nevertheless seems to be justified since it belonged to the Holy Roman Empire for most of the observation period and was thus part of the same institutional setting as the other cities included (e.g.,it was a imperial city from 1162 onward). As already described in the main text, the observation period is 800–1800, while I have data for eleven hundred-year intervals (i.e., I have data for 800, 900, 1000 and so on). This allows the data to be matched with the Bosker et al. (2013) panel data set of historical city characteristics. I code the dummy and categorical variables as one or zero in one of those eleven intervals if a certain rule or institution was in place their in this year and within 5 years of this date. However, many cities in Western Germany (especially in the Rhine area) became parts of France shortly

longed to the same societal group while in the north people voted for electoral delegates according to the urban district they belonged to. Moreover, there were minor differences due to "institutional drift".

before the end of the 18th century due to the Coalition Wars. The French usually replaced the old constitutions of the cities and restricted their independence. However, in these cases I nevertheless code the cities in 1800 as if the French had not invaded them a few years earlier—since it is very likely that the actual political and economic outcomes in 1800 were primarily influenced by the situation in the decades before the invasion and not by the few years under French rule.

Overall, I collected information for 104 cities located in today's Austria (7 cities), Belgium (10 cities), Germany (67 cities), France (3 cities), the Netherlands (13 cities) and Switzerland (4 cities). I include all cities in these four countries that are contained in the data set of Bosker et al. (2013). However, for Belgium, France and the Netherlands I was unable to find enough reliable information about political institutions for all the cities in the Bosker et al. (2013) data set and hence not all cities in these countries are part of my data set. Furthermore, I only consider those French cities that were under German influence (i.e., part of the Holy Roman Empire) for most of their history (Colmar, Metz and Strasbourg).

The principal source on which the coding of the variables is based for Germany is the "Deutsche Städtebuch" (Handbook of German Cities) edited by Keyeser and Stoob (1939–1974) a systematic collection of encyclopedic articles about the history of all German cities (within the 1937 borders of the German Empire). Each city history article has a section with often very detailed information about a city's political and administrative history, its constitution, laws and institutions from the beginning of its history until the 20th century. The occurrence of significant burgher or guild uprisings during the early modern period, as well as the outcome of these "revolts",is also mentioned in this section. I use this information to code the three variables (election of council or magistrate, institutionalized burgher represen-

tation and guild participation in the city council). The "Deutsche Städtebuch" represents a reliable and—in terms of its information—uniquely comprehensive historical source for the history of German cities.It is also used, for example, in Cantoni (2012,2013), Cantoni and Yuchtman (2014) or Hornung (2014). A similar handbook is available for Austria, the so-called "Österreichisches Städtebuch" (Hoffmann and Pickl (eds.) 1968–1999) which I used to code Innsbruck, Vienna, Schwaz and Linz. However, the Austrian version of the "Städtebuch" is not complete (e.g., there is not yet a volume for Kärnten or Salzburg).

However, even the "Städtebücher" do not always contain every piece of information I am interested in (or at least they are not explicit or detailed enough) and the available information about medieval political institutions is generally scarce and potential unreliable. Moreover, no comprehensive handbook of cities exists for Belgium, France, the Netherlands and Switzerland. Therefore, I relied on more than 100 additional sources to code the variables, validate the information provided by the German and Austrian "Städtebücher" and obtain the additional information about cities in the low countries, the French cities of Colmar, Metz and Strasbourg and towns in contemporary Switzerland.

The cities in the Low Countries are primarily coded according to various articles and studies by Maarten Prak (e.g., Prak 2006a,b), Lis and Soly (2006) and the two volumes of Hegel's (1891) monograph about the "Städte und Gilden der Germanischen Völker im Mittelalter" which also provides detailed information about constitutional arrangements and the political situations in many German towns. Other sources that provide information about political institutions in the Dutch and Belgian cities are e.g., Escher and Hirschmann (eds.)(2005), an overview article by Dumolyn and Hamers (2005), and Auty's (ed.)(2002) "Lexikon des Mittelalters" ("Encyclopedia of the Middle Ages").

For Germany, Austria and Switzerland I furthermore relied heavily on the information about the outcomes of guild revolts given in Planitz (1966), and Czok's (1966) review of burgher uprisings in southern and western Germany in the 14th century. However, I also incorporate information from various city histories (like, e.g., that of Borst (1996) for Stuttgart, or Csendes and Opll (2001) for Vienna).

Other sources include monographs and articles about city constitutions, city councils or burgher/ guild revolts in particular regions or cities, e.g.: Blaschke (2002) dealing with the administrative and constitutional history of Saxony, Endres (1994) about the constitution in late medieval and early modern Nuremberg, or Jecht (1908) considering craftsmen uprisings in medieval Görlitz.

A final kind of sources I take into consideration are city histories on the official websites of a city or reliable online encyclopedias like the "Historisches Lexikon Bayern" (Historical Encyclopedia of Bavaria) an online encyclopedia developed by the federal library of Bavaria and financed by the federal Bavarian Ministry of Education and Science.

In some cases, the information provided by the various sources is inconsistent. Most often this is because not every source gives equally detailed and explicit information about e.g., the election mode of the city council and magistrate or the existence of institutionalized burgher representation. Furthermore, not all sources contain information for the entire period of observation from 800–1800. In these cases I generally rely on the information given by the "Deutsche Städtebuch" unless all other sources agree on another version. In the cases where the "Deutsche Städtebuch" does not provide information (e.g., in the case of the Low Countries) I follow the opinion of the majority of the sources or, if there is no majority opinion, choose the most conservative option, i.e., when two different dates are mentioned for the im-

plementation, e.g., of a community assembly I choose the later one. This should guarantee that I do not measure the effect of an institution that was not actually working in the period in question. What is more, there are considerable differences between the cities in the sample concerning the availability of data. For some large cities, e.g. Cologne or Vienna there are many sources that provide detailed and reliable evidence about the particularities of the respective institutions and their evolution. However, for many cities, especially smaller ones, very few or sometimes (as in the case of Schwaz or Geneva) only one source was available that provided evidence. In addition, this evidence might not be as detailed or comprehensive as that existing for Cologne, Nuremberg or Vienna. More information about how I coded these cities and why I nevertheless included them into the data set is available in Appendix B.2.

As a general rule, I assumed that the particular institution or constitutional right existed, once implemented, until the end of the observation period (1800). However, the sources I consulted (e.g., the "Deutsche Städtebuch") often mentioned when a particular rule or election was changed, a city lost its independence or the guilds were abandoned from the city council. If this information is provided, I take it into account.

Finally, I validate some of the information in the sources for the German cities by looking at the primary sources on which they are based (if available). For example, I looked at Bodemann (ed.) (1883) or Philippi (1890) which collected, edited and commented on the historical public records of the guilds in Lüneburg and Osnabrück, respectively. I also looked at Keutgen (1901) a collection of official documents reporting the constitutional history of several German cities (like e.g., Cologne). From comparing these with the information in my sources they seem to be in line with the documents in these and other primary sources.

Table B.2 reports all cities in the sample (in alphabetical order) and the respective sources

consulted to code the three main variables for the particular city.

3.3.2 Descriptive Overview

Table 3.1 provides a descriptive overview of the three participative political institutions variables and also for the guild constitution dummy (guild participation index=2). Table 3.2 presents bivariate correlations between the three variables as well as important economic and social outcome variables like the natural logarithm of city population (from the Bosker et al. 2013 data set), a dummy representing early (i.e., before 1500 AD) adoption of printing and a dummy indicating whether a city was an important medieval trade center.[6]

Table 3.1: Descriptive Overview of the Participative Political Institutions Measures

Variable	Obs.	Mean	Std. Dev.	Min	Max
Guild Participation Index	1144	0.242	0.563	0	2
Inst. Burgher Representation	1144	0.150	0.358	0	1
Participative Elections	1144	0.102	0.303	0	1
Guild Constitution	1144	0.062	0.241	0	1

These bivariate correlations show, that there are significant, but comparatively modest, positive correlations between the different measures of participative political institutions.[7] The highest correlation exists between participative elections and the guild participation index (0.27). This indicates that while there is a positive relationship between the different participative political institutions, their determinants and origins might be different. Furthermore, each of the participative political institutions measures is significantly related to

[6] The sources and exact definitions of these variables are given in the Appendix.

[7] The only exception is, of course, the high correlation between the guild participation index and the guild constitution dummy.

the early adoption of printing or being a trade city. But only the guild participation index shows a significant and positive correlation to the main proxy of economic development in the pre-industrial world, city population. And even this correlation is relatively low (0.11) when compared to ,e.g., the correlation of guild participation and early adoption of printing (0.3). Thus while there may be a positive impact of more participative political institutions on technological adoption and commercial activities, their impact on city development remains unclear, at least when looking at bivariate correlations. Of course, these correlations do not reveal anything about causal relationships and they should therefore not be over-interpreted.

3.4 Distribution and Evolution of Participative Political Institutions in Medieval Central Europe

3.4.1 The Distribution of Participative Political Institutions in Central Europe

To get an overview of the distribution of participative political institutions and to discover potentially existing spatial patterns that could contribute to the understanding of their origins it is useful to look at maps showing the spatial distribution of these institutions in the considered countries.[8] I have not created a map with cities that have developed communal institutions, since this is true for all but 5 of the cities in the data set and thus a map would hardly be informative.

Figure 3.1 maps the distribution of guild participation in the city council in the Holy Roman Empire in 1500 AD. Cities with no guild participation are gray, cities with at least some

[8]The map is created by the author. The borders of the Holy Roman Empire originate from the shapefile "Georeferenced Historical Vector Data 1500" created by Christos and Marc-Antoine Nüssli (Copyright 2008, Christos Nüssli, Euratlas – www.euratlas.com, reproduction prohibited, license of October 29th 2014).

Table 3.2: Bivariate Correlations of Participative Political Institutions and Economic and Social Outcomes

	Guild Part. Index	Inst. Burgher Representation	Participative Elections	Guild Constitution	ln(Population)	Printing Press before 1500 AD	Trade City
Guild Participation Index	1						
Inst. Burgher Representation	0.1755***	1					
	(0.000)						
Participative Elections	0.2650***	0.1082***	1				
	(0.000)	(0.000)					
Guild Constitution	0.8039***	0.1148***	0.1882***	1			
	(0.000)	(0.000)	(0.000)				
ln(Population)	0.1099***	-0.0617	0.0072	0.1013***	1		
	(0.007)	(0.133)	(0.861)	(0.013)			
Printing Press before 1500 AD	0.2984***	0.1280***	0.1830***	0.2670***	0.3266***	1	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Trade City	0.2368***	0.2512***	0.1626***	0.1578***	0.3696***	0.3228***	1
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Notes. P-values are in parenthesis. *** indicates that the correlation issignificant at 1% level. The number of observations on which the bivariate correlations are based is 596. This is due to the fact that we have only 596 city population figures in our data set.

participation of guilds or craftsmen in the council are blue and cities with a guild constitution (i.e., where the guilds were a major political force) are red colored.

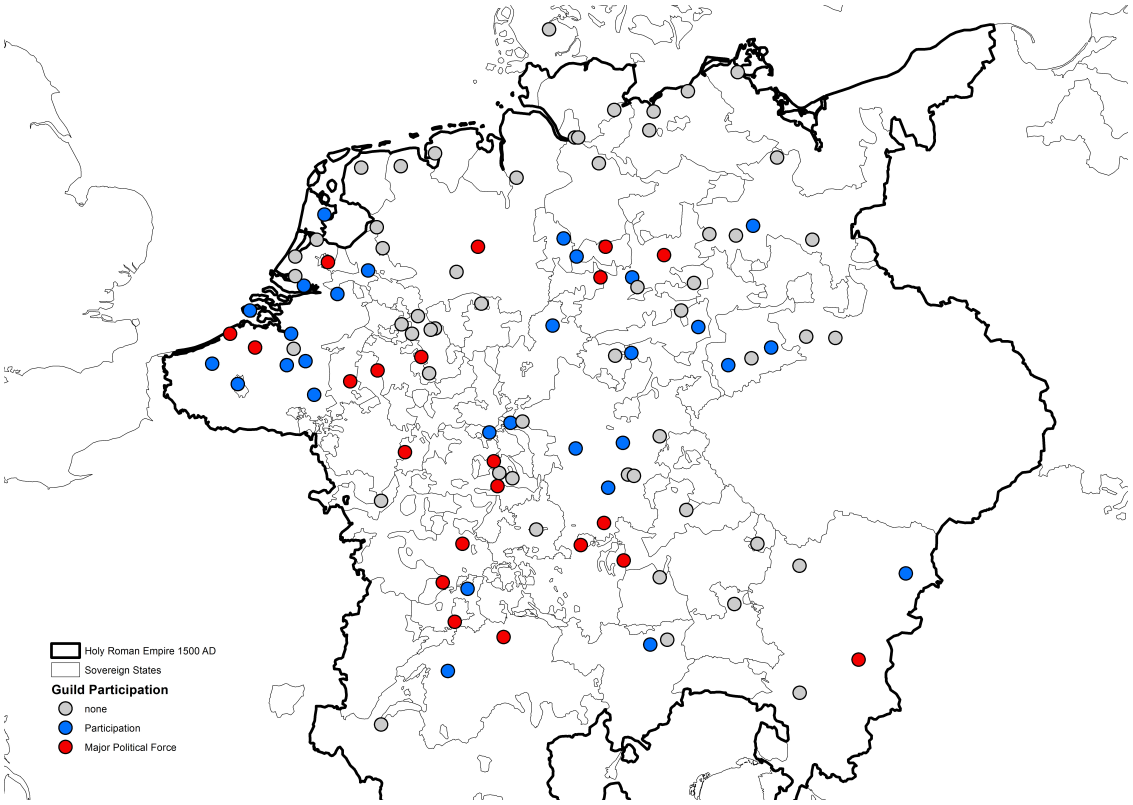


Figure 3.1: Participation of Guilds in City Council

I can infer from the map that there were almost no cities with guild participation in the north of Germany and the Netherlands, i.e. in core area of the Hanseatic League (Dollinger 1966). This is in line with historical evidence that the Hansetic League often successfully suppressed guild revolts and defended the ruling merchant elite in its member cities (e.g. Luther 1966). I also see that guild participation was mainly concentrated in south-west Germany, today's Alsace-Lorraine and Belgium (the duchies of Flanders and Brabant). In central Germany there is a medium frequency of guild participation and there are only a few cities with

a guild constitution (Brunswick, Goslar and Magdeburg) all of which were members of the Hanseatic League and important political, commercial or ecclesiastical centers and therefore predestined for the outbreak of a guild revolt. In those cities the guilds succeeded in their attempts to gain political power despite the opposition of the Hanseatic League. There are almost no cities with guild participation in Bavaria which is due to the comparatively strong position of the Bavarian ruler and to the fact that bishops or archbishops (as e.g. in Passau) were often successful in suppressing the guilds.

Figure 3.2 shows the spatial distribution pattern of institutionalized burgher representation (where cities with burgher representation are colored in dark-gray). As burgher representation was comparatively widespread throughout the German speaking area of the Holy Roman Empire there is no obvious pattern. Perhaps one can say that in the south-west of Germany and in Switzerland —where guild participation was especially prevalent— burgher representation was not as common as it was in, e.g., in Saxony. In general, it seems that in northern Germany (in particular in the north-east apart from the cities on the German-Czech border) the frequency of burgher representation is slightly higher. This could be the case because the trade cities of the Hanseatic League often had a kind of institutionalized burgher representation. What is striking is the virtual absence of burgher representation in Belgium and the Netherlands. There was a weaker tradition of such representative institutions in the Low Countries compared to the German speaking areas.

Figure 3.3 visualizes the distribution of participative elections. Of all participative institutions participative elections are the least widespread. What emerges from the map is that participative elections are almost absent in Austria and Bavaria and less prevalent in Belgium, an area in the middle of Germany today belonging to Thuringia, Lower Saxony and Saxony-

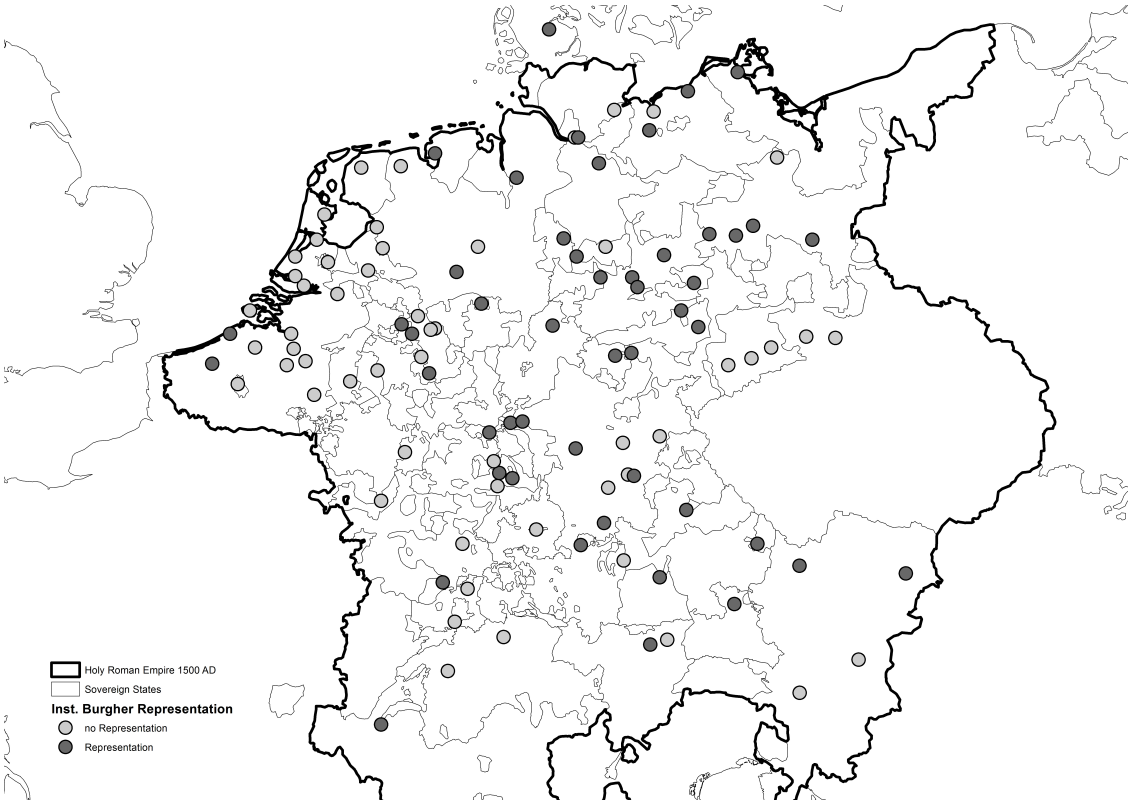


Figure 3.2: Existence of Institutionalized Burgher Representation

Anhalt and historically consisting of many members of the Hanseatic League, residence cities like Hanover, and commercial centers like Erfurt or Magdeburg.

The spatial distribution patterns of the three participative institutions are remarkably dissimilar—pointing to a different evolutionary history of these institutions. Nevertheless, some general insights emerge from the detected spatial patterns. They preliminarily suggest a role of the Hanseatic League, commercial and ecclesiastical importance as well as regime type and state capacity for the existence or non-existence of such institutions. The patterns discovered might also be interpreted as providing evidence for the importance of rivers and distance to the coast for the development of participative political institutions. Because proximity to the

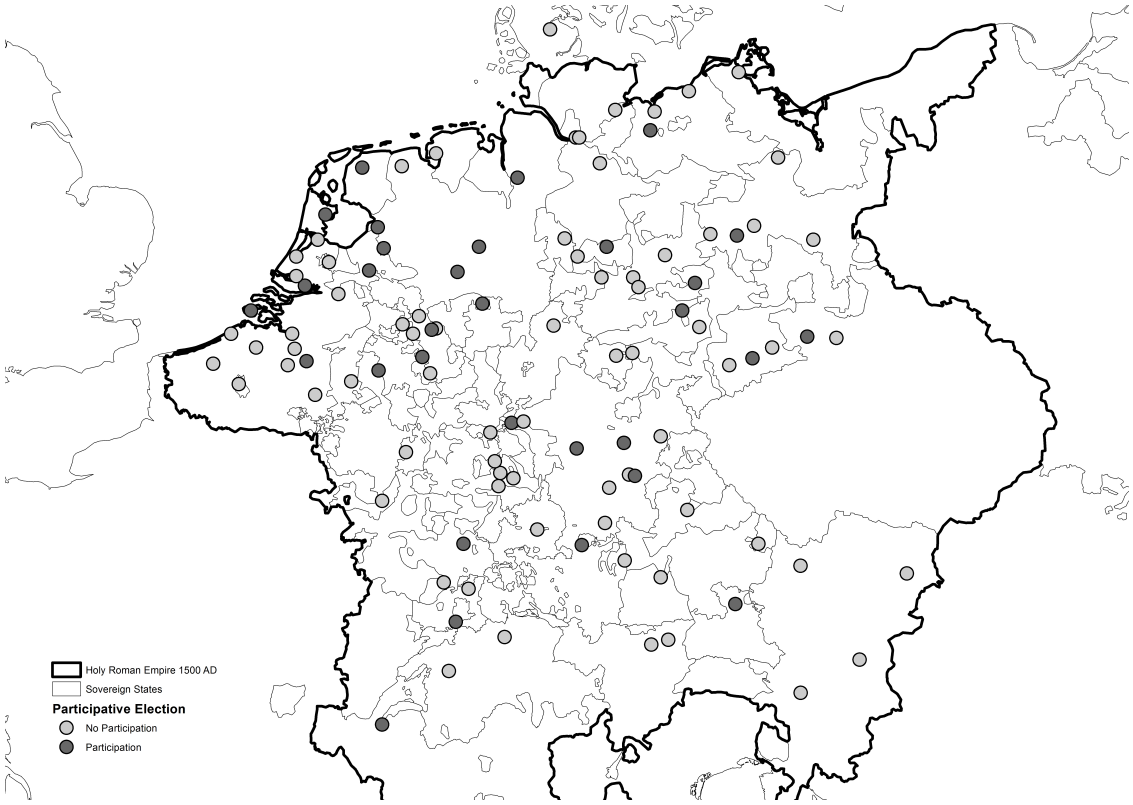


Figure 3.3: Burgher Participation in the Election of City Governments

sea and rivers was connected to e.g. the commercial importance of cities, these factors are likely candidates for the main predictors of participative political institutions.

3.4.2 The Evolution of Participative Political Institutions in Central Europe

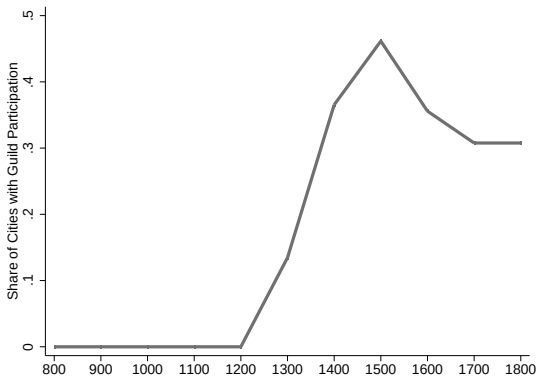
It could be instructive to look at the temporal evolution of the different types of participative political institutions. To do so, I plot the share of cities with one of the four types of participative political institutions for every 100 years from 800 AD to 1800 AD.

The temporal evolution of the share of cities with the respective participative political in-

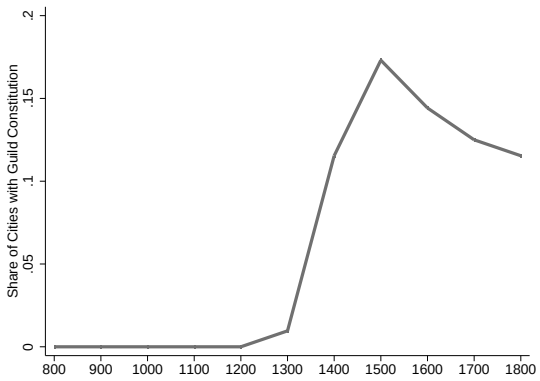
stitutions is depicted separately in Figure 3.4 for four of the three measures but I draw separate picture for cities with guild participation (Guild Participation Index=1 or 2) and guild constitutions (Guild Participation Index=2). The general temporal evolution pattern is the same for each of the four institutions. Their spread began somewhere in the later medieval period and their diffusion continued until the end of the 15th century (consistent with e.g., Pirenne 1964 or van Werveke 1963). From the 16th century onward their prevalence remains roughly constant. But the prevalence of guild participation, guild constitutions and also of participative elections did significantly decline in the early modern period (e.g., the share of cities with guild participation declined from around 50 % to around 30 %). These types of participative institutions were often abolished in the early modern period when local rulers or the emperors became strong again or the cities lost their commercial and strategic importance.

Conversely, institutionalized burgher representation prevailed at pretty much the same level of roughly 30 % after 1500 AD. And the share of cities with communal institutions even increased somewhat after 1500 AD.

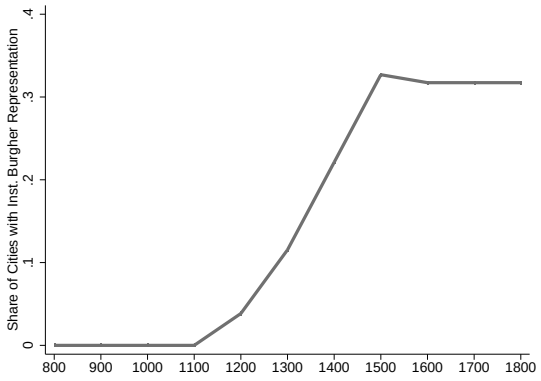
Another peculiarity worth mentioning is the different timing of the diffusion of the respective institutions. While communal institutions developed from the 12th century onward as institutionalized burgher representations and participative elections did, guild participation in the city council did not occur before the 13th century. These latter two institutions are thus closely connected to the rise of communal institutions and reflect the rise of urban Europe that went along with—and was the prerequisite for—the development of other sophisticated economic and social institutions responsible for the growth of trade, commerce and human capital that central and northern Europe experienced in the later medieval and early modern period (e.g. Greif 2006, Lopez 1976). In effect, the development of participative



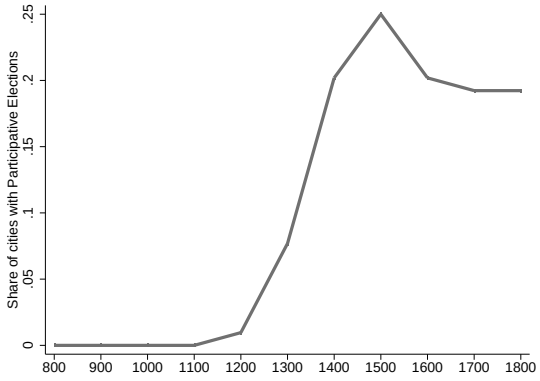
(a) Share of Cities with Guild Participation



(b) Share of Cities with Guild Constitution



(c) Share of Cities with Institutionalized Burgher Representation



(d) Share of Cities with Participative Election

Figure 3.4: The Evolution of Participative Political Institutions

communal political institutions documents the beginning of the "rise of the west" leading to Europe taking over both the Muslim and the Asian world.

By contrast, participation of guilds in the city council did not exist before the 13th century. As this largely resulted from the guild and burgher revolts of the later medieval era the causes and origins of these revolts are of interest themselves. It could be that the rise of communal institutions that started earlier and the guild revolts were symptoms of the same economic

rise of Europe that—together with temporal shocks like the Black Death— later resulted in the "Great Divergence". On the other hand, they might have contributed to a further rise of other participative political institutions and could therefore be considered as a separate factor.

All in all, the data is pretty much in line with previous historical knowledge about the evolution of city governance in pre-modern Europe (as outlined in section 2).

3.5 Final Remarks

This paper has introduced and described a new database on participative political institutions in pre-modern central Europe. The database provides new opportunities for researchers working on questions related to the impact of political institutions and regimes on economic outcomes, the effect of guilds, and on the connections between economic and political institutions. As far as I am aware, it is the most comprehensive and specific database on the political institutions in early modern European cities currently available. The present database only constitutes a starting point and researchers are invited to enlarge the data set with information on other types of institutions or information for cities in other countries or other years. Nevertheless, the existing database already has a useful application, as demonstrated for example in the next chapter, where it is used, together with other data to explore the origins of political change—i.e., the late medieval guild revolts.

"We used to think that revolutions are the cause of change. Actually it is the other way around: change prepares the ground for revolution."

Eric Hoffer

4

Origins of Political Change. Structural vs. Exogenous Factors as Cause of the Late Medieval Guild Revolts*

In the last decades there has been an increasing interest in the role institutional innovations in the later medieval and early modern period played in the so called "Rise of the West"

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and the so called "Great Divergence". This literature, is usually concerned with the consequences of the changes that occurred in this period in national or communal level political institutions and regimes (e.g. Allen 2003, Bosker et al. 2013, De Long and Shleifer 1993, Greif 2006, Stasavage 2007,2011,2014 or Van Zanden et al. 2012). However, these studies rarely provide a systematic empirical analysis of the origins of these institutional innovations. Yet, uncovering the roots of participative (or inclusive) institutions in later medieval central Europe is essential for understanding the medieval roots of the "Great Divergence"(Van Zanden 2008) and, even more important, the origins of political change.[1] Furthermore, it can also be informative about the relationship between economic and political changes as the political change of this period paralleled a notable economic recovery, the so called "commercial revolution" (Lopez 1976).

By investigating the origins of the late medieval guild revolts this study seeks to shed light on these issues. It is supposed that the guild revolts constituted an important trigger for the turn towards more inclusive political institutions documented for the later medieval period.[2] They often resulted in craftsmen and other groups of citizens gaining political rights to have a say in the city council and in election procedures that gave more groups of citizens the right to vote. Therefore, the study of their causes is informative about the origins of the "institutional revolution" in late medieval cities. Furthermore, while there is a vast historical literature on the causes and consequences of the late medieval guild revolts (e.g., Dumolyn and Hamers 2005 or Luther 1966) there is no quantitative empirical assessment of their causes. Hence,

[1] During the later medieval period many other institutional, social, economic and educational innovations emerged that contributed to a renewal of prosperity and growth. Among those innovations are the rise of Protestantism (Cantoni 2012), the invention of the printing press (Dittmar 2011) and the foundation of universities (Cantoni and Yuchtman 2014).

[2] Under guild or burgher revolts I understand the uprisings of craftsmen—and oftentimes other group of burghers—against the rulers of the town (e.g. a merchant elite) .

this study also provides an empirical test of the existing qualitative historical arguments.

Historians identified two types of factors primarily responsible for the outbreak of a revolt. First, many historians consider structural factors as main determinants of the guild revolts. They argue that the renewal of economic prosperity during the commercial revolution shifted the economic but not political power away from the merchants to craftsmen. Hence, the guild revolts are understood as an attempt of newly enriched craftsmen to gain not only economic but also political power. Furthermore, an often enclosed, degenerated and quarreling ruling class promoted the emergence of revolts. On the one hand, this was due to the fact that this elite found itself in a weaker position and on the other hand because their excessive expenditures financially ruined the cities (e.g Luther 1968, Planitz 1966).

Second, exogenous factor or shocks are are given major responsibility for the revolts. Proponents of this view argue that, most importantly, the interplay between the late medieval agrarian crisis and the Black Death alongside more regional events like the double election of the German king or the persecution of Jews (often the context of the plague) caused the revolts (e.g. Blickle 1988, Cohn 2008).

While some scholars put forward one kind of factors as primary source of the guild revolts, most research (e.g. Luther 1968, Planitz 1966) consider both kind of factors to be important for the outbreak of the revolts. Thus, this study seeks to investigate empirically whether structural or exogenous factors or both accounted for the occurrence of guild revolts.

The study is based on uniquely large and systematic data on the prevalence and outcomes of guild revolts in 104 cities in Germany, Austria, the German-speaking area of Switzerland (plus Geneva), Alsace-Lorraine and the Low Countries for every hundred year period between 800 and 1800 AD (i.e., it covers the German-speaking parts of the Holy Roman Em-

pire and the institutionally and culturally similar Low Countries). This data is part of the "Participative Political Institutions in Medieval Europe Database" introduced in chapter 3. The collected data is the most comprehensive and detailed collection of information about the late medieval guild revolts that the author is aware of. Furthermore, it is the first data set on political institutions on city-level and thus making it possible to exploit variation in political institutions between cities.

Based on this data set the article first provides an overview of the temporal evolution and spatial distribution of successful guild revolts. Afterwards, I conduct an empirical analysis of the origins of the guild revolts. For the empirical analysis I supplement the database on participative political institutions with variables from the city level panel data set of Bosker et al. (2013) and further variables coded by making use of other sources and the participative political institutions database. I conduct cross-sectional regressions, accounting for endogeneity by regressing pre-treatment values of the explanatory variables on the guild revolts/participation measures.

A first important results is that cities that were centers of proto-industry had a higher and important centers of medieval trade had a lower probability of guild participation in the city council. This shows that structural factors played a significant role in triggering the guild revolts and the political change towards more participative political institutions. However, I also find that being located in a rural area—but not agricultural productivity—mattered, suggesting that the agricultural crisis and the Black Death were important. Being located in the countryside made a city more severely affected by rural-to-urban migration flows that increased intra-urban conflicts between craftsmen and the ruling elite. At last, the empirical analysis suggests a certain role of neighborhood spillovers, i.e. there is a higher probability

of guild participation if the share of neighborhood cities with such a participation is higher. Therefore, strategic considerations and expectations about the probability of a success or failure of the revolts were of relevance.

The paper proceeds as follows: In section two, an overview of the guild revolt data is given and the temporal evolution and spatial distribution of successful guild revolts is discussed. Then, the causes of guild revolts identified by the historical literature are discussed and connected to arguments from the theoretical economic literature on political institutions. In section four, I conduct the empirical analysis of the causes of the guild revolts and discuss their implications. Finally, section five concludes.

4.1 Late Medieval Guild Revolts—Data and Descriptive Patterns

4.1.1 Data on Guild Revolts

The data on guild revolts and other types of political institutions in cities stems from the "Participative Political Institutions in Pre-Modern Europe Database" created by the author and introduced in the previous chapter. Among others, the database includes information on the occurrence and outcome of guild revolts for the German-speaking area (i.e., Germany, Austria and Switzerland) as well as the Netherlands, Belgium and three cities located in the Alsace-Lorraine region of today's France (Colmar, Metz and Strasbourg) but historically belonging largely to the Holy Roman Empire (for reasons of simplicity, in the following I will call this area "central Europe").[3] The inclusion of the Netherlands and Belgium is justified because parts of those countries belonged to the Holy Roman Empire throughout the later

[3] Furthermore, I include Flensburg in the dataset. Flensburg was Danish until it became Prussian in 1846. Nevertheless, it is contained in the "Deutsche Städtebuch" and its history and development is closely connected with Germany and e.g., the Hanseatic League. Due to this I decided to include Flensburg.

medieval period. The institutional environment and economic and social developments in these countries were comparatively similar to that in the German-speaking area as, for example, there were also guild revolts and there also existed imperial cities and cities of the Hanseatic League. In including the territory of today's Belgium and the Netherlands I follow other historians, like Luther (1968), who have previously studied the guild revolts.

The starting point for the collection of data was the city level panel data set on European and Muslim cities assembled by Bosker et al. (2013). They follow Bairoch et al. (1984) and consider a place to be a city if it had more than 10000 inhabitants at least one time in its history. Each of the variables in this data set has a value at the beginning of each 100 year period from 800 AD to 1800 AD (i.e. there is data for 800, 900, 1000, 1100 and so on). The rationale for choosing this data set was that the variables it contains are used to conduct the empirical investigation on the origins of participative political institutions later on. For each city in the sampling area described above and included in the Bosker et al. (2013) data set I tried to find information on whether and when their was a guild revolt in a city and what its outcome was.

My main source for the coding of the variables was the "Deutsche Städtebuch" (Handbook of German Cities) edited by Keyser and Stoob (1939–1974) an eleven volume encyclopedia with systematic information on various aspects of the history of all German cities within the 1937 border of the German Empire. I coded the cities in Austria primarily according to a similar handbook for Austria, the "Österreichisches Städtebuch", or from monographs about city history. The cities in Belgium and the Netherlands were coded primarily according to Prak (2006a,b), Lis and Soly (2006), the second volume of Hegel (1891), Dumolyn and Hamers (2005), Van Zanden and Prak (2006) and various other sources.

Since the coding requires comparatively detailed data and because there is a considerable amount of uncertainty in information about developments and institutions in the medieval and early modern period I additionally consulted sources about the history of each individual city (e.g., Borst 1968 or Csendes and Opll 2001) and about their historical constitutions, guilds or political institutions (such as Blaschke 2002, Endres 1994 or Jecht 1908). Overall, I consulted more than 100 sources for the coding of the variables. The city specific sources on which the coding is based are reported city-wise in Appendix B, Table B.2. In chapter 3 I elaborate on the data and discuss its construction in more detail.

Table 4.1: Guild Revolts and Participation in the City Council—Descriptive Overview

	1300	1400	1500	1600	1700	1800
Successful Guild Revolts	14	28	11			
Guild Participation (cumulated)	13	25	29	21	18	18
Guild Constitution (cumulated)	1	13	19	16	14	13
Share of Cities with Guild Participation	12.50%	36.50%	46.20%	35.60%	30.80%	29.80%

However, even when using such a large amount of sources, I was unable to find reliable information for each of the cities considered in Belgium and the Netherlands. Overall, I was able to collect information on participative political institutions in 104 cities. In 51 of them successful guild revolts took place somewhere between the 13th and the 15th century.[4] In eleven cities, primarily in the north of Germany, unsuccessful revolts were recorded.[5] An

[4] In two cities, Berlin and Chemnitz, two successful revolts took place, the first in the 13th century and then, after the guilds lost their participation in the council the regained it in the 15th century.

[5] Apart from a few cases (Nuremberg in 1348/49) it is not possible to two identify how many unsuccessful revolts took place as the information on this is often very unspecific. Thus, I cannot meaningfully attribute these events to one of the observation years. Furthermore, I am primarily interested in the triggers of economic change and therefore in successful guild revolts.

overview of the number of revolts and the number of cities with participation of the guilds in the city government in each century is given in Table 4.1.

It could be instructive to look at the temporal evolution of the guild participation as depicted in Table 4.1. The general temporal evolution pattern is the same for both kinds of revolt outcomes. Their spread began after 1200 AD and their diffusion continued until the end of the 15th century (consistent with e.g., Pirenne 1964 or van Werveke 1963). From the 16th century onward their prevalence declines remarkably . Both types of participative institutions were abolished, often in the early modern period when local rulers or the emperors became strong again or when the cities lost their commercial and strategic importance.

4.1.2 The Spatial Distribution of Guild Revolts and Participation

To get an overview of the distribution of guild revolts and guild participation in the city council and to discover potentially existing spatial patterns that could contribute to the understanding of their origins it is useful to look at maps showing the spatial distribution of these revolts in the considered countries and across different waves.

Figure 4.1 therefore maps the distribution of cities with successful revolts in the 13th and 14th century, i.e. in the first two waves of the revolts. Cities that had at least some participation of craftsmen in the council for any period are blue colored and cities with a guild constitution are red. The maps show that the first wave of guild revolts was concentrated in western and northern Germany, i.e. in the later Upper Rhenish Circle of the HRE and in the Lower Saxon Circle. The Upper Rhenish Circle in particular was highly politically fragmented and thus lacked a strong central authority that could probably prevent successful revolts.

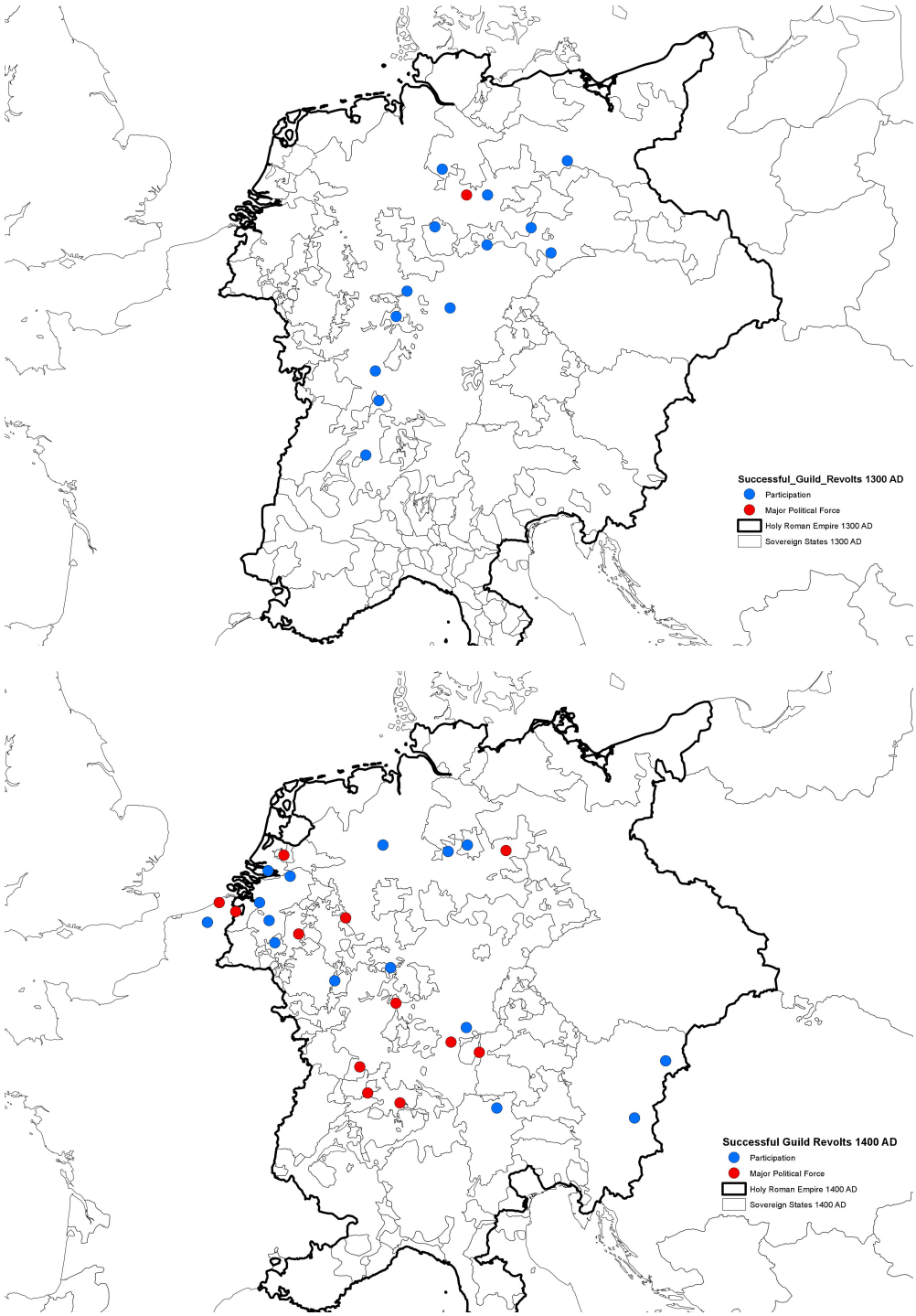


Figure 4.1: Spatial Distribution of the First Two Waves of Guild Revolts

This first wave is perhaps also connected with a lack of central power and the anarchic situation after the collapse of the Staufer dynasty and the subsequent "great interregnum". It is also visible that in this first wave the guilds were only able to gain some participation in city government but not to become the dominant political force.

More than half of all revolts took place in the second wave of the revolts in the 14th century. This time, the geographic focus was more in the south of the empire (i.e., in the Swabian Circle and in today's Switzerland as well as in the Westphalian and Burgundian Circle). Contrary to previous revolts, this time the guilds succeeded in a complete take over of the city government in many cases. The newly gained strength of the Southern and Western German imperial and trade cities as well as the outbreak of the Black Death were likely to have been responsible for this wave of revolts.

Figure 4.2 maps the third and last wave of the revolts (the upper map) and also visualizes the overall picture of guild participation in 1500 AD, a date after which no new successful guild revolts are recorded (the lower map). The last wave of the revolts in the 15th century saw only a few revolts, mainly in the Low Countries (Burgundian Circle) and in the Franconian Circle. In general, the shift of the revolts to the South and in particular to the north mirrors the regional economic and social development patterns in this period. Again, none of the revolts in the third wave resulted in a complete take-over of the city government.

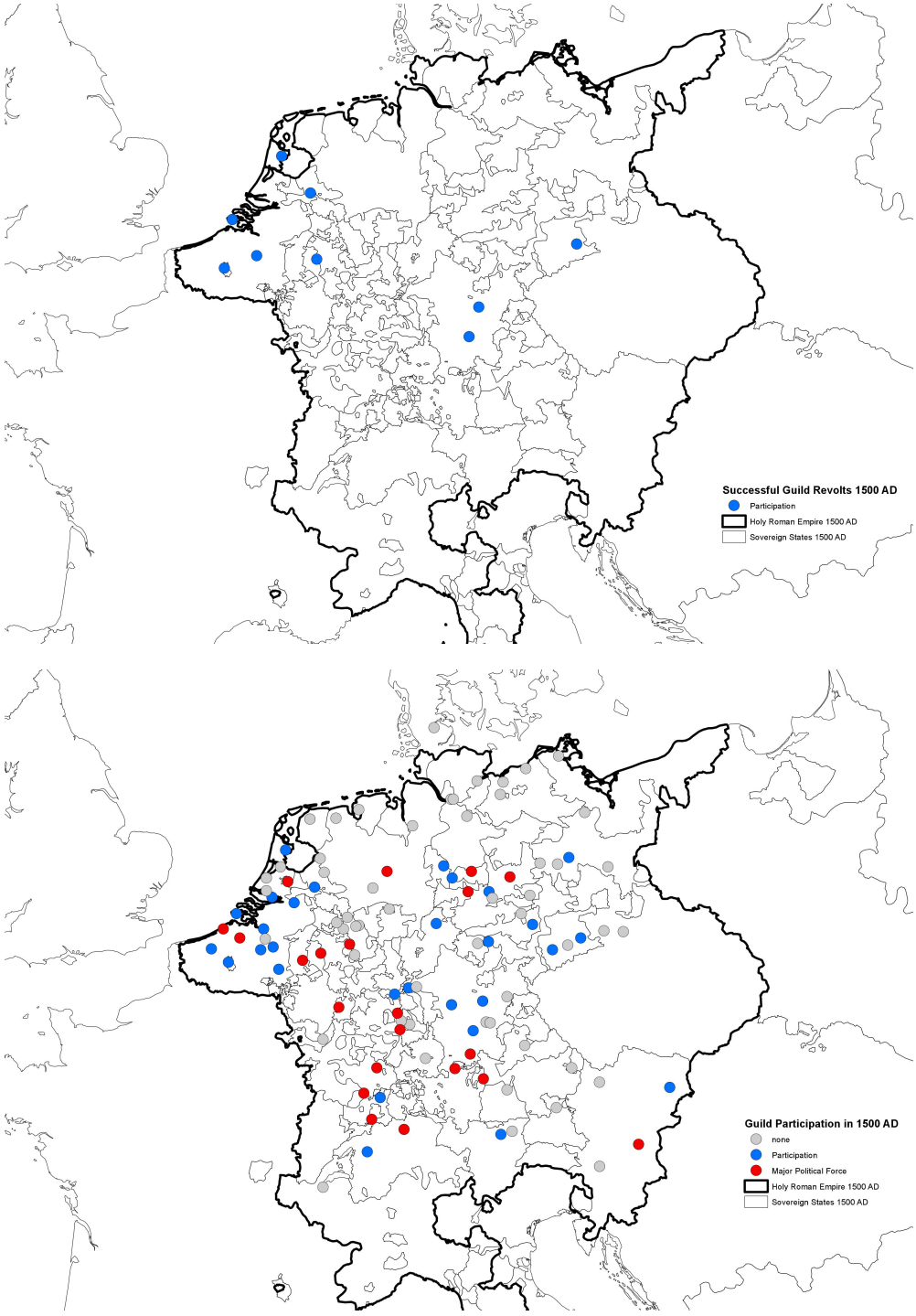


Figure 4.2: Spatial Distribution of the Guild Revolts and Their Third Wave

In Table 4.2, I conducted OLS regressions to predict the occurrence of a revolt in a respective wave by the geographic coordinates of the cities and Imperial circle dummies.[6]

These linear probability models complement the visualization of the evolution of guild revolts in Figure 4.1. They confirm that the first wave of revolts in the 13th century were concentrated in the upper Rhenish circle while the subsequent wave in the 14th century primarily took place in the south west of the sampling area (in low latitudes and longitudes) especially in the Swabian circle (probability of a successful guild revolt is around 50 % higher than for the Bavarian circle constituting the base group). But the second wave seems to have had another north-eastern regional core in the Saxon Circle (later separated into the lower and upper Saxon circles). Finally, the last wave of revolts in the 15th century was geographically concentrated in the Low Countries (i.e., the Burgundian Circle) and in the Franconian Circle (nowadays in Hesse and the north of Bavaria) although the significant negative coefficient of Longitude in column (5) indicates that the main center of revolts was in the Low Countries.

Finally, the overall picture of guild participation after the end of the revolts in 1500 AD is depicted in the lower map of Figure 4.2. When looking at this map one can infer that there were almost no cities with guild participation in the north of Germany and the Netherlands, i.e. in core area of the Hanseatic League (Dollinger 1966). This is in line with historical evidence that the Hansetic League often successfully suppressed guild revolts and defended the ruling merchant elite in its member cities (e.g. Luther 1968). I also see that guild participation was mainly concentrated in south-west Germany, today's Alsace-Lorraine and Belgium

[6] Imperial circles were established as administrative units in the Holy Roman Empire in 1512—that is shortly after the period of the revolts. Nevertheless, they could capture much of the heterogeneity between the areas of the Holy Roman Empire in the previous centuries. Furthermore, as the 104 cities in the data set are located in 73 territories it is no alternative to use territory fixed effects instead. I also include a separate dummy for the "electorate" territories, the so called "Kurfürstentümer', i.e. the territories of the "Kurfürsten" the secular rulers and archbishops who were allowed to elect the German king.

Table 4.2: Geographic Evolution of the Guild Revolts

Dependent Variable	Successful Revolt in					
	13th century		14th century		15th century	
	(1)	(2)	(3)	(4)	(5)	(6)
Latitude	-0.012	-0.011	-0.057***	-0.096**	0.006	-0.026
	(0.017)	(0.030)	(0.022)	(0.037)	(0.009)	(0.023)
Longitude	0.011	-0.008	-0.035**	-0.020	-0.009	0.02
	(0.008)	(0.025)	(0.013)	(0.029)	(0.011)	(0.016)
Electorate		0.138		0.205		0.204*
		(0.136)		(0.157)		(0.111)
Upper Rhenish Circle		0.393*		0.07		0.068
		(0.227)		(0.225)		(0.059)
Saxon Circle		0.150		0.389*		0.105
		(0.184)		(0.224)		(0.1)
Swabian Circle		-0.100		0.523*		0.004
		(0.096)		(0.264)		(0.023)
Franconian Circle		0.083		-0.118		0.35*
		(0.178)		(0.12)		(0.207)
Westphalian Circle		-0.095		0.264		0.234
		(0.175)		(0.271)		(0.149)
Austrian Circle		0.055		0.154		-0.083
		(0.222)		(0.248)		(0.063)
Burgundian Circle		-0.112		0.369		0.420**
		(0.231)		(0.305)		(0.173)
No. of Revolts	14		28		11	
Obs.	104	104	104	104	104	104
R^2	0.017	0.163	0.111	0.201	0.011	0.132

Notes. Heteroskedasdicity robust are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The base group for the Imperial circle dummies is the Bavarian circle. Each regression includes a constant not reported.

(the duchies of Flanders and Brabant). In central Germany there is a medium frequency of guild participation and there are only a few cities with a guild constitution (Brunswick, Goslar and Magdeburg) all of which were members of the Hanseatic league and important political, commercial or ecclesiastical centers and therefore probably predestined for the outbreak of a guild revolt. In those cities the guilds succeeded in their attempts to gain political power despite the opposition of the Hanseatic League. There are almost no cities with guild participation in Bavaria which could be due the comparatively strong position of the Bavarian ruler and to the fact that bishops there (e.g. in Passau) were often successful in suppressing the guilds.

4.2 Origins of Guild Revolts—Historical Discussion and Theoretical Considerations

Broadly spoken, existing historical research on the causes of the guild revolts identified two kind of factors as playing a major role in the occurrence of the late medieval guild revolts.

First, many scholars highlight the role structural (or endogenous) factors played in the causation of the revolts (e.g. Blickle 1988, Czok 1966, Epstein 1991, Luther 1968, Maschke 1959 or Pirenne 1963). Hence, the guild revolts are understood as consequence of the revival of trade, commerce and the institutional innovations connected with this "commercial revolution" of the late medieval period. Many researchers (e.g. Blickle 1988, Luther 1968) have pointed to the stark contrast between the economic importance of the craftsmen and their non-existent political rights as major cause of the revolts. The theoretical framework of Acemoglu et al. (2005a) and Acemoglu and Robinson (2006) is useful to understand this argument. While the de jure political power was concentrated in the hand of the patriciate, the de facto political

power shifted to the craft guilds and non-patriciate merchants. This shift was the outcome of the economic institutions, which allocated more and more resources to the guilds. This was true not only for economic resources but also for military resources, as the guilds often also provided the city's military. Consequently, the guilds aimed on gaining de jure political power by making a revolt—and they actually most often succeeded at least temporarily.

This story also fits with a second often-mentioned structural reason for the guild revolts: the decline or degeneration of the elite (Blickle 1988, Luther 1968, Planitz 1966, Pirenne 1963). What began as the rule of economically successful and sometimes even philanthropic merchants engaged in long-distance trade activities usually ended-up in an enclosed, oligarchic rule of a few families. This oligarchic rule increased inequality, which is a major cause of revolts and revolutions (Acemoglu and Robinson 2001, 2006). Furthermore, this degeneration had various other effects giving rise to the occurrence of a revolt.

At first the families often fought against each other often resulting in the deaths of important members of such dynasties leaving both a vacuum of power and a rational reason—the restoration of peace—for the guilds and burghers to take over government. Second, corruption, misgovernment and wars led by the elites resulted in financial problems and tax increases not for the elite but for the majority of people without political rights (e.g. Wissell 1971). This increased inequality and the likelihood of revolt. Last, the elites lost their economic and educational advantages since they stopped being engaged in long-distance trade and lived as gentlemen of leisure or pensioners (Luther 1968). The degeneration of patrician and oligarchic rule is in line with the theoretical considerations of Acemoglu (2008),the empirical findings on that matter for a cross-section of European cities (e.g. Epstein 2000 or Stasavage 2011, 2014) for particular cases like e.g. Venice (Puga and Trefler 2014) and classical ideas about a

"political" or "regime cycle" going back to Plato and Aristotle and which are also emphasized by Pirenne (1963). More generally, this picture underlines that economic opportunities and institutions are essential prerequisites for political change and the emergence of participative political institutions. If this is true, the guild revolts can be seen as a phenomenon similar to the increase of Atlantic trade in the early modern period that laid the ground for further institutional improvements (Acemoglu et al. 2005). To sum up, according to this argument, the elite became the victims of the prosperity, economic and social complexity it had generated by itself.

Second, historians discuss several exogenous factors potentially important for the occurrence of guild revolts. Most prominently, they argue that the outbreak of the Black Death in the 14th century was connected to the occurrence of guild revolts in various way (e.g., Blickle 1988, Cohn 2008, Luther 1968 or Planitz 1966). For example, it led—together with climatic changes at the end of the medieval warm period—to a severe agrarian crisis resulting in a decline in the prices of agricultural goods and a corresponding increase in the prices of industrial commodities and real wages in cities—as mortality form the plague was higher in cities than in the countryside. This divergence of living standards between rural and urban areas led to massive migration movements of people from the countryside to the cities. This influx of people, especially craftsmen, resulted in a conflict about the restrictiveness of migration policy between the urban craftsmen and the city council controlled by the merchant elite. [7] Moreover, the persecution of Jews was often connected with an upheaval of the old elites (Luther 1968) and was also connected with the Black Death epidemics (Cohn 2007). Finally, the double-election of the German King in 1314 AD was a source of intra-city conflicts as the

[7] More on the nexus between the Black Death, the Agrarian crisis and its impact on the economy can be found in Henning (1994).

guilds and the elite were often loyal to other kings and were strategically supported by the king to which they were loyal. Sometimes the guilds used this conflict to revolt against the elites and to come to power themselves (Luther 1968).

What is more, most scholars agree that probably both type of factors jointly contributed to the emergence of the guild revolts (e.g. Luther 1968). Hence, it is likely that the both exogenous and structural factors are jointly responsible for the causation of the revolts.

Therefore, it is the aim of this article to test whether structural or exogenous factors or both were responsible for the occurrence of the late medieval guild revolts.

4.3 Explaining the Guild Revolts—Empirical Evidence

4.3.1 Variables

4.3.1.1 Dependent Variables

To explore the roots of the guild revolts in the 14th and 15th century I make use of three different dummy variables acting as dependent variables.

The first dependent variable is a dummy variable equal to one if a city experienced a successful guild revolt and the guilds participated in the city council ("Guild Participation Dummy"). Second, I use a dummy variable reporting the occurrence of guild revolts in a city, i.e. it is equal to one if the sources indicate a guild upraising, regardless of whether it was successful (i.e. the guilds participated in the city government after the revolt) or not ("Guild Revolt" Dummy). Third, a dummy variable serves as dependent variable indicating cities with a guild constitution, i.e. cities in which the guilds not only participate in the city council but also had the majority or all of the seats ("Guild Constitution Dummy").

The three different guild revolt measures are chosen because using only one of them would potentially lead to erroneous conclusions. This is because focusing only on successful revolts could give the wrong picture of their underlying causes. This is especially true if there were systematic reasons behind the failure of some revolts. The choice to consider separately those cities under full political control of the guilds is justified for several reasons. First, the influence of guilds on the actual politics of a city was much lower when they only had e.g., one third of the representatives in the city council instead of the majority. Even if the guilds held half of the seats the actual influence of those representatives was often limited (Maschke 1959). Hence, the effect of successful guild revolts is expected to be lower in those cities than in cities where the triumph of craftsmen was absolute and they became the dominant political force.[8]

4.3.1.2 Main Explanatory Variables

The main explanatory variables are proxies for the structural and exogenous factors discussed in the previous section. Structural factors are proxied by economic variables.

If it is correct that the guild revolts endogenously emerged as a byproduct of the commercial revolution they should have occurred primarily in the commercial and economic centers of the late medieval HRE. To test this, I collected data on the centers of proto-industry in the HRE, i.e. I construct a variable that is equal to zero if a city was not an important cen-

[8]Some historians, e.g. Luther (1968) argue for the necessity of a even more fine-grained categorization scheme of the political influence of guilds. He distinguishes between five categories of cities: (i) Cities where the majority of the seats in the city council is held by the patriciate, (ii) cities in which guilds and the patriciate have half of the seats respectively, (iii) cities where the guilds provide the majority of the representatives in the city council, (iv) cities where the guilds have all seats in the city council and (v) cities that remain under the complete control of the patriciate. However, it is not obvious what the difference between e.g. category (iii) and (iv) actually is. In conclusion, these five categories seem to be much more arbitrary than necessary. Moreover, for many cities the information provided by the sources is not detailed enough to code the cities according to such a categorization scheme. This is why I follow e.g. Fuhrmann (1939) and stick to a three category scheme (i.e., (i) no guild participation, (ii) some guild participation and (iii) guilds are the major political force).

ter of proto-industry, one if it was a center of textile (cloth, linen, silk or woolen industry) *or* metal industry and two if it was a center of both industries.[9] As second measure, I include a dummy variable indicating whether a city was an important supra-regional center of trade. Being an important trade center could raise the probability of a guild revolt since medieval trade and commerce created the economic opportunities and high inequality that were conductive for guild uprisings. On the other hand, the local merchant elite had a strong incentive to suppress these revolts and to defend its power by all available means and it can be assumed that the power of guilds was higher in industrial centers than in commercial centers primarily engaged in trade but not production (e.g. Maschke 1959). Furthermore, it is justified to consider the interaction of commercial and industrial importance (i.e. a city that was both a center of industry and trade) as it was probably decisive for the outbreak of a revolt. This for example can be illustrated with the case of Brunswick—that was a notable center of production—there was a successful guild revolt despite the fact that it was a member of the Hanseatic League. Actually, many of the important members of the Hanseatic League were only engaged in large-scale trade and not production activities. In effect, the craft guilds were not that powerful in these cities. Hence, it was easier for the merchant elites to prevent a revolt of the craft guilds there.

The most important exogenous trigger of the revolts is the nexus of the late medieval agrarian crisis and the Black Death. To capture the effect of these events I use two variables. First, I include a variable reporting the suitability of the soil around a city for agriculture. Agricultural suitability serves as a proxy for the agricultural productivity of a city's hinterland which could be decisive for the outbreak of guild revolts because of the agrarian crisis. It is supposed

[9] Details about the construction of these variables (sources etc.) is provided in the Appendix C.1.2.2.

that areas with better soils showed a higher agricultural productivity and were not so severely affected by the crisis and its consequences. Furthermore, I consider a measure of a city's urban potential, i.e. the distance-weighted sum of the population of all other cities in the data set of Bosker et al. (2013).[10] "Urban Potential" serves as a measure for the centrality of a city within the European city network and therefore as a proxy of e.g. the size of its potential markets but also of the characteristics of its surrounding hinterland (Bosker et al. 2013). As it proxies for the importance of a city relative to its hinterland, it is related to the extent to which a city was affected by the agricultural crisis, the Black Death and the migration from rural areas to cities following both events. For example, if a city was located in a rural area, it is supposed to be subject to larger flows of migrants from the countryside and thus it should be more affected by the agricultural crisis (especially, as the mortality rates due to the Black Death were considerably higher in the cities than in the countryside).

4.3.1.3 Further Explanatory Variables

Following insights of the historical and economic literature I include several variables to diminish concerns about omitted variables.

First, I take into account the pre-existing political institutions in cities and territorial states. I include dummy variables that indicate the existence of institutionalized burgher representation and participative election of city government. These variables also originate from the "Participative Political Institutions in Medieval Europe Database". They should account for the pre-existing institutional environment in the city. Furthermore, they consider the fact

[10] For a detailed description of the variables originating from Bosker et al. (2013) the reader is referred to their data appendix, available online at this url http://www.mitpressjournals.org/doi/suppl/10.1162/REST_a_00284/suppl_file/REST_a_00284_data_appendix.pdf; accessed on March 12th, 2014.

that the outbreak of a revolt is less likely if the political institutions in a city are already relatively inclusive.

Third, I include several other variables that proxy for the political and ecclesiastical importance of a city. All these variables are considered to be relevant factors in the causation of the guild revolts by some of the consulted historical studies and were relevant in some of the studied cases of revolts. Among them are variables indicating the presence of a bishop or archbishop, whether a city had the status of a free or imperial city or was a residence of a secular ruler. A city had to have a relatively large degree of autonomy for a guild revolt to occur. Due to this, imperial cities should have a high probability of a guild revolt (Blickle 1988, Kluge 2009) . Complementary, a residence city of a secular ruler might have a lower probability for a revolt since the autonomy of such cities was usually limited—although kings in general had a relatively pragmatic attitude toward guild participation. A special case are the residences of archbishops. While archbishops were sometimes on the side of the guilds, supporting them to regain power in the city, they sometimes fought against the attempts of the guilds. Thus, it is not a priori certain what the effect of the presence of an archbishop should be. The effect of archbishops is also unclear because their military strength was more limited than those of secular rulers. Moreover, their relationship with local secular rulers was often conflicting. These aspects strengthen the arguments for a positive effect of archbishops on the occurrence of guild revolts (Isenmann 1988). It is also possible that negative and positive effects offset each other leading to no detectable effect of archbishops.

Finally, Kluge (2009) mentions that successful revolts inspired revolts in neighbor cities, although the revolts in general remained a local phenomenon. This gives rise to the conjecture that spatial spillovers and strategic considerations played a certain role in the diffusion of guild

revolts similar to, for example, the case of the spread of Protestantism (Cantoni 2012). Hence, it is likely that the institutional arrangements of neighboring cities could have influenced the introduction of participative political institutions and the occurrence of guild revolts.

Yet, it is not clear in which direction these strategic spatial spillovers worked. On the one hand, a guild revolt in a neighbor city may have increased the probability of a successful guild revolt, e.g. because the guilds, craftsmen and other burghers saw higher chances of success or found support from their neighbor city in their revolutionary attempts. On the other hand, the elites of a city that saw a successful guild revolt in a neighbor city could try to prevent it by forming an alliance with the elites of other cities. If this was the case, I expect negative neighborhood spillovers. Such negative neighborhood spillovers will also occur when the elite, in order to prevent a likely revolt, introduce some kind of institutions giving the citizens a right to have a say in the political matters of the city. At last, if significant neighborhood spillovers existed this means that the individual observations are not independent from each other, making it necessary to account for this fact to have unbiased estimates.

To consider the impact of such spatial spillovers, I will include a variable for the share of neighbor cities with guild participation within a 150km distance band around the city under consideration to some of the regressions.[11]

Appendix C.1 provides an overview of these variables, their sources and definitions.

[11] I also tried a 250 and 500km buffer distance band around a city. The result was that with an increasing distance band the influence of the neighborhood spillovers become smaller and smaller indicating that—as proposed by Kluge (2009)—revolts more far away than 150km did not matter much for the outbreak of a revolt in a city.

4.3.2 Empirical Approach and Results

To unravel the origins of guild revolts and the political change connected with successful ones, a straightforward strategy consists in running probit regressions where the above mentioned independent variables are regressed on one of the three dependent variables. Such estimates are probably biased by reverse causality since the dependent variable are likely to influence some of the included regressors. A first approach to avoid these kind of endogeneity problem is to use pre-treatment values of the regressors in the estimation. To achieve this I created, based on the panel data set, a cross-sectional data set containing the values of the regressors in the immediate period before the revolt before a (successful) guild revolt broke out in a city. For cities that did not experience guild revolts I keep the observations in the year 1500 AD. This is because after 1500 AD no new guild revolts occurred and the treatment period ended (probability of a new revolt becomes zero after 1500 AD). A descriptive overview of this cross-sectional data set is given in Table C.1.

I investigate which pre-treatment characteristics of cities determined the occurrence and success of guild revolts by estimating variants of the following equation using the probit method:

$$\begin{aligned} &Pr(GUILDPARTci, t|\text{STR}_{ci,Pre-Treat}, \text{EXOG}_{ci}, \text{X}_{ci,Pre-Treat}) \\ &= \Phi(\alpha + \beta'\text{STR}_{ci,Pre-Treat} + \gamma'\text{EXOG}_{ci,Pre-Treat} + \delta'\text{X}_{ci,Pre-Treat} \\ &+ \lambda_c + \epsilon_{ci}) \end{aligned} \tag{4.1}$$

Where $GUILDPART_{ci}$ represents the three dummy variables measuring guild revolts and guild participation in the city council, $\text{STR}_{ci,Pre-Treat}$ is a vector containing proxies for the structural triggers of the revolts, $\text{EXOG}_{ci,Pre-Treat}$ represents the variables capturing the most important exogenous factors and $\text{X}_{ci,Pre-Treat}$ is a vector of control variables. λ_c are

imperial circle fixed effects and electorate fixed effects and ϵ_{ci} is the error term capturing unobserved factors. I choose to estimate this equation using probit estimation. For each of the three dependent variable the results are presented in a separate Table.

Additionally, I will investigate whether and how structural factors interacted in the causation of the revolts by interacting the trade city dummy and the proto-industry variable. Hence, equation one becomes to:

$$\begin{aligned} &Pr(GUILDPARTci,t|\text{STR}_{ci,Pre-Treat},\text{EXOG}_{ci},\text{TRADE}*\text{PROTOIND}_{ci},\text{X}_{ci,Pre-Treat}) \\ &=\Phi(\alpha+\beta'\text{STR}_{ci,Pre-Treat}+\gamma'\text{EXOG}_{ci,Pre-Treat}+\delta'\text{TRADE}*\text{PROTOIND}_{ci} \\ &+\theta'\text{X}_{ci,Pre-Treat}+\lambda_c+\epsilon_{ci}) \end{aligned} \tag{4.2}$$

Where $\text{TRADE}*\text{PROTOIND}_{ci}$ is the interaction term and the rest of the equation is identical to equation (1).

Results of estimating equations (1) and (2) are presented in Tables 4.3–4.5. In all three tables, the variables proxying structural and endogenous factors are introduced separately first and then they are included simultaneously. Afterwards, the regressions form first columns are repeated but this time including he neighborhood spillover variable (share of cities with guild participation in a radius of 150km around a city). Each regression additionally includes all mentioned control variables and imperial circle dummies. The tables report average marginal effects.

In Table 4.3, the dependent variable is guild participation in the city council, the main variable of interest in this study. With regard to the structural factors, columns (1) and (2) of Table reveal that both important trade cities as well as centers of proto-industry played a significant role for explaining guild participation. Both variables are individually and jointly (as indicated by the Chi^2 test reported at the bottom of the Table) significant and show a sizable positive effect on the probability of guild participation in the city council. However,

Table 4.3: Explaining Guild Participation in City Government

Dep. Var.	Guild Participation (Successful Revolt)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						With Local Spatial Spillovers		
Proto-Industry	0.286***	0.212**		0.282**	0.236**	0.161		0.230**
	(0.104)	(0.105)		(0.122)	(0.106)	(0.101)		(0.116)
Trade City	-0.174*	-0.229**		-0.137	-0.142	-0.202*		-0.085
	(0.101)	(0.116)		(0.094)	(0.100)	(0.118)		(0.093)
Proto-Industry × Trade City		0.342				0.342		
		(0.239)				(0.241)		
Urban Potential			-0.040***	-0.039***			-0.040***	-0.039***
			(0.011)	(0.011)			(0.010)	(0.010)
Agricultural Productivity			0.221	0.266			0.056	0.114
			(0.207)	(0.198)			(0.194)	(0.194)
% of Cities with Guild Participation (150km radius)					0.378**	0.382**	0.471***	0.350**
					(0.177)	(0.175)	(0.163)	(0.157)
Imperial Circle Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electorate Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	104	104	104	104	104	104	104	104
Chi^2	11.19	14.24	17.62	32.35	6.597	8.495	16.96	21.38
p-value	0.004	0.003	0.000	0.000	0.037	0.037	0.000	0.000

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. In all columns average marginal effects (AME) are reported. The unit of observation is a city. Each regression includes a constant not reported as well as a set of control variables including a dummy variables reporting whether a city was an imperial city, a residence of a secular ruler or of a bishop or archbishop as well as dummy variables showing whether there were participative election procedures or institutionalized burgher representation in a city.

in line with the discussion in section 3, the estimates suggest that while industrial centers had a significantly higher probability of a successful revolt, trade cities had a smaller. Therefore, it is confirmed that the commercial revolution strengthened the craft guilds and lead them to make revolt to get political rights to say in cities where their position was strong as they were centers of proto-industry. In contrast, cities that primarily concentrated on trade (and not production) like most of the cities of the Hanseatic league, had a lower probability of a successful revolt. This is in line with historical evidence and supports the argument that a strong merchant elite could successfully handle to remain in power after a revolt or to prevent a revolt in the first place. This ambiguity in the effect of structural factors is interesting, as it tells us, that not economic prosperity per se but mainly the upswing of proto-industry was conductive to political changes and a transition towards more inclusive political institutions. Hence, only when economic growth enriched new, formerly poor groups of the society it sometimes resulted in political changes. Finally, when the proto-industry and trade city dummy are interacted (column 2) there is no evidence for a significantly different revolt probability of cities that are both centers of proto-industry and trade (like e.g. Brunswick). However, as there are only 6 cities that are identified as centers of proto-industry and trade the insignificance of the interaction term (that actually shows a comparatively large coefficient) is probably due to the small amount of variation.

The agricultural crisis and the black death also matter jointly ($Chi^2 = 14.24$) but only the urban potential variable shows a significant negative coefficient throughout all observations, while agricultural productivity is always insignificant. Thus, it seems that cities with a low urban potential, i.e. that are surrounded by a rural area have a higher revolt probabil-

ity than cities in urbanized areas while agricultural productivity seems not to play a role.[12] Nevertheless, this result delivers evidence in support of those historians that argue for the revolt-triggering effect of the considerable urban-rural migration following the agricultural crisis and the Black Death. In column (4) both kind of variables are included together in one regression. Urban potential and the proto-industry variable remain significant with a virtually identical coefficient while the coefficient of the trade city dummy becomes smaller and insignificant. Most likely, this loss of significance can be attributed to the fact that there is an intuitive significant positive correlation between urban potential and and the trade city dummy.[13] Hence, the urban potential variable takes away some of the effect of the trade city variable.

In sum, the results suggest that both, exogenous factors like the agricultural crisis and structural factors like the commercial revolution and the prosperity of proto-industry were prominent factors in the causation of the revolts.[14]

In columns (5)–(8) I additionally add the share of cities with guild participation within a 150km radius around the city to the specification. It always enters with a significant and large positive coefficient providing evidence for the existence of neighborhood spillovers and the importance of strategic considerations in the spread of the revolts. Existing participation of guilds as result of a successful revolt increases the probability of a successful revolt in the city under consideration by around 38%. Interestingly, the spillover variable reduces

[12] A possible interaction of both factors would also not yield a significant result and hence, the effect of urban potential and agricultural productivity do not depend on each other.

[13] The bivariate correlation between both variables is around 0.2

[14] I ran additional regressions were I interact the agricultural productivity dummy and the proto-industry variable or the urban potential and proto-industry variable. In both cases the interaction term was always insignificant and had a low amount of additional variation. I therefore decided not to include this regressions in the main text. However, the estimations are available from the author upon request.

the significance and robustness of the proto-industry and trade city dummy. Again, this is expectable and follows from the fact that not only the guild revolts but also trade and proto-industry was clustered in space and therefore, the spillover variable is significantly correlated with both structural variables. Nevertheless, the existence of neighborhood spillovers and hence, the non-independence of the observations, does not change the overall conclusions drawn before.

Table 4.4 repeats the regressions of Table 4.3 but with the guild revolts dummy, i.e. also including unsuccessful revolts that did not lead to participation of the guilds in the city council. Here, the interaction between trade and proto-industry is not included as the interaction term would be a perfect predictor and hence is excluded from the probit model.[15] The results are identical, but the trade cities and neighborhood spillovers are not significant here. Additionally, the effect of urban potential is also considerably reduced yet remains statistically significant. Despite this, especially when both structural variables and crisis variables are included jointly (as in column (3)) the differences between the results with and without unsuccessful revolts (Table 4.4 column (4)) are minor suggesting that there are no systematic differences between cities with successful and unsuccessful revolts responsible for success or failure of a revolt. However, it is to mention that according to the estimates revolts per se are significantly more likely in imperial cities, what is not the case for guild participation. In conclusion, while there seems to be no connection between the success of a revolt and imperial cities, the outbreak of a revolt per se is significantly more likely in an imperial city. This finding confirms the reasoning of historians and the conclusion of many quantitative case studies (e.g. Blickle 1988 or Kluge 2009). It also suggests that the revolts were primarily intra-

[15] Alternatively, I estimated the specification as linear probability model using OLS. The results are similar to the probit model with the interaction and the interaction term itself is clearly insignificant.

urban power struggles taking place in independent city states and not so much revolts against a territorial ruler and its representatives. The insignificance of the neighborhoods spillovers indicates that the revolts per se were less spatially clustered and that, the preventive effect of failed revolts might had offset the reinforcing effect of successful ones.

Table 4.4: Explaining Guild Revolts (Successful & Unsuccessful)

Dep. Var.	Guild Participation (Successful Revolt)					
	(1)	(2)	(3)	(4)	(5)	(6)
						With Local Spatial Spillovers
Proto-Industry	0.301**		0.271**	0.291**		0.255**
	(0.126)		(0.125)	(0.130)		(0.126)
Trade City	-0.032		0.048	-0.022		0.073
	(0.103)		(0.098)	(0.105)		(0.101)
Urban Potential		-0.029***	-0.028***		-0.029***	-0.029***
		(0.008)	(0.008)		(0.008)	(0.008)
Agricultural Productivity		0.063	0.051		-0.000	-0.008
		(0.200)	(0.198)		(0.207)	(0.208)
% of Cities with Guild Participation (150km radius)				0.109	0.190	0.147
				(0.165)	(0.162)	(0.155)
Imperial Circle Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Electorate Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	104	104	104	104	104	104
Chi^2	5.716	13.24	18.64	5.026	13.35	16.59
p-value	0.057	0.001	0.001	0.081	0.001	0.002

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. In all columns average marginal effects (AME) are reported. The unit of observation is a city. Each regression includes a constant not reported as well as a set of control variables including a dummy variables reporting whether a city was an imperial city, a residence of a secular ruler or of a bishop or archbishop as well as dummy variables showing whether there were participative election procedures or institutionalized burgher representation in a city.

Finally, in Table 4.5, I consider only the cities in which the guilds succeeded in completely taking over the government (i.e., gained the majority or all seat in the city council). To consider these cities separately could be useful if there were systematic differences in the determinants of revolts that resulted in such a complete success of the guilds. Furthermore, in considering only these cities I avoid the more gray areas of guild participation were the guilds are only a minority in the council and there actual political influence remains unclear. Hence, in Table 4.5 I only look at cities in which a guild revolt resulted in considerable actual political influence of the guilds. As in Table 4.3, being a center of proto-industry is robustly and positively associated with having a guild constitution after a successful revolt and neighborhood spillovers also have a positive and significant influence. However, urban potential is insignificant and exogenous factor were not decisive for the implementation of this type of political change after a successful revolt.

Table 4.5: Explaining Guild Constitutions

Dep. Var.	Guild Constitution							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					With Local Spatial Spillovers			
Proto-Industry	0.193***	0.151**		0.182***	0.174***	0.131**		0.168***
	(0.063)	(0.065)		(0.066)	(0.063)	(0.066)		(0.064)
Trade City	-0.022	-0.094		-0.040	0.002	-0.073		-0.003
	(0.091)	(0.110)		(0.092)	(0.092)	(0.116)		(0.092)
Proto-Industry×Trade City		0.213				0.214		
		(0.174)				(0.164)		
Urban Potential			-0.005	-0.004			-0.006	-0.005
			(0.007)	(0.008)			(0.007)	(0.008)
Agricultural Productivity			0.219	0.167			0.138	0.074
			(0.185)	(0.162)			(0.174)	(0.149)
% of Cities with Guild Participation (150km radius)					0.291*	0.295**	0.330**	0.276*
					(0.150)	(0.147)	(0.152)	(0.146)
Imperial Circle Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electorate Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	104	104	104	104	104	104	104	104
Chi^2	9.776	10.51	2.570	10.82	7.682	9.039	1.633	8.540
p-value	0.00754	0.0147	0.277	0.0286	0.0215	0.0288	0.442	0.0737

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. In all columns average marginal effects (AME) are reported. The unit of observation is a city. Each regression includes a constant not reported as well as a set of control variables including a dummy variables reporting whether a city was an imperial city, a residence of a secular ruler or of a bishop or archbishop as well as dummy variables showing whether there were participative election procedures or institutionalized burgher representation in a city.

4.4 Discussion and Conclusion

What caused political change towards more participative city governments in late medieval cities? Was it the result of exogenous circumstances like the plague or climatic changes or was it a consequence of economic prosperity and the improvement of economic institutions during the commercial revolution, or both? The result of this study suggest that both factors played a decisive role in the causation of the late medieval guild revolts and the political changes towards participation of the guilds. Being a center of proto-industry as well as being located in a rural area are significant predictors of guild participation in the city council and the outbreak of a revolt. This means, that purely institutional explanations of the transition towards more inclusive institutions according to which a virtuous cycle of better economic institutions leading to better political institutions leading to even better economic institution and so forth, tell only one part of the story. Nature, History and strategic considerations of guilds and elites tell the rest. Given this results, it seems that political change in the late medieval neither was the pure result of structural factors nor of purely exogenous events.

However, the fact that only structural factors seem to be significant predictors when the guilds achieved the full control of a city's government indicates that structural factors might have played the more prominent role giving credit to the institutionalist view of political change as outlined, among others, in Acemoglu and Robinson (2012). Yet, the interesting result that trade cities are less likely to have guild participation in the city council, suggests an even more differentiated picture: It was not the economic upswing of the late medieval period itself that caused the emergence of participative political institutions, it was the prosperity of proto-industry that enriched new groups of the society, namely the craftsmen and their political and economic associations, the craft guilds. The lesson here is, that not economic

prosperity per se matters, but that all groups of citizens profit from economic growth and not only the ruling elite. A top-down diffusion of wealth, so called inclusive growth, therefore was the key for the political emergence of participative political institutions in late medieval cities.

"Die Summe aller Einzelinteressen ergibt nicht Gemeinwohl sondern Chaos."

Manfred Rommel

5

Political Change and Economic Development. Evidence from the Late Medieval German Lands*

When political change towards more democracy can successfully increases long-run prosperity? Under which conditions does an increase in the participativeness of the polit-

*An earlier version of this chapter was published as EHES Working Paper in Economic History No. 73 entitled "Participative Political Institutions and City Development, 800—1800" (Wahl 2015). The author is indebted to Davide Cantoni, Edward Glaeser, Sibylle Lehmann-Hasemeyer, Alexander Opitz and Aderonke Osikominu as well as seminar participants at the 30th EEA Congress in Mannheim, in Esbjerg, the LSE and at the Trinity College Dublin for helpful discussions and suggestions.

ical process such as the extension of franchise (Acemoglu and Robinson 2000, Lehmann-Hasemeyer et al. 2014) and the political empowerment of common people in general, have positive consequences for economic development? Previous research comes to inconsistent conclusions about the effects of democracy or democratization on economic development (for a review see Przeworski and Limongi 1993, or Acemoglu et al. 2014) by working out the possible negative and positive growth effects of democracy (e.g., secure property rights and increased economic stability vs. susceptibility for rent-seeking or harmful redistribution). Yet, what is lacking is a study linking these positive and negative aspects of democracy to specific political institutions and exploring their effects on long-run development.[1] Information about which type of political institutions/ framework should be implemented to make democratization beneficial for long-run economic growth is useful for a better understanding of how to transition successfully to democracy, as well as for a better understanding of the different development effects of various aspects of democracy and the political institutions associated with it

This paper tries to address these questions by looking at the rise of participative political institutions (PPIs) in the cities of the late medieval German Lands. These participative political institutions can be defined as "political institutions that are open to one or more groups of citizens. Alternatively, participative political institutions can constitute rules or constitutional procedures (like e.g. electoral procedures) ensuring that one or more group of citizens have an influence on the composition and/or political decisions of the government" (Wahl

[1] The study closest to this is that of Papaioannou and Sourounis (2008). However, unlike the present study, they consider only the short-run effects (10 years after transition) of a transition from autocracy to democracy. Furthermore, they focus on the 20th century and consider a complete regime change while this study is only concerned with an increase in participativeness of the political process that is not identical to a complete transition to democracy.

2015d, pp. 5).[2] An example of participative political institutions are universal (passive and active) suffrage. In consequence, universal suffrage is more participative than adult male suffrage (which clearly excludes women). Thus, the turn towards more participative political institutions can be seen as the enlargement of political rights to larger groups of the population; and the rise of such institutions is associated with an increase of democracy or the rise of the middle class. Yet, unlike inclusive institutions, these participative political institutions are less frequently studied, especially for periods before the 19th century.

According to historical sources there were three major types of participative political institutions (Wahl 2015d): (i) the existence and degree of craft guild participation in the city council, (ii) the existence of a participative election mode of the city government, i.e. an electoral procedure, where the city council or the magistrate of the city was not elected by the ruler or by the members of these institutions themselves but by at least a sub-group of citizens and (iii) whether there was some kind of institutionalized burgher representation (e.g. a regularly meeting community assembly deciding on important matters of city policy). Furthermore, as the implementation of participative political institutions did not result in a completely democratic government and not all cities implemented all types of PPIs. Hence, an advantage of the historical setting is that it enables to assess the effect of the introduction of some aspects of democracy in isolation as well as their interactions.

The data set used for the empirical investigation in this paper, the "Participative Political Institutions in Pre-Modern Europe Database" (Wahl 2015d) contains information on these three types of participative political institutions in 104 cities in Germany, Austria, the German-speaking area of Switzerland (plus Geneva), Alsace-Lorraine and the Low Countries

[2] The idea of participative political institutions is also related to the idea of "generalized" vs. "particularized" institutions as discussed in Ogilvie and Carus (2014).

for every hundred year period between 800 and 1800 AD. Yet, in this study, the focus will be on the "German Lands", i.e. I will not consider the Low Countries as their political traditions and development diverged from the rest of the HRE after 1500 AD.[3] This leaves me with 83 of the 104 cities in the database that will be the subject of the later empirical investigations.[4]

The extensive margin of participative political institutions is already studied by Bosker et al. (2013) who find a positive effect of the existence of city councils on city development in Europe or compare the growth performance of autonomous (oligarchic) to non-autonomous cities in Europe (Stasavage 2014). Furthermore, there are studies comparing the economic performance of oligarchic city states with absolutist territorial states (De Long and Shleifer 1993, Dincecco 2009b Putnam 1993, Stasavage 2011). Those studies find the extensive margin of participative political institutions, for example, associated with limited government and better checks and balances leading among other things to a better provision of public goods.

However, the present paper goes one step further, as it takes into account the intensive margin of PPIs, i.e., the varying degrees of participativeness of the political institutions among cities. As there is a considerable heterogeneity in the degree of participativeness of political institutions among the cities, this enables a more precise picture to be gained of the actual effect of political participativeness. Furthermore, the data set utilized by this study allows different types of participative political institutions to be identified. This makes it possible to investigate whether there are varied effects of these types of institutions. Given the different nature of the three kinds of PPIs (i.e., their association with different aspects of democracy) it could be expected that they have other effects on city development.

[3] For example, the role and nature of the craft guilds differ from those in the rest of the Holy Roman Empire and their political centralization began considerably earlier than in the rest of the HRE.

[4] An earlier version of this study (Wahl 2015c) shows results including the Low Countries and discusses the differences to the German lands and their possible causes in more detail.

Participation of craft guilds in city councils or the establishment of burgher assemblies could for example give rise to increased checks-and-balances and an orientation of policy towards the interests of larger segments of the population. Furthermore, the political empowerment of guilds could be positive for economic prosperity, as they, e.g, helped to overcome market failures (Epstein 1998). But, given the character of the political system of medieval cities, they could also lead to rent-seeking, oligarchisation and, in the longer-run, also increasing conflicts within different groups of burghers (e.g., Olson 1982, Puga and Trefler 2014 or Stasavage 2014, Ogilvie 2008). The actual effect of guild participation in the city council is thus not a priori clear and this study can contribute to resolving this debate.

The election of the city government by different groups of citizens,conversely, is expected to increase the accountability of the government members and orientation of politics away from particular interests to public welfare–similar to the extensive margin of PPIs. Thus, it probably had a positive effect on city development. Generally speaking, I expect that the effect of an increase in participativeness has a positive effect only when it was associated with changes in the political framework like stronger orientation on public welfare or a higher degree of accountability. If higher participativeness only meant that more groups of citizens engaged in rent-seeking or a different/enlarged oligarchy this effect was probably negative or neutral.

Finally, as my database contains information about PPIs from 800 AD to 1800 AD sheds light on the long-run evolution patterns of these institutions and their effects. This makes it possible to test for e.g., the existence of an "Olson effect" (i.e, a declining positive effect of PPIs due to increased rent-seeking and stagnation (Olson 1982), over a long time. It can also add more evidence to recent economic research concerned with the interaction of political

institutions and economic (like the rise of long-distance trade in the 16th century) or historical arguments of historians about oligarchisation and elite degeneration taking away the initially positive effect of more participative political institutions (e.g., Puga and Trefler 2014, Luther 1968) and leading to a democracy "captured" by the elite (Acemoglu and Robinson 2008).

One important finding is that, pooled over all cities and centuries, there is indeed a positive effect of participative election procedures on city development. When I look closely at the temporal evolution of the effects, by interacting the PPI measures with century dummies I find that the effect of participative elections is significant during the late medieval period but not after the 15th century. These results underline the significance of participative election procedures in the later medieval revival of trade and commerce. It also supports the more skeptical views of guild government as I additionally find a negative effect of city councils with a craft guild majority on city development that vanished afterwards. In general, guild rule shows an increasingly negative effect over time. When investigating the existence of an "Olson effect" (i.e., institutional degeneration) more directly by interacting century dummies with variables reporting the number of centuries a particular PPI already exists in a city, the results suggest the presence of institutional degeneration in the case of guild rule with increasingly negative coefficients the longer the guilds ruled a city. For the case of participative elections I do not find such a declining coefficient until the 5th century of existence implying that this type of institution is—unlike guild participation or burgher assemblies—likely to have a persistent positive impact on city development.

The paper is structured as follows: Section 2 reviews the relevant theoretical, empirical and historical literature and formulates the research questions this study seeks to answer. Section 3 proceeds by describing the data used and the setting of the empirical analysis. In Section 4,

I conduct the empirical analysis and interpret the results. Finally, Section 5 concludes.

5.1 Participative Political Institutions and City Development

In medieval Europe, political institutions in which citizens could participate first emerged in the cities of the Holy Roman Empire as a consequence of the deterioration of central political power following the break-down of the Staufer dynasty in the 13th century. Often the participativeness of these institutions increased as a result of the revolts of craftsmen and other groups of burghers in the late medieval era that occurred as a consequence of both exogenous shocks like the Black Death and the late medieval agrarian crisis and the enrichment craftsmen as a consequence of the commercial revolution (e.g., Blickle 1988 or Luther 1968).[5] When such revolts were successful, craftsmen and other groups of burghers gained political rights and sometimes even completely took over the government of cities. As a result of those revolts the other types of participative political institutions emerged, such as burgher assemblies and participative election of the city government.[6]

There is a large literature investigating the institutional advantages early-modern city-states had compared to large territorial states. Guiso et al. (2013) and Putnam (1993) for example found that cities that were city states in the medieval period have a higher level of civic capital today. Stasavage (2007,2011) finds that city states with constitutional constraints on the elites had easier access to credit and a more solid fiscal policy than territorial states without checks and balances or representative assemblies. This enabled a better provision of public goods, necessary for commerce to prosper (like e.g. a functioning system of justice).[7] Finally, Avner

[5] Wahl (2015b) provides a discussion of the revolts and their causes.

[6] In fact, burgher assemblies were often implemented to prevent the outbreak of a revolt in the first place. More on the origins and evolution of political institutions in central Europe can be found in Wahl (2015d).

[7] These findings mirror the evidence of De Long and Shleifer (1993) that regions under non-absolutist

Greif (e.g., Greif 2006) has shown the role that newly developed and sophisticated political and economic institutions played in fostering long-distance trade and impersonal exchange in general.

In contrast, differences in political institutions among cities (and not compared to territorial states) and their consequences have not been investigated in any depth until now. Bosker et al. (2013) look at the consequences of participative political institutions on the extensive margin, i.e. they find that cities with institutions of communal self-governance (i.e., a city council) developed better than cities without. They argue, that those participative governments enabled, among others things, the pursuit of policies fostering industry and trade activities. The only other study in this direction that I am aware of is Stasavage (2007) who also showed that city-states with high levels of checks-and-balances had easier access to credit than city-states with less checks-and-balances. However, here again, the difference studied is the kind of regime, that is, oligarchy vs. city states ruled by a territorial ruler. Hence, Stasavage's study still does not exploit the different degrees of participativeness within oligarchic city states—which is what this paper is able to do.

To summarize, this strand of research finds positive development effects of inclusive political institutions (Acemoglu and Robinson 2012) associated with checks-and-balances, higher fiscal capacity, better provision of public goods and favorable institutional arrangements for trade and commerce. Transferring these insights to urban participative political institutions, it can be expected that they also have positive effects if they are associated with this kind of inclusiveness (or general welfare orientation). This is typically the case, as, e.g., the more sub-

("free") rule experienced better economic and social development during the medieval and early-modern period. De Long and Shleifer trace this development advantage back to a better tax policy of merchant ruled oligarchies.

groups of the population are allowed to vote the less easy it is for powerful individual groups to enforce their special interests. Hence, I would expect that participative election of city government had a positive effect on the subsequent development of the city.

However, the nature of the political framework in the medieval Holy Roman Empire (i.e, a political system characterized by clientelism, elitism and class consciousness) makes it likely that the effect of enlarging the number of groups participating in the political process can also have negative effects. Most of the arguments suggesting negative or neutral effects of the participativeness of political institutions in this setting refer to the "conflict view" of political institutions, understanding institutions as the outcome of conflicts about redistribution and as the product of changing political power (Ogilvie 2007, Acemoglu et al. 2005a).

A first argument in this context refers to the fact that city councils with participation of guild representatives were one of the most important types of participative political institutions. Hence, the question about the impact of guilds and the nature of their actual policy (rent-seeking for their members vs. policy that helped to overcome market failures to the benefit of the guilds and the rest of the burghers) is important for the direction of the impact of guild participation in the city government on development. One view, associated with Epstein (e.g., Epstein 1998, 2004) argues for a positive effect of guilds on economic development as, among others, they fostered the adoption of useful innovations and blocked that of harmful ones, ensured high quality of products, provided standardized and high-quality training of new craftsmen and increased social capital within the city. The other view is connected to Ogilvie (e.g. Ogilvie 2004, 2008, 2011) and rejects the idea that they were efficient institutions helping to resolve market failures. According to this line of thought, they were inefficient rent-seeking institutions, upheld by a small group of powerful members to enforce their po-

litical and economic interests. They erected market entry barriers and monopolies, restricted migration and blocked innovations. The debate is still ongoing and there is no consensus view on guilds. In consequence, the impact of guild representatives participating in the city council on the development of the city is a priori unclear.

Additionally, there are theoretical and empirical insights of, for example, Acemoglu (2008), Puga and Trefler (2014) and Stasavage (2014). These papers are concerned with the temporal evolution of the impact of oligarchic rule. They show that oligarchic rule initially had a positive effect on city development. After some time, however, oligarchic city-states tended to become stagnant or economically declining. This could be explained by some process of elite degeneration as the initially active long-distance merchants in the elite end up becoming pensioners or gentlemen of leisure. Alternatively, it could be that the prosperity generated by the virtuous circle of growth, enhancing political and economic institutions carried the germs of decline within itself from the beginning. The latter would fit with the case of Venice as analyzed by Puga and Trefler (2014) where newly enriched craftsmen posed a danger to the power of the old elites. To prevent a revolt and preserve their power, the elites first gave the most powerful craftsmen a political voice and afterwards restricted the level of participation of political institutions. As a result, a larger but enclosed patriciate emerged. Participation in long-distance trade was monopolized by the most influential families and the access to the city council became hereditary. Thus, inequality and social stratification increased and production activities replaced long-distance trade as the most important economic activity. If processes following this logic were typical for the development of political institutions in cities, I would observe an initial positive impact of participative political institutions on city development that declines as time elapses and at some moment becomes insignificant or even

negative.

Such logic could also be valid if the participative political institutions maintain their level of inclusiveness de jure but not de facto. Such a situation can occur, for example, after incomplete democratic transitions, i.e. democratic reforms that only introduced some aspects of democracy but not all. As shown by Acemoglu and Robinson (2008) it is then likely that the elite invests more in the de facto political power as the common citizens and prevents economic policy contrary to its interest.

Alternatively, such a temporal heterogeneity of the participative political institution's effect could arise from a typical "Olson effect" (Olson 1982), i.e. the positive initial effect vanishes the longer the same institutions exist because they become increasingly vulnerable to rent-seeking and the special interest of powerful but small groups of citizens. As a consequence, the city stagnates as its institutions are no longer oriented on the welfare of all citizens. Monopolies, cartels and regulations in favor of specific lobby groups (i.e., powerful guilds or families) will lead to a degeneration of perhaps de jure still participative political institutions, resulting in the same, or even a worse policy as in cities with no government controlled by the guilds.

In consequence guild participation in the city council or burgher assemblies that simply enlarged the groups of citizens who could participate in the political process might have a negative or neutral effect on city development. Alternatively, their positive effect could only be short-lived in nature and, thus, the broadening of political rights to formerly rightless groups could not have been an effective political innovation to sustain inclusiveness of institutions and prosperity.

Hence, this study aims to investigate the effect of different PPIs on long-run city develop-

ment but is also concerned with the temporal evolution of their effect.

5.2 Data and Empirical Setting

5.2.1 Dependent Variable and Observation Period

As I am interested in the effects of participative political institutions on city development and economic prosperity, the most suitable—and the only systematically available— variable to measure development is city population. For the present paper I rely on the city population figures provided by Bosker et al. (2013). This city population data is an updated version of the Bairoch et al. (1988) data. It includes all cities in Bairoch et al. (1988) that reached a population threshold of 10,000 inhabitants.[8]

The Bosker et al. (2013) data set includes centennial population figures for every included city starting with 800 and ending in 1800.[9]

5.2.2 Independent Variables and Sampling Area

The main explanatory variables representing measures of the different kinds of participative political institutions that I use are three different variables originating from the "Participative Political Institutions in Medieval Europe Database" (Wahl 2015d).

First, I use a binary variable indicating the existence of institutionalized burgher representation, i.e. equal to one if there was some form of institutionalized burgher representation in a city (e.g., a regularly meeting community assembly that has the right to decide, e.g., about

[8] As they only include population figures larger than 5,000 inhabitants I supplement lower figures from Bairoch et al. (1988).

[9] The population figures for 1100 AD are interpolated by Bosker et al. (2013) as for this year no estimates from Bairoch et al. (1988) are available.

the increase of taxes or the declaration of war).

Second, a dummy variable reporting the existence of a participative election mode of the city government is considered. In other words, the variable indicates whether citizens of a town were able to elect all or parts of the city government either directly or indirectly (through a community assembly or through an electoral college).

Third, I use a categorical variable called guild participation index equal to zero if guilds were not allowed to participate in the city council, which was normally the most important and powerful political institution of the city. The variable is equal to one if the guilds participated at the council, i.e. had a constitutionally guaranteed number of council members, but did not have the right to send more than half of the members. The variable is equal to two in cities with a so-called "Zunftverfassung" ("guild constitution"), that is, where the majority or even all members of the city council were representatives of a guild.

I also include a dummy variable "guild constitution" that is one if a city had such a guild constitution as an additional measure. There are several reasons to consider separately those cities under full political control of the guilds. For example, the influence of guilds on the actual politics of a city was much lower when they only had, e.g., one third of the representatives in the city council instead of the majority. Hence, the effect of successful guild politics is expected to be lower in those cities than in cities where the craftsmen became the dominant political force.

These variables represent the universe of participative political institutions in the medieval city and should thus offer a complete picture of their effects on city development.

I collected information for the coding of the three variables from available historical sources. The relevant information is primarily provided by the "Deutsche Städtebuch" (Handbook

of German Cities) edited by Keyser and Stoob (1939–1974).[10]

I code these variables for cities in today's Germany, Austria and the German-speaking part of Switzerland as well as Alsace-Lorraine. The consulted sources provide information for 83 of the cities located in these countries and included in the Bosker et al. (2013) data set.

5.3 Spatial Distribution and Temporal Evolution of PPIs

o understand the origins of participative political institutions in late medieval central Europe it is useful to look at their spatial distribution. For this purpose, Figure 1 shows maps of the distribution of the three kinds of participative political institutions in 1500 AD.[11] Figure 1a shows the distribution of guild participation in the city council in 1500 AD. Cities with no guild participation are colored gray, cities with at least some participation are blue and cities where the guilds were a major political force are red. It is evident from the maps that guild participation was less widespread in the north of Germany and the Netherlands—that is in the core areas of the Hanseatic League and in Bavaria. This shows that the Hanseatic League was often successful in suppressing the uprising of the guilds. Additionally, the cities of the Hanse were not usually centers of production which implies a weaker position of craft guilds there. Most cities with guild participation were located in south-west Germany and today's Alsace-Lorraine. Central Germany shows a medium frequency of guild participation and

[10] To account for the uncertain nature of the (often limited) information I additionally consulted primary sources (e.g., official documents, charters, etc., as collected by, for example, Gengler 1867) and monographs about the history of individual cities or their constitutions and political institutions (e.g., Borst 1986, Csendes and Opll 2001, Dopsch and Lipburger 1983 or Endres 1994). All these sources, a detailed description of the construction procedure and an overview of the coding of each variable are provided in Wahl (2015d).

[11] The maps show the borders of the Holy Roman Empire in 1500 AD. The map is created by the author. Political borders are from the shapefile "Georeferenced Historical Vector Data 1500" provided by Nüssli and Nüssli (2008).

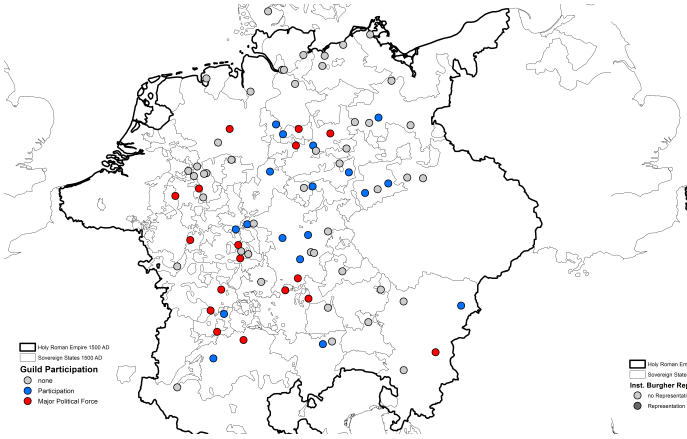
only a few cities with guild constitutions.[12]

Figure 1b maps the spatial distribution of institutionalized burgher representation (cities with burgher representation are colored in dark-gray). Institutionalized burgher representation was widespread in the German speaking area of the Holy Roman Empire and sometimes implemented by the ruling elite of a city to prevent the outbreak of a burgher revolt. In consequence, there is no obvious spatial distribution pattern. However, it seems that in the south-west of Germany and in Switzerland–where guild participation was especially prevalent—burgher representation was not so common as in the northern part of the HRE. Figure 1c presents the distribution of participative election procedures. They are the less frequent than the other types of PPIs. Again, they are less prevalent in Bavaria and Austria and are concentrated in the north-west in the Rhine area and Lower Saxony.

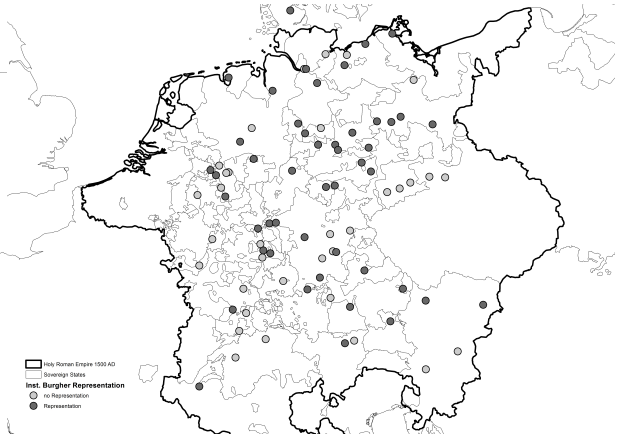
The visual impression is validated by probit regressions where the latitude and longitude of each city location, sea and river dummies, soil quality, a measure for urban potential (all from the Bosker et al. 2013 data set) and imperial circle dummies are regressed on five PPI measures (guild participation and guild constitution, participative elections and institutionalized burgher representation dummies) in 1500 AD—when the spread of PPIs reached its peak.[13] The results are reported in Table 1. The regressions confirm that guild participation was significantly more frequent in the south-west of the HRE, less prevalent in Bavaria and Austria and in highly urbanized areas (i.e., in places with a high urban potential). They also show that institutionalized burgher representation seems not to follow a clear geographic pattern

[12] The three cities with a guild constitution in Lower Saxony (Brunswick, Goslar and Magdeburg) were all important political, ecclesiastical and proto-industrial centers and therefore likely candidates for a late medieval burgher revolt, despite being members of the Hanseatic League.

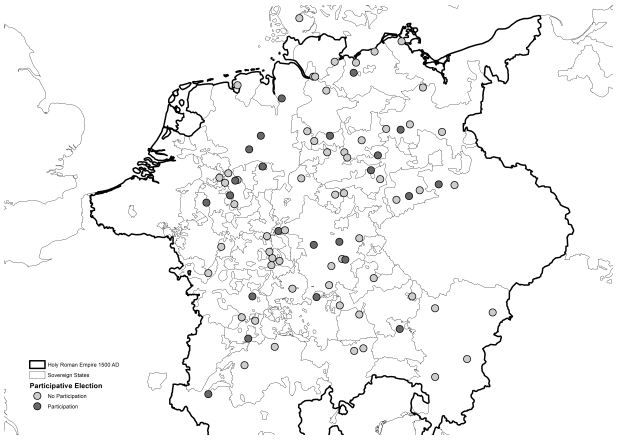
[13] Imperial circles were established as administrative units in the Holy Roman Empire in 1512—that is shortly after the period of the revolts. I also include a separate dummy for the "electorate" territories, i.e. the territories of the "Kurfürsten"—the secular rulers and archbishops who were allowed to elect the German king.



(a) Participation of Guilds in City Council 1500 AD



(b) Existence of Institutionalized Burgher Representation in 1500 AD



(c) Burgher Participation in the Election of the City Governments in 1500 AD

Figure 5.1: Spatial Distribution of Participative Political Institutions

and that participative elections were significantly less prevalent in cities located at rivers and with a high urban potential and in the east of the HRE. As Wahl (2015b) shows, trade cities and cities in highly urbanized areas are less likely to have guild participation, which probably explains these findings.

Figures 5.2(a)–(d) depict the temporal evolution of the prevalence of different kinds of par-

Table 5.1: Geographic and Biogeographic Determinants of PPIs—Probit Regressions

Dep. Var.	Guild Participation	Guild Constitution	Participative Elections	Inst. Burgher Repr.	Communal Institutions
	(1)	(2)	(3)	(4)	(5)
Latitude	-0.172***	-0.100**	0.018	0.048	0.004
	(0.062)	(0.049)	(0.048)	(0.050)	(0.045)
Longitude	-0.014	-0.049**	-0.009	-0.004	0.007
	(0.031)	(0.025)	(0.033)	(0.029)	(0.014)
River	0.074	0.161	0.188	-0.233	-0.062
	(0.170)	(0.133)	(0.172)	(0.180)	(0.111)
Sea	-0.002		0.201	-0.587*	
	(0.272)		(0.270)	(0.329)	
Soil Quality	0.003	0.048	0.278	-0.000	0.108
	(0.225)	(0.173)	(0.228)	(0.237)	(0.153)
Urban Potential	-0.008	-0.010	-0.030	0.024	0.003
	(0.018)	(0.011)	(0.020)	(0.021)	(0.009)
Austrian Circle	0.196	0.207		-0.084	-0.703***
	(0.225)	(0.181)		(0.228)	(0.231)
Burgundian Circle	0.945**	0.174	0.047	-0.700**	
	(0.388)	(0.304)	(0.312)	(0.295)	
Electorate	0.663**	0.223	-0.311*	-0.124	-0.698***
	(0.266)	(0.215)	(0.175)	(0.193)	(0.258)
Franconian Circle	0.485**		0.103	-0.196	-0.747***
	(0.237)		(0.187)	(0.224)	(0.247)
Lower Saxon Circle	0.870**	0.555*	-0.379*	-0.217	-0.667**
	(0.339)	(0.294)	(0.229)	(0.245)	(0.268)
Upper Rhenish Circle	0.660**	0.307	-0.343	-0.271	
	(0.261)	(0.208)	(0.232)	(0.223)	
Swabian Circle	0.517*	0.455**	-0.165	-0.002	
	(0.265)	(0.208)	(0.244)	(0.251)	
Westphalian Cirlce	0.652*	0.363	-0.074	-0.208	-0.755***
	(0.356)	(0.280)	(0.259)	(0.263)	(0.277)
Obs.	104	98	97	104	70
Psuedo-R^2	0.1814	0.2575	0.1052	0.1059	0.0954

Notes. Robust Standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. Reported are average marginal effects (AME) instead of coefficients. Each regression includes a constant not reported.

ticipative political institutions. The spread of all these institutions began in the high medieval period and their diffusion continued until the end of the 15th century. From the 16th century onward their prevalence remains roughly constant. But particularly the share of cities with guild participation, guild constitutions, and participative elections declined significantly in the early modern period. These types of participative institutions were often abolished after the 16th century when local rulers or the emperors became strong again or the cities lost their commercial and strategic importance. Institutionalized Burgher Representation, on the contrary, prevailed at almost the same level of roughly 30% after 1500 AD. And the share of cities with communal institutions even increased a little after 1500 AD.

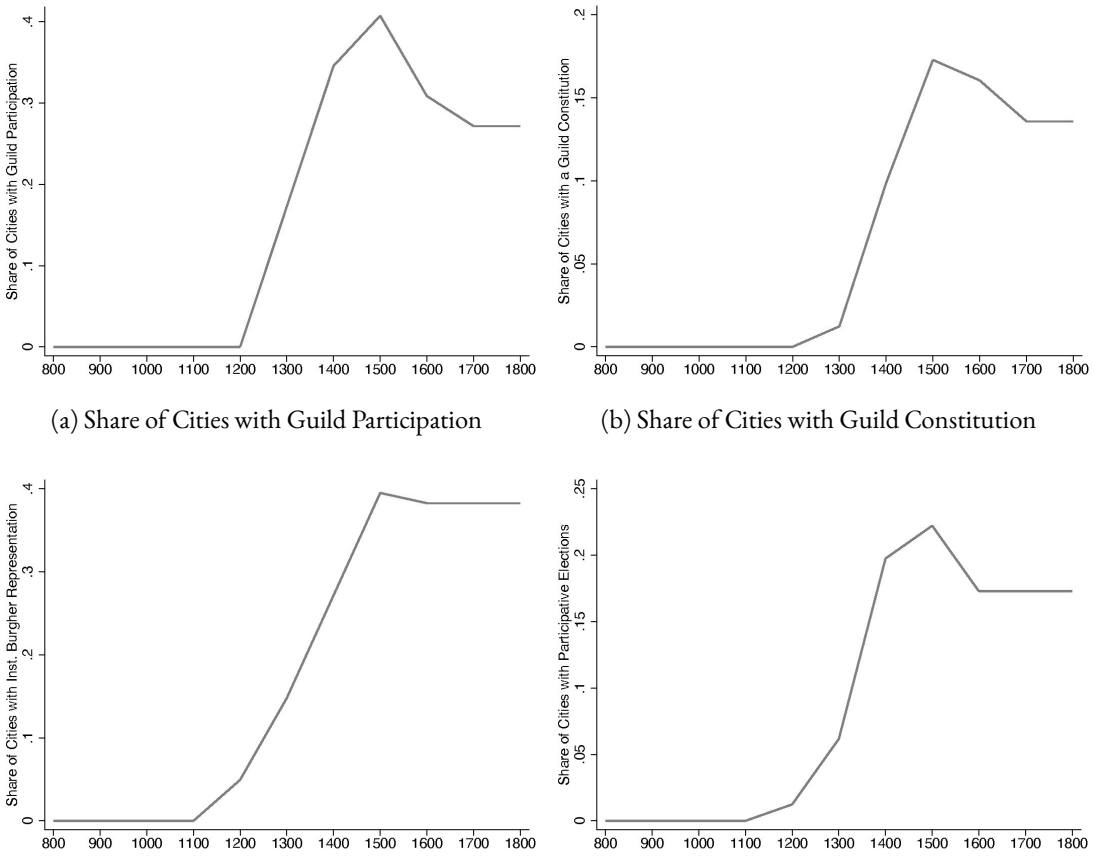
In conclusion a look at the spatial distribution and temporal evolution supports a close connection between the existence of PPIs and guild revolts.[14] Hence, the determinants of the guilds and revolts like the Hanseatic League, commercial and ecclesiastical importance of a city as well as political fragmentation and the economic structure of cities seem to be relevant for the existence or non-existence of such institutions.

5.4 Empirical Analysis

5.4.1 Baseline Results

A strategy to empirically investigate the impact of participative political institutions on city development is to regress the four measures of participative political institutions on the natural logarithm of city population and control variables using a fixed effects panel estimator to account for time-invariant unobserved heterogeneity. This amounts to estimating variants

[14] Note also the significant positive correlation especially between participative election procedures and guild participation (0.265).



(a) Share of Cities with Guild Participation

(b) Share of Cities with Guild Constitution

(c) Share of Cities with Institutionalized Burgher Representation

(d) Share of Cities with Participative Election

Figure 5.2: The Evolution of Participative Political Institutions

of the following equation:

$$\begin{aligned} ln(POP)_{ci,t} = \alpha + \beta' \text{CITYINST}_{ci,t} + \gamma' \text{NATIONINST}_{ci,t} + \theta' \text{CITYCHAR}_{ci,t} \\ + \sum_{\tau \in \Gamma} \mu'_\tau \text{GEOG}_{ci,\tau} \cdot \pi_\tau + \lambda \text{HISTORY}_{ci,t} + \delta_i + \pi_t + \rho_{c,t} + \epsilon_{ci,t} \end{aligned} \tag{5.1}$$

With $\tau = 1200, 1300, 1400, ..., 1800$. $ln(POP)_{ci,t}$ is the natural logarithm of the population of city i, in country c, in year t ($t = 800, 900, ..., 1800$)). CITYINST$_{ci,t}$ represents one or all of four measures of participative political institutions. NATIONINST$_{ci,t}$ represents a set of control variables capturing the effect of national-level political institutions on political institutions in cities. This set incorporates the Free-Prince dummy of DeLong and Shleifer (1993), a dummy variable reporting the existence of an active parliament and dummy variable indicating whether a city is located in a large territorial state (according to the definition of Bosker et al. 2013).

CITYCHAR$_{ci,t}$ is a vector of control variables capturing specific city characteristics that are potentially important for both the existence of participative political institutions (see chapter four) and city development (e.g. Bosker et al. 2013, Bosker and Buringh 2015). Among them are dummy variables equal to one if a city served as capital, as residence of a bishop or archbishop, dummy variables indicating whether a city was an imperial city or an important trade center, a member of the Hanseatic League, had a university or adopted printing technology before 1500 AD. Additionally, it includes a variable reporting the number of times a city was plundered in the previous century and the urban potential of a city (according to the definition of De Vries 1984).[15]

GEOG$_{ci,\tau} \cdot \pi_\tau$ is a set of time-invariant geographic variables interacted with century dummies, consisting of a sea and river dummy as well as agricultural productivity (cultivation probability of the land around a city) and terrain ruggedness (standard deviation of eleva-

[15]For the exact definition of this variable consult the Bosker et al. (2013) study and their Data Appendix available here: `http://www.mitpressjournals.org/doi/suppl/10.1162/REST_a_00284/suppl_file/REST_a_00284_esupp.pdf`; accessed on April 14th, 2014. It shows the population of a city's in the data set of Bosker et al. (2013) apart from the city under consideration inversely weighted by the distance from the considered city to the other cities. Additionally, it takes into account (by assigning lower weights) whether cities are located at sea or on a navigable river.

tion).

HISTORY$_{ci,t}$ is a vector of control variables that are included to account for the possible effects of historical events on both the emergence of PPIs and city development. These variables include a binary variable for cities located in the sphere of influence of the Staufer Dynasty. Three members of this noble lineage served as emperors of the HRE throughout the 12th and 13th centuries. The dynasty suddenly collapsed with the death of King Conrad IV in 1254, leading to a rapid decline of central authority and a vacuum of power with no elected emperor for more than two decades. This so called "Great Interregnum" was a decisive factor in the rise of independent city states during the 13th and 14th centuries. Second, the vector also includes the ln of each city's geodetic distance to Wittenberg to account for the possible effects of Protestantism on city development.

δ_i are city fixed effects, π_t are century fixed effects accounting for temporal shocks common to all cities in the data set, $\rho_{c,t}$ are interacted country and century fixed effects accounting for country-specific temporal shocks and $\epsilon_{ci,t}$ is the error term capturing unobserved factors. These controls should capture factors relevant for both the existence of participative political institutions and city development and thus are meant to reduce omitted variables bias (OVB). They are selected according to insights from previous literature (Bosker and Buringh 2015, Bosker et al. 2013, Cantoni and Yuchtman 2014, Dittmar 2011 etc.) and the result of Table 5.1.

First, I estimate equation one without the interacted time-invariant variables. The results are shown in Table 2. First, city population and the control variables are regressed on each of the four participative political institutions measures. In columns (5) to (8) I include three of the four political institutions variables jointly. In column (6) all control variables that are insignificant in column (5) are removed and also those becoming insignificant after this removal

(i.e., only significant control variables are kept in column (6)). These are the archbishop and bishop as well as the capital, Hanseatic League, residence and trade city dummies and the urban potential measure. I remove the non-robust covariates to reduce white noise and to keep the regression as parsimonious as possible.

Participative Elections show a robustly significant and positive effect, implying that cities with participative election of city government are on average around 30% larger (assuming the coefficient in column (4)). The guild participation index and institutionalized burgher representation remain insignificant in all specifications. When added jointly with the elections and burgher representation, cities where the guilds were the dominant political actor (i.e, cities with a guild constitution) are on average significantly smaller (again around 30%). Hence, the results support the skeptical view of the guilds as they seem to have a negative effect on city development when they ruled a city and at least no positive effect if they participated in the government of the city. Additionally taking into account the insignificance of institutionalized burgher representation, the results provide supporting evidence for the argument that—given the hierarchical and collectivist nature of the society and political system in the late medieval cities—a simple enlargement of the number of groups/ citizens that could participate in the political process has a positive effect. Furthermore, the results confirm my expectations of a positive effect of participative elections of city government.

Hence, the results contribute to explaining why Fürth (a city without participative elections) today is roughly five times smaller than nearby Nuremberg (a city with elections).

The result of the regressions including the interacted time-invariant variables (terrain ruggedness, river and sea dummies as well as soil quality) are reported in Table 5.3. They are similar to those of Table 5.2. If anything the coefficients slightly increased in size and significance.

Table 5.2: Early-Modern Participative Political Institutions and City Development—Fixed Effects

Dep. Var.	ln(Population)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Guild Participation Index	-0.014				-0.063	-0.090		
	(0.093)				(0.100)	(0.107)		
Guild Constitution		-0.185					-0.273*	-0.306*
		(0.157)					(0.159)	(0.169)
Institutionalized Burgher Representation			0.043		0.030	0.048	0.015	0.028
			(0.092)		(0.094)	(0.092)	(0.093)	(0.091)
Participative Election				0.242**	0.280**	0.353***	0.316***	0.383***
				(0.112)	(0.122)	(0.128)	(0.119)	(0.125)
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Century Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Century*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
National Political Institutions	Yes	Yes	Yes	Yes	Yes	No	Yes	No
City Characteristics	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Historical Events	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Robust Controls	No	No	No	No	No	Yes	No	Yes
Obs.	457	457	457	457	457	457	457	457
Within-R^2	0.435	0.439	0.435	0.442	0.443	0.410	0.450	0.417

Notes. Standard errors clustered on city level are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The set of control variables "National Political Institutions" controls for the Free-Prince variable from De Long and Shleifer (1993), parliamentary activity (according to Van Zanden et al. 2012), and a dummy variable indicating that a city is located in a political entity with a large territory. All these variables originate from the Bosker et al. (2013) data set. The set "City Characteristics" includes dummy variables indicating capital cities of sovereign political entities, residences of bishops and archbishops, cities that have a university, cities that were plundered in the previous century and a variable controlling for the urban potential of each city. Again these variables stem from the Bosker et al. (2013) data set. This set of variables further consists of dummy variables reporting whether a city was an Imperial city, a member of the Hanseatic League, adopted printing technology before 1500 AD or was an important medieval/ early modern trade center. The set "Historical Events" controls for the ln of a cities geodetic distance to Wittenberg, and a dummy variable equal to one if a city was in the sphere of influence of the Staufer. Finally, the set of "Robust Controls" includes every variable that was significant (at 10 % level at least) in the regression including all sets of covariates jointly. These are the archbishop and bishop dummies, the residence city dummy, the capital, Hanseatic League, and trade city dummies as well as the urban potential measure. Each regression includes a constant not reported.

If it is true that participative elections hamper rent-seeking and decrease oligarchisation tendencies, I would see that cities with guild participation and participative elections should do better than cities with guild participation but without elections. I test this by interacting the guild constitution and participative election dummies and including the interaction term to Table 5.3 column (7), the regression with a full set of covariates. Including the interaction term makes it possible to compute the difference between cities with a guild constitution and participative elections and cities with guild participation but without elections. It turns out that cities with both guild constitutions and elections are on average around 50% larger than cities with guild constitutions and no elections (coefficient=0.470, p-value=0.044).[16] Accordingly, participative elections seem to mitigate the negative effect of guild participation which is in line with the notion that the, e.g., increased accountability decreases the negative tendencies of guild rule. It also confirms the theoretical predictions of Acemoglu and Robinson (2008) that the more complete the transition to democratic institutions is (i.e., the more of the different aspects of democracy are realized in the political institutions) the more likely democratization can successfully improve economic outcomes.

Finally, it is important to note that although we probably have dealt with the most important source of unobserved heterogeneity by including city fixed effects and various control variables selection on unobservables can still be an issue.

However, if I test the likelihood that the estimates are actually biased by unobservables I follow the strategy developed by Altonji et al. (2005) and applied (among others) by Nunn and Wantchekon (2011) by looking on how strong selection on unobservables relative to selection on observables has to be to completely explain the estimated effect. This can be done

[16] The interaction term itself is insignificant but has a sizeable positive coefficient (0.14).

Table 5.3: Early-Modern Participative Political Institutions and City Development—Table 2 with Time-Invariant Variables Interacted with Century Fixed Effects

Dep. Var.	ln(Population)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Guild Participation Index	-0.005				-0.063	-0.074		
	(0.094)				(0.100)	(0.099)		
Guild Constitution		-0.207					-0.308*	-0.328*
		(0.161)					(0.157)	(0.165)
Institutionalized Burgher Representation			0.058		0.030	0.044	0.023	0.026
			(0.091)		(0.094)	(0.091)	(0.096)	(0.091)
Participative Election				0.294**	0.280**	0.335***	0.372***	0.381***
				(0.113)	(0.122)	(0.122)	(0.120)	(0.129)
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Century Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Century*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
National Political Institutions	Yes	Yes	Yes	Yes	Yes	No	Yes	No
City Characteristics	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Historical Events	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Time-Invariant Controls*Century FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust Controls	No	No	No	No	No	Yes	No	Yes
Obs.	457	457	457	457	457	457	457	457
Within-R^2	0.527	0.532	0.528	0.537	0.443	0.524	0.546	0.533

Notes. Standard errors clustered on city level are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The set of control variables "National Political Institutions" controls for the Free-Prince variable from De Long and Shleifer (1993), parliamentary activity (according to Van Zanden et al. 2012), and a dummy variable indicating that a city is located in a political entity with a large territory. All these variables originate from the Bosker et al. (2013) data set. The set "City Characteristics" includes dummy variables indicating capital cities of sovereign political entities, residences of bishops and archbishops, cities that have a university, cities that were plundered in the previous century and a variable controlling for the urban potential of each city. Again these variables stem from the Bosker et al. (2013) data set. This set of variables further consists of dummy variables reporting whether a city was an Imperial city, a member of the Hanseatic League, adopted printing technology before 1500 AD or was an important medieval/ early modern trade center. The set "Historical Events" controls for the ln of a cities geodetic distance to Wittenberg, and a dummy variable equal to one if a city was in the sphere of influence of the Staufer. The time-invariant variables which are interacted with century fixed effects are terrain ruggedness, soil quality as well as river and sea dummies. Finally, the set of "Robust Controls" includes every variable that was significant (at 10 % level at least) in the regression including all sets of covariates jointly. These are the archbishop and bishop dummies, the residence city dummy, the capital, Hanseatic League, and trade city dummies as well as the urban potential measure. Each regression includes a constant not reported.

by dividing the coefficient of the variable of interest with a full set of controls (Table 5.2 column (7)) by the difference between this coefficient and the coefficient of a regression only including the three PPI measures and city fixed effects. Calculating this ratio for the guild constitution dummy I arrive at 3.8, meaning that selection on unobservables has to be around 4 times larger than selection on observables to explain away the effect. For the participative election dummy I arrive at a ratio of 2.6. Hence, it seems unlikely that the estimated results are fully attributable to unobserved factors.

5.4.2 Testing for Temporal Heterogeneity

A first possibility to uncover the temporal evolution pattern of participative political institutions is to look at how their effect varied throughout the centuries between their implementation and 1800 AD. This shed light on whether the effect of, e.g, participative elections was short-lived or persisting. To explore this I estimate the temporal evolution of the effects using a more flexible empirical approach. That is, I interact each of the participative political institutions measures with dummy variables for each century and re-run the fixed effects estimations of Table 2. Due to this, equation (5.1) becomes:

$$ln(POP)_{ci,t} = \alpha + \sum_{\tau \in \Gamma} \beta'_{\tau} CITYINST_{ci,\tau} \cdot \pi_{\tau} + \gamma' \mathrm{X}_{ci,t} + \delta_i + \pi_t + \rho_{c,t} + \epsilon_{ci,t} \quad (5.2)$$

With $\tau = 1200, 1300, 1400, ..., 1800$ and $\mathrm{X}_{ci,t}$ representing the set of robust time-varying controls as used in Table 5.3. Furthermore, I estimate equation (5.2) using one of the participative institutions variables each time. The results are reported in Table 5.4. For guild participation a more or less insignificant, yet declining time pattern emerges with insignificant coefficients of the interaction terms in all cases. The same, but increasingly pronounced

pattern is visible for cities with guild constitutions. The guild constitution dummy shows a large positive effect in 1300 AD (after the first wave of guild revolts). This effect then becomes increasingly smaller and in the end (in 1700 AD and 1800 AD) shows a large and significantly negative effect. The large effects, in particular that in 1300 AD, could possibly arise due to the fact that before 1400 AD, the number of cities with guild constitution is very small. Hence, the clearly declining time pattern of the effect of guild constitutions is the most interesting aspect here. Consequently, it is important to note, that an F-test of the equality of each interaction term's coefficient indeed reject that the effect of guild constitutions is the same in each century (F-value = 10.38, p-value = 0.000). The declining temporal pattern suggests that the guild representatives indeed became part of the oligarchy themselves and were increasingly engaged in rent-seeking and other activities serving their special interests.

For institutionalized burgher representation, all interactions are insignificant and an F-test of the equality of the interaction terms cannot reject that they are all the same. This indicates that there is no temporal heterogeneity in its influence. For participative elections, I see that it had a large and positively significant effect during the medieval period and becomes insignificant afterwards. However, the coefficient in 1700 AD (0.29) is virtually the same as that in 1300 AD (0.297) and the F-test of equality of coefficients cannot reject that the interaction terms are identical in each century (F-value = 0.36, p-value = 0.873). Hence, the effect of election procedures seem not to be different among the centuries. This can be because unlike guild participation—or more broadly burgher representation—election procedures are not so prone to degeneration or changes in the political framework.[17]

[17] In Table D.2 in the Appendix I report the results of estimating Table 5.4 including the time-invariant control variables interacted with century fixed effects. The results are almost identical.

Table 5.4: Temporal Heterogeneity in the Impact of Participative Political Institutions—Flexible Specification

Dep. Var.	ln(Population)			
	(1)	(2)	(3)	(4)
Interacted Variable	Guild Part. Index	Guild Constitution	Inst. Burgher Representation	Participative Election
1200 × Variable			0.140	
			(0.220)	
1300 × Variable	0.222	0.885***	-0.191	0.429***
	(0.143)	(0.241)	(0.177)	(0.125)
1400 × Variable	-0.018	-0.080	0.010	0.297**
	(0.093)	(0.131)	(0.137)	(0.133)
1500 × Variable	0.050	0.122	0.060	0.366***
	(0.084)	(0.128)	(0.113)	(0.125)
1600× Variable	-0.016	-0.188	0.166	0.270
	(0.110)	(0.215)	(0.129)	(0.174)
1700 × Variable	-0.137	-0.489*	0.233	0.290
	(0.148)	(0.283)	(0.170)	(0.189)
1800 × Variable	-0.188	-0.651**	0.072	0.196
	(0.146)	(0.267)	(0.186)	(0.203)
City Fixed Effects	Yes	Yes	Yes	Yes
Century Fixed Effects	Yes	Yes	Yes	Yes
Century*Country Fixed Effects	Yes	Yes	Yes	Yes
Robust Controls	Yes	Yes	Yes	Yes
Obs.	457	457	457	457
Within R^2	0.412	0.427	0.402	0.407

Notes. Standard errors clustered on city level are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The set of "Robust Controls" includes every variable that was significant (at 10 % level at least) in the regression including all sets of covariates jointly. These are the archbishop and bishop dummies, the residence city dummy, the capital, Hanseatic League, and trade city dummies as well as the urban potential measure. Each regression includes a constant not reported.

5.4.3 Testing for Institutional Degeneration ("Olson Effect")

The empirical patterns detected in Table 5.4 do not necessarily have to be due to institutional degeneration, oligarchisation and rent-seeking activities (or their absence). The declining negative effect of guild rule, for example, could also be due to the fact that the importance of the guilds generally declined or because the cities became increasingly dependent on territorial rulers again during the early-modern period.[18]

Testing the existence of an "Olson effect" (i.e., that a positive effect of participative political institutions becomes increasingly negative as time elapses) more directly can help to clarify this issue. I test the existence of an "Olson effect" by interacting the four participative institutions measures with dummy variables indicating whether a certain type of participative political institution had already existed for one, two, three, four, five or six centuries in a city in a certain century.[19] In consequence, equation (2) is transformed into:

$$ln(POP)_{ci,t} = \alpha + \sum_{\tau \in \Gamma} \beta'_{\tau} CITYINST_{ci,\tau} \cdot CENT\_INST_{ci,\tau} + \gamma' \mathrm{X}_{ci,t} + \delta_i + \pi_t + \rho_{c,t} + \epsilon_{ci,t} \tag{5.3}$$

With $CENT\_INST_{ci,\tau}$ being dummy variables equal to one if a participative political institution was in place one, two, three, four, five or six centuries in city i in period τ with $\tau = 1, 2, ..., 6$. The other terms in equation (5.3) are similar to equation (5.2). I estimate equation (5.3) using separate dummy variables for cities with guild participation and for cities with guild constitution, i.e. I assume that with respect to the "Olson effect", the effect of some political voice of guilds is different from the effect of a city government dominated by

[18] Although, the fact that the effect does not merely become small and insignificant but actually becomes more and more negative speaks in favor of the degeneration hypothesis.

[19] There is no institution in my data set that existed for more than six centuries. If an institution was installed, abandoned and later re-installed, I begin to re-count from one beginning with the re-implementation of the institution.

the guilds. The results of estimating equation (5.4) are reported in Table 5.5.

I observe the pattern of an increasingly negative effect only in the case of guild constitutions. Here, the interaction terms show an increasingly negative coefficient from the third century of existence onward, resulting in a large and significantly negative coefficient for the 5th and 6th century of existence.[20] Again, an F-test rejects the null hypothesis that all the interaction terms are the same, implying that an "Olson effect" due to institutional stagnation and degeneration is really present (F-value = 20.52, p-value = 0.000).[21] These results fit to those of Stasavage (2014) who also finds that the growth advantage of autonomous cities vanished after 100 years. He supposes that this declining growth advantage can be traced back to the negative effect of guild politics on e.g., market entry barriers. However, Stasavage assumes that there is no difference in the politics of a city regardless of whether only merchant guilds or also craft guilds had political power there. To the contrast, the results in this section imply that there was an additional, but also short-living affect of the empowerment of craft guilds.

As before, the guild participation index and institutionalized burgher representation remain insignificant and also show no clear temporal pattern.[22] Importantly however, I do again see persistence in the positive effect of election procedures. Until the 4th century of existence they show almost the same positive and significant coefficient (again the size of the coefficient is around 0.3).[23] Reassuringly, an F-test cannot reject the equality of coefficients—

[20] Again the large coefficients for the last two centuries are probably due to the small number of cases that had a guild constitution for 5 or 6 centuries.

[21] For example, the guilds probably implemented an increasingly economically harmful policy in the cities they controlled the longer they ruled, i.e. they erected market entry barriers or favored a restrictive migration policy (e.g. Ogilvie 2004, 2007).

[22] Consequently, F-tests cannot reject the equality of the interaction terms for both variables.

[23] As in the case of guild constitutions, the coefficient for the 6th century is due to a very small number of cities and should hence not be taken too seriously.

at least when the last coefficient is not taken into account (F-value = 1.27, p-value = 0.287).[24]

Table 5.5: The Longer, the Worse? The Impact of Length of Existence

Dep. Var.	ln(Population)			
	(1)	(2)	(3)	(4)
Variable	Guild Participation	Guild Constitution	Inst. Burgher Representation	Participative Election
Variable × 1. Century	0.006	-0.083	0.095	0.344***
	(0.131)	(0.133)	(0.127)	(0.098)
Variable × 2. Century	0.143	-0.055	0.101	0.334**
	(0.159)	(0.172)	(0.115)	(0.140)
Variable × 3. Century	0.056	-0.290	0.138	0.312**
	(0.177)	(0.225)	(0.145)	(0.138)
Variable × 4. Century	0.064	-0.492	0.031	0.327*
	(0.219)	(0.304)	(0.205)	(0.194)
Variable × 5. Century	-0.203	-0.822*	0.172	0.019
	(0.270)	(0.452)	(0.181)	(0.205)
Variable × 6. Century	0.032	-1.385***	-0.052	-0.478*
	(0.431)	(0.228)	(0.334)	(0.268)
City Fixed Effects	Yes	Yes	Yes	Yes
Century Fixed Effects	Yes	Yes	Yes	Yes
Century*Country Fixed Effects	Yes	Yes	Yes	Yes
Robust Controls	Yes	Yes	Yes	Yes
Obs.	457	457	457	457
Within-R^2	0.401	0.421	0.398	0.414

Notes. Standard errors clustered on city level are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The set of "Robust Controls" includes every variable that was significant (at 10 % level at least) in the regression including all sets of covariates jointly. These are the archbishop and bishop dummies, the residence city dummy, the capital, Hanseatic League, and trade city dummies as well as the urban potential measure. Each regression includes a constant not reported.

[24]In Table D.3 in the Appendix I report the results of estimating Table 5.5 including the time-invariant control variables interacted with century fixed effects. The results are almost identical.

5.5 Concluding Remarks

This study has looked at the question of when political change towards a more democratic regime can be successful in fostering long-run economic development. The overall answer emerging from the results of the empirical analysis in this paper is that to be positive for long-run economic development, it is not enough to implement political institutions in which larger groups of citizens participate. Instead, it is necessary that more participative political institutions also come along with a different policy that is oriented more on public welfare. The results suggest that this was—at least partly—achieved when the city council was elected by more than one group of citizens. On the one hand, this guaranteed that policy was relatively more oriented toward public welfare. On the other hand, the opportunity to deselect council members that were responsible for a bad policy increased the accountability of government and decreased oligarchisation tendencies which is also expected to have positive effects on the policy of the city government. Hence, the implementation of participative election procedures is not prone to degenerative processes, stagnation, and increasing rent-seeking resulting in economic policy that served special interests but not public welfare. Therefore, instead of enlarging the participation of citizens in the existing elitist political system, as was the case when letting the craft guilds participate in the city government, changes in the actual political framework, like allowing citizens to vote for their political representatives were necessary to achieve sustained prosperity.

Finally, the results also provide evidence that supports the skeptical view of craft guilds as rent-seeking institutions that erected market-entry barriers to preserve monopolies, increased prices artificially, and whose policy was primarily geared around furthering the interests of their members.

"The existence of a problem of knowledge depends on the future being different from the past, while the possibility of the solution of the problem depends on the future being like the past."

Frank Knight

6

General Conclusions

Often, economist complain about economic historians that they "[...]are good in describing the trees, but they do not see the forest". I would say that this does not exactly describe the problem economist have with many economic historians. Rather, the problem seems to be that many economic historians deny that there is a forest at all, claiming that there are only individual trees scattered around randomly in the landscape of history. In consequence, economic historians often complain about economist that the only see a forest because they want to see one. In other words, economists have a strong tendency towards economic determinism, while economic historians tend to follow the culturalist tradition and

view history as a random walk like process of happenstances.[1] The results of present studies do not confirm one of these extreme positions. In fact, they imply that both positions are right and wrong the same time.

As the thesis shows, economic development indeed often followed systematic patterns of persistence and non-persistence, of declining, increasing or sustaining prosperity. As such, historical developments sometimes follow a systematic path that can be understood by looking at economic aspects like the incentive structure of a society or by applying economic concepts like positive feedback and increasing returns. However, chapter four has shown that exogenous shocks and idiosyncratic circumstances are also essential factors for the understanding of historical events and the determination of development path.

Closely related to this aspect is the question of whether history is deterministic or random and consequently, whether we can learn something from looking at it for today or not. Here again, the thesis comes to a differentiated conclusion. Historical events—even as far in the past as the middle ages—can matter for today as in the case of medieval trade patterns, that still are visible in today's patterns of regional prosperity. However, I have also shown that historical events not always have persistent effects as the effects of participative political institutions in late medieval cities disappeared, or at least became much weaker over time. Whether historical events have persistent effects or not seems to depend on the logic of the development processes they trigger. In this respect, the thesis confirms and complements the few existing studies (e.g. Voigtländer and Voth 2012) showing that persistence in developments and attitudes exists but only works under certain conditions.

Medieval trade activities had persistent effects because they triggered an increase in agglom-

[1] For a more detailed discussion of these issues and the different positions towards this matter within development economics, the reader is referred to Banerjee and Duflo (2014).

eration and industry concentration that is self-reinforcing as it follows the logic of positive feedback and increasing returns.[2] Any yet on the other side, the fact that a "man-made" factor like trade can have such a long-lasting positive influence on economic outcomes suggests that history has not to be destiny, but that political and economic decisions can have a crucial influence on the fate of nations and regions.

The case of participative political institutions, on the contrary, is one where the incentives of the political system and the logic of collective action had worked hand in hand to undo the potentially positive effects of democratization. The isolated rise of participative political institutions within the still inherently undemocratic political system of the late medieval city, had no chance to succeed in the long-run as it was not fundamental enough to overcome the detrimental logic of a system in which rational actors were only interested in their own welfare and not in that of the society as a whole. Social dilemmas like this, where there is a contrast between individual and social rationality—and that closely resemble the structure of a classical prisoner's dilemma—can only be solved by the introduction of a full set of self-reinforcing economic and political rules that are able to alter the logic of the system. These rules can bring in line individual and social rationality and thus, sustain themselves as everyone profits from sticking to them. Such a set of economic and political rules was development earliest following the "Glorious Revolution" in 17th century England and took another almost 200 years before they began to significantly pay off during Industrialization.

Furthermore, the findings in chapters four and five also have some implications for ongoing debates in development economics about the determinants of successful political change and the process of democratization. First, they advocate the view that successful political

[2] Hence, the findings in chapter two are fully in line with the classical cases of path-dependent developments as outlined in David (1985).

changes are bottom-up changes, originating from inclusive growth that enriches formerly poor parts of the society. Therefore, it also reminds one about the fact that by no means all people automatically profit from economic prosperity, as it often seems to be assumed in the contemporary economic and political discussion. Furthermore, that the isolated increase of the participativeness of the political institutions was not able to significantly positively influence economic development suggests that the transition from autocracy to democracy can only be successful if there is a sharp and complete transition from one system to the other. Gradual transitions aiming on introducing one element of democracy after the other might not be successful in the long-run.

To conclude, the landscape of history is not scattered by randomly distributed individual trees nor by a few, large forests. Rather, there are both, small conglomerations of trees scattered in a random fashion as well as larger and smaller forests. Some of the forests and trees already exist for a long period of time and are still healthy and prosperous, while other forest and trees already died and are not visible anymore. New trees continuously emerge around the existing forests and trees—and the already existing trees could both foster or inhibit the growing of new ones. Hence, the world today is not the same as yesterday, but some of the patterns and characteristics of the past are still present in today's world while others are not—there is always a part of the world that is random or unconnected to the past. We can learn from history, but not about everything and in every case.

Hence, any study concerned with the impact of historical phenomena on contemporary economic outcomes has to be quite careful in working out the mechanism through which the impact of the historical event could have persisted until today.

A

Appendices to Chapter 2

A.1 Data Appendix

The level of an observation is a NUTS-3 region (for example, in Germany this corresponds to the "Landkreise", in France to the "Departments", and in Italy to the "Provincias"). If the variables are defined on another NUTS level, this is indicated in the description of the respective variable. City level information is matched to the NUTS-3 regions by the use of Eurostat (2007). I use the NUTS-2006 classification, since most of the data is available only for this version of the NUTS classification. A descriptive overview of all variables used in the empirical analysis is given in Table A.1 below.

A.1.1 Main Variables

Trade Center. The data on historical trade cities is based on four maps. The first is printed in Davies and Moorhouse (2002) and includes the "Main trade routes in the Holy Roman Empire and nearby countries" for the period around 1500 AD, showing the trade routes and

the cities located on them. Davies and Moorhouse (2002) is a book about the history of the Polish city of Wroclaw written by a renowned expert on Polish and Eastern European history, Norman Davies, and Roger Moorhouse. According to Google Scholar it has been cited around 60 times (as of 24th June 2013) e.g., in articles in the Journal of the Royal Statistical Association. It is therefore considered to be a reliable source of information about medieval trade activities.

Because this map only covers the areas of Austria, Belgium, the Czech Republic, Eastern France, Germany, Hungary Lithuania, the Netherlands, Poland and North Italy I make use of a second map published in King (1985) including "Chief trade routes in Europe, Levant and North Africa 1300-1500 CE". This map covers a wide area including parts of North Africa and the Near East. From this map I primarily take information about French trade cities, but I also include cities from other countries that are not mentioned in the first map. The original map is printed in a chapter entitled the "Currents of Trade: Industry, Merchants and Money" in "The Flowering of the Middle Ages" edited by the Oxford-based medieval art historian Joan Evans. In this chapter, Donald King introduces the most important goods of the medieval economy, and discusses how they were produced and traded. He places special emphasis on the patterns of commerce and trade, as well describing the most important centers of commerce and trade activity (Fair and market cities etc.). He also discusses the importance of institutions (like contract security) etc., and the role they played for trade activities. Again, this volume appears to be a frequently cited source with around 50 citations in Google Scholar (as of 24th June 2013). According to the bibliography of the volume, King (1985) draws heavily on standard sources for medieval trade including Heyd (1879), Lopez and Raymond (1955) and Postan and Rich (eds.)(1952).

As a third source I use an overview map of late medieval trade printed in Magocsi (2002), an historical atlas of central Europe and an often cited source for historical information about economic, cultural, and political features. He is cited 222 times by Google scholar (as of 24th June 2013). Among the papers using the information provided by the atlas are the historical economic papers by Börner and Severgnini (2015) and Dittmar (2011), as well as Becker et al. (2011). The map contains information on the "economic patterns" in Central Europe around the year 1450. I primarily took from this map information about Southern Italian trade cities not included in the other maps. Again, I also include cities mentioned there but

not in the other two sources. From this map, a city is considered if it is located on a "major" or "important" trade route. The map also contains information about members of the Hanseatic League (and their importance) as well as commercial offices and foreign depots of the Hanseatic League. Further, it also depicts the goods traded over the particular routes and the areas in which the commodities are typically produced. The map drawn in Magocsi's atlas relies on other regional and general historical atlases, like those of Darby and Fuller (eds.) (1978) or Lendl and Wagner (1963) for Austria. However, Magocsi also consulted books about the history of particular cities like Dubrovnik (Carter 1972) or Wroclaw (Ochmanski 1982).

Finally, I consult several maps included in Westermanns Atlas zur Weltgeschichte□ (Stier et al. 1956). To be precise, I used the information given by a map depicting the "Hanseatic League and its Opponents in the 15th century after the Peace of Utrecht". The map reports the location of Hanseatic cities, the kontors of the Hanseatic League in other countries and the main trade routes of the time, as well as the goods traded. The geographical scope of the map is limited to the part of Germany north of Prague, the Netherlands, and the majority of today's Belgium and Poland. If a city is located on one of the trade routes, I include it regardless of whether it was a member of the Hanseatic League. Second, I draw information from a map in the atlas that shows "Western European Trade" in the late medieval age and reports the course of the "important trade routes" and the cities located along them. The scope of the map is south-west Europe (Spain and France) but it also includes West Germany and the north-west of Italy. Here again, I include a city if it is located on a major trade route. Finally, I use the information contained in a map regarding "Levant Trade in the Late Medieval and the Ottoman Invasion". This map, in addition to other information, delineates the course of "important" trade routes (both on land and sea) and the cities located on them. I recognize cities on trade routes in the southern part of Germany, Hungary, Italy and most parts of France as well as parts of Poland.

Although far from being the only sources of information on medieval trade activities, these four maps seem to contain the most complete cross-national information about important trade activities in the later medieval period.

Furthermore, I consult additional sources including a list of the members of the Hanseatic league from Dollinger (1966), a standard source for the history of the Hanseatic League. I only recognize those cities that, according to Dollinger, "played an important role in the

Hanseatic League", or were capitals of thirds and quarters. Moreover, I consult a map containing information about "North-South Trade Routes in the Alps Area in the Medieval Period" from Schulte (1966); two very general maps printed in Kinder and Hilgemann (1970) focusing on Baltic Sea and Levant trading activities in 1400 AD; a map published in Ammann (1955) focusing on trade routes for Southern German textile products (Barchent); and the map "Business Centers and Maritime Trade Routes, High Middle Ages" printed in Hunt and Murray (1999).[1] Furthermore, I draw on qualitative information about the importance of a trade cities from Spufford's (2002) standard work about medieval trade and commerce and the monograph about the history of German trade written by Dietze (1923).

In Table A.3, all trade cities and the corresponding regions for which the dummy variable is equal to one and the source(s) mention the respective city as a trade center are shown. However, due to space restrictions I do not report any of the sources I consulted for getting information about the validity of the sample of important trade centers. For example, there is a three-volume anthology by Escher and Hirschmann (eds.) (2005) in which a group of researches researchers developed an index of urban centrality for cities in the "Rhine-Meuse area" for the period 1000 to 1350 AD (i.e., south-west Germany, western Switzerland, eastern France, large parts of Belgium and the South of the Netherlands). As part of the index of urban centrality, they collected data about the existence and number of markets, fairs, trade halls and the presence and importance of long-distance trade activities. They also have data about the existence of certain manufacturing activities that are also good indicators of the presence of trade. They develop a categorical index of centrality from the qualitative information they collect. The trade cities in the sample that are included in the volume are: Aachen, Antwerp, Cologne, Dordrecht, Dortmund, Frankfurt, Maastricht, Metz, Münster, Paderborn, Rotterdam, Soest and Straßburg. For each of those cities, one or more markets, fairs, or important long-distance trade is mentioned. But, here, the range goes from Cologne (with 4 markets, and "very important" fairs and long-distance trade activities) to, e.g., Paderborn ––where it is stated that it has a fair and long-distance trade. Due to this, it is not easy to say if the information provided by this source can be used to validate a city's importance and thus if it should be included in the sample. Furthermore, the period for which the index is constructed ends

[1] Geographical scope, time period and level of generality sometimes differ between these maps, so a cross-validation is not always possible to a full extent.

in the middle of the 14th century, and thus earlier than my period of observation. Nevertheless, the information provided in the anthology of Escher and Hirschmann (eds.) (2005) can be useful to select cities that were possibly less important because the markets, fairs or trade there were comparably limited in scope (i.e., according to the number of markets, halls, fairs or their importance) or time. Additionally, it provides clear evidence for the outstanding importance of Cologne and, e.g. the over-regional importance ("very important" long-distance trade or fair) of Dortmund, Frankfurt, Münster and Soest.

As already mentioned, the information in those sources is used primarily to validate the information printed in the maps. However, as indicated in the main text I sometimes include cities mentioned in these sources but not in the maps when I am in doubt about the actual importance of a city in terms of medieval trade.

Furthermore, I construct several trade center dummies using alternative samples of trade cities (as discussed in the main text). At first, I exclude cities mentioned by only one of my sources. These cities are: Amberg, Bruck, Fulda, Maastricht, Malbork, Mantoa , Minden, Orleans, Parma, Pecs, Piotrkow Trybunalski, Plock, Rotterdam, Saint-Malo , Udine, Utrecht and Zwickau. Second, I exclude cities for which I am not completely sure about their importance, although they are reported in more than one of my sources. Those cities are Paderborn, Einbeck, Greifswald, Braniewo, Görlitz, Metz, Palanga, Como, and Stargard. For example, I exclude Paderborn because despite the fact that it was a member of the Hanseatic League and lay on the Hellweg no other source mentioned it, and Dollinger (1966) did not consider it as a Hanseatic city of special importance. Furthermore, the data collected by Escher and Hirschmann (eds.) (2005) implies that the existing trade activity in Paderborn was of relatively low importance compared to, e.g. Cologne, Münster, Dortmund or other leading trade cities. Third, I add some cities to the original sample of trade cities. These cities are cases where a first look at the available information leads to the decision to exclude a trade city, even if the city is mentioned in one or more of the sources as a place of some relevance for trade. This is the case, for example, for Anklam, a member city of the Hanseatic League situated on an important trade route according to a map in Stier et al. (1956). However, none of the other sources mention Anklam as an important trade center and Dollinger (1966) did not note a special role for Anklam within the Hanseatic League.

Finally, I build a last alternative sample of trade cities that includes only those cities for

which historical sources indicate long-run trade activities (i.e., cities that were important trade cities around 1500 AD and that were also important before that time). An overview of these cities, for the earliest period in which trade activities are reported, and the sources that mention the respective cities are given in Table A.4. This re-coding is based on information primarily derived from Wilhelm Heyd's two volumes on medieval Levant trade (Heyd 1879). Heyd provides information about medieval trade activities in the Levant and the most important parties involved, in chronological order beginning with the end of migration period ("Barbarian Invasions"). I take the period mentioned in the chapter headings of the chapter in which the trade activities of a city are firstly mentioned as the period with the earliest authenticated trade activities. If Heyd explicitly reports a date or a time frame then I use this date/time. Heyd (1879) provides information about the trade activities of Austrian, Belgian, French, German and Italian cities. Additionally, the monograph about the Hanseatic League written by Dollinger (1966) includes a number of maps depicting, e.g. the main Hanseatic trade routes and trade cities before 1250, between 1250 and 1350 and 1350 and 1500 (always AD). Another map reports important trade routes (e.g., the salt way) and the cities that signed the treaty of Smolensk in 1229 AD. According to Dollinger (1966), this map covers the period 1286 to approximately 1336. I stick to the dates given in these maps when assigning the respective cities the dates when they are mentioned first. All in all, this, along with other maps in Dollinger (1966), contains information about trade activities in France, Germany, Lithuania and Poland. Finally, for Germany, Italy and France the work of Dietze (1923), on the history of German trade, reports significant trade activities and locations since the "pre-historical" period. I include a city in the sample if Dietze (1923) reports that city to be an important player in early and high medieval trade.

For Austria, the Czech Republic and Poland information is provided by three digitized maps from T. Matthew Ciolek's OWTRAD website. The first is based on a map printed in Humnicki and Borawska (1969) and shows "Central European Trade Routes 800 – 900 CE".[2] The second map originates from Wojtowicz (1956) and according to the OWTRAD website reports "Major trade roads in Poland and adjacent border regions 1340–1400 CE".[3]

[2]The map can be found under the following URL:
http://www.ciolek.com/OWTRAD/DATA/tmcCZm0800.html; accessed on June 11th, 2013.

[3]The original title of the map is (according to the OWTRAD website) "Trade roads

Form this map I include information about Polish trade cities. The last map from the OWTRAD project is based on Rutkowski (1980) and is about 'Major trade roads in Poland and adjacent border regions in 1370 CE".[4]; accessed June 11th, 2013. From this map, I solely include the German city of Görlitz since all the other relevant cities in the map were mentioned by another source depicting trade in an earlier period. Overall I were able to find information for about 75 of my 115 medieval trade cities.

ln(Distance to Trade Center). This variable is calculated using the ArcGIS Near Tool. It represents the natural logarithm (ln) of the distance between a region's centroid and the closest trade center region in degrees. The variable takes the value 0 for regions that contain medieval trade cities (i.e. for which the trade center dummy is equal to one).

Centuries of Trade. The variable indicates how many centuries elapsed since a city was firstly mentioned as an important trade center according to my information. The variable is coded by the author. The minimum number of centuries is six (from 1500 AD until nowadays). Six is also the value if I did not find information about earlier significant trade activities in the region.

ln(Population Density). A region's Population Density comes from the Eurostat regional statistics database
(http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_r_d3dens&lang=en; accessed on October 10th 2012). The values are from 2009.

ln(Relative GDP Density). This variable is calculated using the following formula (Roos 2005):

$$rd_i = \frac{Y_i / \sum Y_i}{A_i / \sum A_i}$$

Where rd_i is the relative GDP Density of a region. Y_i is a region's GDP (calculated by multiplying the GDP per capita with the population density) and A_i is a region's area. Therefore, the relative GDP Density is the GDP density of a region (GDP per km^2) relative to the average density of all other regions. Alternatively, it is the ratio of a regions share of GDP relative to its share of a country's overall area. In consequence, if the relative GDP Density is larger than one this means that a region shows concentration of economic activity higher than the

at the times of Casimir the Great"). The map is available from the OWTRAD website at http://www.ciolek.com/OWTRAD/DATA/tmcPLm1370a.html; accessed June 11th, 2013.

[4] The map can be accessed under the URL http://www.ciolek.com/OWTRAD/DATA/tmcPLm1370.html

average region in a country (Roos 2005). For the empirical estimations, I take the natural logarithm of the variable, so that it is greater than zero for above average levels of spatial economic concentration. GDP per capita, the population density and the area of a region are all from the sources listed in this appendix.

A.1.2 Control Variables

Altitude. The Altitude of a region is taken from the website gpsvisualizer.com(accessed at November 8th 2012) and based on the coordinates of its centroid.
Bishop. Dummy variable equal to one if a region includes a city that was seat of a bishop (or, in France and Italy, of an archbishop) in 1500 AD. The variable is coded according to information from the website http://www.catholic-hierarchy.org (accessed on November 27th, 2012). For bishoprics in the Holy Roman Empire Oestreich and Holzer (1970b) are additionally consulted. When there were doubts as to whether a diocese or archbishopric was founded before 1000 AD, Wikipedia and the catholic encyclopedia
(http://www.newadvent.org/cathen/; accessed on November 27th, 2012) were consulted.
Capital. A dummy variable equal to one if a region includes the capital of a sovereign state. Coded by the author.
Education. I measure the human capital of a NUTS-2 region with the share (in percent) of persons aged 25-64 to have attained tertiary education. The variable is obtained from the Eurostat regional statistics database
(http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=edat_lfse_11&lang=en; accessed on October 10th, 2012). I took the values from 2009.
Hanseatic League. Binary variable equal to one if a region contains at least one city that was a member of the Hanseatic League. Coded according to Dollinger (1966).
Imperial City. A Dummy Variable equal to one if a region includes at least one city that was an imperial city in the Holy Roman Empire. The variable is coded following Oestreich and Holzer (1970a). They provide a list of cities mentioned as "Reichsstädte" in the Reichsmatrikel of 1521 (sometimes called the "Wormser Matrikel"). However, there is a considerable amount of uncertainty about when, and after how long, a city actually becomes an imperial city and what criteria have to be fulfilled. Indeed there are cases where it is not clear if a city

mentioned in the Reichsmatrikel was actually an imperial city or not. There are also some cities (e.g., Düren or Chemnitz) that lost their status as an imperial city after a short period of time or at least prior to 1500 AD. Moreover, according to Wikipedia there seem to be some Dutch cities such as Kampen, Deventer, and Zwolle that became imperial cities in 1495 but are not mentioned in Oestreich and Holzer (1970a) or the Reichsmatrikel. I am nevertheless aware that the reliability of some sources, particularly for the Wikipedia article, cannot be verified. What is more, I are interested in the long-run effect that the status of an imperial city can have on the development of a city. For this reason it might suffice to include the cities mentioned in the Reichsmatrikel, and that had the status of an imperial city not only over a short time period. This is also why we do not exclude Düren since it was imperial city for more than 200 years (from around 1000 AD to 1241 AD) when it became property of the earl of Jülich.

Imperial Road. Dummy variable equal to one if a region contains at least one city that was located on an important imperial road, i.e. the Via Imperii, the Via Regia or the Via Regia Lusatiae Superioris. The variable is coded according to information provided by Kühn (2005), the entry "Hohe Landstraße" in the online version of "Meyers Großes Konversations-Lexikon" (http://www.zeno.org/Meyers-1905/A/Hohe%20Landstra%DFe;
accessed December 18th, 2012), a map from a website of the federal government of the German State Saxony on regional development
(http://www.landesentwicklung.sachsen.de/download/Landesentwicklung/
ED-C_III_Via_Regia_Verlauf.jpg; accessed December 18th, 2012) and wikipedia entries.

Inequality. I measure inequality as the ratio of average workers compensation to the GDP per capita. The Sources of GDP per capita and average workers compensation are as listed in this appendix.

Latitude. The values of this variable represent the latitude in decimal degrees of a region's centroid and are obtained from a GIS map of NUTS territories provided by the Eurostat GISCO Database.
(http://epp.eurostat.ec.europa.eu/cache/GISCO/geodatafiles/NUTS_2010_03M_SH.zip; accessed on November 8th, 2012).

Latitude. The values of this variable represent the latitude in decimal degrees of a region's centroid and are obtained from a GIS map of NUTS territories provided by the Eurostat

GISCO Database.
(http://epp.eurostat.ec.europa.eu/cache/GISCO/geodatafiles/NUTS_2010_03M_SH.zip; accessed on November 8th, 2012).
Longitude. The values of this variable represent the longitude in decimal degrees of a region's centroid and are obtained from a GIS map of NUTS territories provided by the Eurostat GISCO Database.
(http://epp.eurostat.ec.europa.eu/cache/GISCO/geodatafiles/NUTS_2010_03M_SH.zip; accessed on November 8th, 2012).
ln(Agricultural Suitability). Variable originates from Ramankutty et al. (2002). It measures the probability of an area to be cultivated. This probability of cultivation is calculated according to the climatic conditions (temperature, sunshine hours etc.) and the soil quality (pH value, waterholding capacity etc.).
ln(Area). The natural logarithm of a region's area is taken from the Eurostat regional statistics database
(http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_r_d3area&lang=en; accessed on January 10th, 2013). As always, I use the values from 2009.
ln(Distance to Border). The variable represents the natural logarithm of the distance between a region's centroid and the closest point of the country's border. It is calculated using the ArcGIS Near Tool. The coordinates of borderlines are taken from a GIS map of EU countries provided by the Eurostat GISCO Database
(http://epp.eurostat.ec.europa.eu/cache/GISCO/geodatafiles/CNTR_2010_03M_SH.zip; accessed on January 10th, 2013).
ln(Distance to Coast). The variable represents the natural logarithm of the distance between a region's centroid and the closest point of a country's coastline. It is calculated using the ArcGIS Near Tool. The coordinates of a country's coastlines are taken from the GIS map "Corine land cover 2000 coastline" provided by European Environment Agency (EEA)
(http://www.eea.europa.eu/data-and-maps/data/corine-land-cover-2000-coastline; accessed on November 8th, 2012).
ln(Distance to River). The variable represents the natural logarithm of the distance between a region's centroid and the closest point of a country's major waterway (e.g., in Germany these are Elbe, Danube, Rhine and Oder). It is calculated using the ArcGIS Near Tool. The

coordinates of the rivers are taken from the GIS map "WISE Large rivers and large lakes" provided by European Environment Agency (EEA) (http://www.eea.europa.eu/data-and-maps/data/wise-large-rivers-and-large-lakes; accessed on November 8th, 2012).

ln(Employees Compensation). Natural logarithm of average of employees compensation (wages, salaries and employer's social contributions) at NUTS-2 level measured at current prices and from the year 2009. Data was obtained from the Eurostat regional statistics database (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_r_e2rem&lang=en; accessed on October 10th, 2012).

ln(Fixed Capital). Gross fixed capital formation by NUTS-2 regions measured for 2009. Data is obtained from the Eurostat regional statistics database (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_r_e2gfcfr2&lang=en; accessed on October 10th, 2012).

ln(Neighborhood GDP p.c.). Variable contains the distance weighted average GDP per capita of regions within a 150km radius around the considered city. Variable is computed by the author using the Stata command "nearstat".

Number of Trade Regions x–y kilometers away. Four variables reporting the absolute number of regions harboring a medieval trade center in (i) 0–50km, (ii) 50–100km, (iii) 100–150km and (iv) 150-250km away from the considered city. Variable is computed by the author using the Stata command "nearstat".

ln(Distance to Roman Road). Variable reporting the distance of a regions centroid to the closest Roman Road in degrees. The distances are calculated on the basis of a GIS map of the ancient Roman road network provided by the Digital Atlas of Roman and Medieval Civilizations (DARMC). The shapefile can be downloaded here: https://docs.google.com/file/d/0B4KitLDpLpYfN3hKM3E2YWltWm8/edit?usp=sharing; accessed on February 20th, 2014.

Longitude. The values of this variable represent the longitude in decimal degrees of a region's centroid and are obtained from a GIS map of NUTS territories provided by the Eurostat GISCO Database (http://epp.eurostat.ec.europa.eu/cache/GISCO/geodatafiles/NUTS_2010_03M_SH.zip; accessed on November 8th, 2012).

Mining Region. Dummy variable equal to one if in a region at least one ore or coal mine (or

mining firm) is located. The information on which the coding is based originate from the structural business statistics included in the Eurostat regional statistics database (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_r_nuts06_r2&lang=en; accessed on January 28th, 2012).

Mountain Region. Categorical variable equal to one if more than 50% of a population in a region live in mountainous areas according to the ESPON (European Observation Network for Territorial Development and Cohesion) regional typologies project. Thus, the variable is equal to one if more than 50% of a region's population live in a mountain area; it is two if more than 50% of a region's surface is covered by mountain areas; and it is three if a region has more than 50% of its surface covered by mountain areas and more than 50% of the population live in mountain areas. It is zero when a region fulfills none of these criteria. The data and an explanation of the classifications can be downloaded from http://www.espon.eu/export/sites/default/Documents/ToolsandMaps/ESPONTypologies/Typologies_metadata_data_final.xls(accessed on November 8th, 2012).

Patents. Total number (over all IPO section and classes) of patent applications submitted to the European Patent Office (EPO) in each region in 2009. Data available from the Eurostat regional statistics database (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=pat_ep_ripc&lang=en; accessed on October 10th, 2012).

Printing Press before 1500 AD. Dummy variable equal to one if at least one city in a region had adopted printing technology before 1500 AD. The coding is based on information in Benzing (1982), Clair (1976) and the Incunabula Short Title Catalogue (ISTC) of the British library (http://www.bl.uk/catalogues/istc/index.html; accessed on November 18th, 2012). A region is included if any of these sources mention a city in this region.

Quality of Government. The European Regional Quality of Government Index (EQI) as developed by the Quality of Government Institute at the university of Gothenburg in Denmark. The index is constructed in a similar way to the World Governance (WGI) Indicators of the World Bank (further information on the index design and data can be found at: http://www.qog.pol.gu.se/digitalAssets/1362/1362471_eqi—correlates-codebook.pdf; accessed on January 28th 2013). The data on which the index is based were collected in 2009. In Belgium, Germany, Netherlands and Hungary the index report values at NUTS-1 level in

the other countries in the dataset it reports values at NUTS-2 level. The data can be downloaded from
http://www.qog.pol.gu.se/digitalAssets/1362/1362473_eqi-and-correlates–qog-website-.xlsx (accessed on January 28th, 2013).
Residence City. Binary variable that represents important residence cities (of Dukes, Kings...) in the Holy Roman Empire or the German Reich (after 1871). The coding follows a Wikipedia list at http://de.wikipedia.org/wiki/Residenzstadt (accessed February, 24th 2013) and Köbler (1988). It also includes residences of electors ("Kurfürsten") and prince-bishoprics. Furthermore, it represents the capitals or residence cities of Italian duchies, kingdoms and republics (e.g., Venice, Lombardy, Sardinia, Parma, Modena, Tuscany, Naples or the Kingdom of the Two Sicilies). For all other countries it marked the capitals of pre-existing states or kingdoms, duchies etc. (e.g., in Poland it includes the residence of the kings of the Kingdom of Poland, in Lithuania the residence of the grand duke of Lithuania...). The coding here follows the author's information or different versions of Putzgers Historical Atlas (Bruckmüller (eds.) 2011 and Baldamus et al. (eds.) 1914).
Unemployment. I measure the average annual unemployment rate (in percent) of a region in 2009 (including people above the age of 15). Data is from the Eurostat regional statistics database (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_r_lfu3rt&lang=en; accessed on October 10th, 2012).
University before 1500. Dummy variable equal to one if at least one city in a region has a university founded before 1500 AD. Coding according to Eulenburg (1994), Kinder and Hilgemann (1970) and Rüegg (1993). A city is recognized if it is mentioned by any of these sources. If there were doubts about the founding date of a university (or contradicting dates) Cantoni and Yuchtman (2014) or Wikipedia were used as validation. Since I am only interested in the long-run effect of universities, cities with very short periods with universities like, e.g. Vicenza or Piacenza are not coded as having a university.

A.1.3 City Level Variables

Most of the city-level variables used for the panel analysis originate from the Bosker et al. (2013) data set. The reader is referred to their data Appendix for detailed information on the data. The Data Appendix to Bosker et al. (2013) is available here:

http://www.mitpressjournals.org/doi/suppl/10.1162/REST_a_00284/suppl_file/REST_a_00284_data_appendix.pdf (accessed on April, 8th 2014). The trade medieval trade measures and the neighborhood effects variable are coded by the author and describe below in more detail. However, I choose to include that version of their urban potential variable that follows DeVries (1984), i.e. the contribution of another city to a city's urban potential does not only depend on distance but takes additionally into account whether one or both cities are located at sea or a navigable river. All used variables not part of the Bosker et al. (2013) data set are described below.

Centuries of Trade. The variable indicates how many centuries elapsed since a city was firstly mentioned as an important trade center according to my information. The minimum number of centuries is 0 (i.e, in the period before a city became a trade city or for cities that never became important trade centers) the maximum number is eleven (corresponding to the eleven centuries for which I have data).

ln(Distance to Trade City). Variable represents the geodesic distance between a city and the closest trade city in degrees. The variable takes the value 0 for cities that are coded as trade cities (i.e. for which the trade center dummy is equal to one). The variable takes into account that the number of trade cities varied by centuries.

Imperial City. A Dummy Variable equal to one if a city was an imperial city in the Holy Roman Empire. The variable is coded following Oestreich and Holzer (1970a). They provide a commented list of cities mentioned as imperial cities ("Reichsstädte") in the Reichsmatrikel of 1521 (sometimes called the "Wormser Matrikel"). This variable takes into account the available information about when a city took on the status of an imperial city (the so-called "Reichsunmittelbarkeit"). Such information suffers from a marked amount of uncertainty. However, the German version of Wikipedia provides a list of imperial cities including information about the approximate date the city become imperial city. This information is often based on corresponding decrees of kings or emperors of the Holy Roman Empire available in the Regesta Imperii, an archive of all documentary and historiographic documents of the Roman-German kings until Maximilian I (http://www.regesta-imperii.de/startseite.html). This archive is maintained by the "Akademie der Wissenschaften und der Literatur Mainz" and is a reliable source of historical information.

Still, not all the dates in the list are validated by these sources. In these cases, we rely on

available information from city history or other sources to assign a date. Despite these efforts, sometimes sources mention different dates or rely on other criteria. We then proceed by assuming the date seeming most plausible from what we infer from city history. Where it was impossible to find satisfactory information, we code the city as an imperial city from 1500 AD onward.

Trade City. The trade city dummy is coded according to the procedure described in detail below and follows that of the trade center dummy on regional level. The cities coded as trade cities (with the year since they are coded as trade city) are:Amsterdam (since 1500), Ancona (since 1500), Antwerpen (since 1500), Augsburg (since 900), Avignon (since 1300), Bari (since 1100), Bayonne (since 800), Berlin (since 1500), Bologna (since 1400), Bordeaux (since 1500), Brunswick (since 800), Bremen (since 1100), Brno (since 900), Bruges (since 900), Budapest (since 1400), Cologne (since 1500), Como (since 1500), Deventer (since 1400), Dordrecht (since 1500), Erfurt (since 1100), Florence (since 1400), Frankfurt am Main (since 800), Frankfurt an der Oder (since 1100), Gdansk (since 1400), Genova (since 1100), Ghent (since 1200), Graz (since 1500), Görlitz (since 1400), Hamburg (since 1200), Hanover (since 800), Hildesheim (since 1400), Innsbruck (since 1500), Kampen (since 1400), Krakow (since 900), Kutna Hora (since 1500), Leipzig (since 800), Limoges (since 1100), Linz (since 900), Lucca (since 1200), Lyons (since 1500), Lübeck (since 1200), Lüneburg (since 1400), Magdeburg (since 900), Mantoa (since 800), Marseille (since 900), Metz (since 1400), Milano (since 1400), Montpellier (since 1100), Münster (since 1200), Napoli (since 1100), Narbonne (since 1100), Nuremberg (since 800), Olmouc (since 900), Orleans (since 1500), Osnabrück (since 1500), Padova (since 800), Paris (since 1500), Parma (since 1400), Perpignan (since 1500), Pest (since 1400), Pisa (since 1300), Poznan (since 1400), Praha (since 900), Prato (since 800), Regensburg (since 800), Reims (since 1500), Roma (since 1100), Rostock (since 1400), Salzburg (since 1500), Siena (since 1200), Soest (since 1200), St. Malo (since 1500), Stralsund (since 1300), Straßbourg (since 1200), Torun (since 1400), Toulouse (since 1500), Tours (since 1500), Treviso (since 800), Troyes (since 800), Udine (since 800), Ulm (since 800), Utrecht (since 1500), Venice (since 1100), Verona (since 800), Warsaw (since 1400), Vienna (since 1300) and Wroclaw (since 1400). The panel version of the variable takes into consideration information about the period in which a city became an important center of trade. This information is depicted in Table A.4. The consulted historical sources usually only provide basic informa-

tion about when a city became important (e.g., "during the 14th century" or "before the 10th century"). As a result, I still have to choose the exact period from which I code a city as being an important trade center. Here, I stick to the following rule: If the source states simply "9th century" I code the city as a trade city from the year 900 AD onward. If the source reports, e.g., "before the 14th century" I code the city as a trade city from 1300 AD onwards. If it states "between the 13th and 14th century" we code the city as being a trade city from 1400 AD onward. If a city signed the treaty of Smolensk in 1229 AD we code it as being a trade city since 1200 AD. In the case of Straßbourg, Dollinger (1966) reports the city to be important "before 1250 AD". In this case we coded Straßbourg as being a trade city since 1200 AD. In general, if two different periods or years are available we always choose the later year.

Table A.1: Descriptive Data Overview — Regional Level Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Altitude	839	279.230	320.194	-6.200	2472.600
Bishop	839	.098	.297	0	1
Capital	839	0.011	0.103	0	1
Centuries of Trade	839	1.088	2.823	0	13
Commercial Importance	839	0.67	0.955	0	5
Commercial Importance Alt.	839	1.46	0.866	0	5.357
Education	832	24.211	6.319	8.4	48.6
Hanseatic League	839	0.108	0.311	0	1
Imperial City	839	0.069	0.254	0	1
Imperial Road	839	0.045	0.208	0	1
Inequality	825	1.134	0.921	0.037	8.425
Latitude	839	49.460	3.088	38.245	55.939
ln(Agricultural Suitability)	839	0.429	0.186	0	0.693
ln(Area)	839	7.032	1.297	3.575	9.400
ln(Distance to Border)	839	-0.825	1.083	-5.532	1.16
ln(Distance to Coast)	839	0.308	1.204	-5.566	1.882
ln(Distance to River)	839	-.675	1.322	-7.185	1.944
ln(Distance to Trade Center)	839	0.432	0.272	0	1.665
ln(Employees Compensation)	825	9.867	0.924	7.086	12.331
ln(Fixed Capital)	803	9.141	0.818	6.802	11.494
ln(Neighborhood GDP p.c.)	839	2.531	-2.121	4.3	
ln(Night Light Intensity)	839	2.723	0.648	1.43	4.143
ln(Population Density)	839	5.351	1.137	2.709	9.964
ln(Relative GDP Density)	839	-.077	1.262	-2.461	6.194
ln(Distance Roman Road)	839	-1.47	2.161	-8.594	2.16
Longitude	839	10.228	5.012	-4.091	25.573
Mining Region	839	0.228	0.420	0	1
Mountain Region	839	0.479	1.022	0	3
Number of Trade Regions(0–50km)	839	0.558	0.756	0	4
Number of Trade Regions(50–100km)	839	1.776	1.444	0	7
Number of Trade Regions(100–150km)	839	2.785	1.902	0	9
Number of Trade Regions(150–250km)	839	8.143	4.149	0	21
Patents	803	83.094	89.654	0.286	764.717
Printing Press before 1500	839	0.199	0.4	0	1
Quality of Government	839	72.130	17.163	10.18	97.61
Residence City	839	0.067	0.25	0	1
Trade Center	839	0.137	0.344	0	1
Unemployment	582	8.237	3.435	1.9	19.1
University before 1500	839	0.052	0.223	0	1

Table A.2: Descriptive Data Overview — City Level Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Archbishop	3982	0.088	0.283	0	1
Bishop	3982	0.374	0.484	0	1
Capital	3982	0.029	0.169	0	1
Centuries of Trade	3982	0.708	1.963	0	11
Communal Institutions	3982	0.331	0.471	0	1
Ecozone=3	3982	0.047	0.212	0	1
Ecozone=4	3982	0.771	0.42	0	1
Ecozone=6	3982	0.069	0.254	0	1
Elevation	3982	132.423	149.121	-4	1085
Free-Prince	3982	0.368	0.482	0	1
Imperial City	3982	0.024	0.153	0	1
Large State	3982	0.593	0.491	0	1
Latitude	3982	47.37	3.835	38.9	54.783
ln(Distance to Trade City)	3982	3.82	1.839	0	6.61
ln(Population)	1533	2.834	0.674	1.792	6.312
Longitude	3982	8.92	5.836	-4.483	22.683
Number of Trade Cities (0–50km)	3982	0.291	0.594	0	4
Number of Trade Cities (50–100km)	3982	1.819	2.075	0	11
Number of Trade Cities (100–150km)	3982	3.032	2.774	0	14
Parliament	3982	0.261	0.439	0	1
Plundered	3982	0.036	0.217	0	3
River	3982	0.646	0.478	0	1
Roman Road	3982	0.215	0.411	0	1
Roman Road Hub	3982	0.71	0.454	0	1
Sea	3982	0.157	0.364	0	1
Terrain Ruggedness	3982	56.229	72.838	0.466	559.45
Trade City	3982	0.158	0.365	0	1
University	3982	0.069	0.253	0	1
Urban Centrality Index	3982	2.429	1.021	0	6
Urban Potential	3982	14.906	17.513	0.703	200.06

Notes. The 3982 observations mean 3982 city-year pairs as there is data for 11 periods in time in the Bosker et al. (2013) data set.

Table A.3: Overview of the Included Trade Cities and Regions

Trade City	NUTS-3 Region	country	Map Sources (Primary)	Other Historical Records
Bruck	Östliche Obersteiermark	Austria	Magocsi (2002)	
Innsbruck	Innsbruck	Austria	Davies and Moorhouse (2002), King (1985), Magocsi (2002) and Stier et al. (1956)	Schulte (1966), Spufford (2002)
Graz	Graz	Austria	Magocsi (2002), Stier et al. (1956)	
Linz	Linz-Wels	Austria	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	
Vienna	Wien	Austria	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Kinder and Hilgemann (1982), Spufford (2002)
Villach	Klagenfurt-Villach	Austria	Magocsi (2002)	Schulte (1966)
Salzburg	Salzburg und Umgebung	Austria	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Schulte (1966), Spufford (2002)
Antwerp	Arr. Antwerpen	Belgium	Davies and Moorhouse (2002), Stier et al. (1956)	Ammann (1955), Hunt and Murray (1999), Kinder and Hilgemann (1982), Spufford (2002)
Bruges	Arr. Brugge	Belgium	Davies and Moorhouse (2002), King (1985), Stier et al. (1985)	Hunt and Murray (1999), Kinder and Hilgemann (1982), Spufford (2002)

Table A.3 – *Continued*

Ghent	Arr. Gent	Belgium	Stier et al. (1956)	Hunt and Murray (1999), Kinder and Hilgemann (1982), Spufford (2002)
Brno	Jihomoravský kraj	Czech Republic	Davies and Moorhouse (2002), Magocsi (2002)	
Kutna Hora	Stredoceský kraj	Czech Republic	Magocsi (2002)	Spufford (2002)
Olomouc	Olomoucký kraj	Czech Republic	Davies and Moorhouse (2002), Magocsi (2002)	
Prague	Hlavní mesto Praha	Czech Republic	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Kinder and Hilgemann (1982), Spufford (2002)
Avignon	Vaucluse	France	King (1985), Stier et al. (1956)	Hunt and Murray (1999), Spufford (2002)
Bayonne	Pyrénées-Atlantique	France	Stier et al. (1956)	Spufford (2002)
Bordeaux	Gironde	France	Stier et al. (1956)	Spufford (2002)
Chalon-sur-Saône	Saône-et-Loire	France	Stier et al. (1956)	Schulte (1966), Spufford (2002)
Harfleur	Seine-Maritime	France	King (1985), Stier et al. (1956)	
Limoges	Haute-Vienne	France	King (1985), Stier et al. (1956)	
Lyon	Rhône	France	Stier et al. (1956)	Ammann (1955), Hunt and Murray (1999), Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Marseille	Bouches-du-Rhône	France	King (1985), Stier et al. (1956)	Kinder and Hilgemann (1982), Spufford (2002)
Metz	Moselle	France	Davies and Moorhouse (2002)	Schulte (1966)
Montpellier	Hérault	France	King (1985)	Spufford (2002)

Table A.3 – *Continued*

Narbonne	Aude	France	King (1985), Stier et al. (1956)	
Orleans	Loiret	France	Stier et al. (1956)	
Paris	Paris	France	Davies and Moorhouse (2002), King (1985), Stier et al. (1956)	Kinder and Hilgemann (1982), Hunt and Murray (1999), Schulte (1966), Spufford (2002)
Perpignan	Pyrénées-Orientales	France	King (1985)	Spufford (2002)
Reims	Marne	France	Stier et al. (1956)	Schulte (1966), Spufford (2002)
St. Melo	Ille-et-Vilaine	France	Stier et al. (1956)	
Strasbourg	Bas-Rhin	France	Davies and Moorhouse (2002), Stier et al. (1956)	Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Toulouse	Haute-Garonne	France	Stier et al. (1956)	Spufford (2002)
Tours	Indre-et-Loire	France	Stier et al. (1956)	Spufford (2002)
Troyes	Aube	France	Stier et al. (1956)	Schulte (1966), Spufford (2002)
Amberg	Amberg, District-Free City	Germany	Magocsi (2002)	
Augsburg	Augsburg, District-Free City	Germany	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Dietze (1923), Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Berlin	Berlin	Germany	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	
Brunswick	Braunschweig, District-Free City	Germany	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Dollinger (1966), Kinder and Hilgemann (1982)
Bremen	Bremen, District-Free City	Germany	Davies and Moorhouse (2002), Stier et al. (1956)	Dollinger (1966), Kinder and Hilgemann (1982), Spufford (2002)
Bremerhaven	Bremerhaven, District-Free City	Germany	Davies and Moorhouse (2002), Stier et al. (1956)	Dollinger (1966), Kinder and Hilgemann (1982), Spufford (2002)
Cologne	Cologne, District-Free City	Germany	Davies and Moorhouse (2002), King (1985), Stier et al. (1956)	Ammann (1955), Dollinger (1966), Hunt and Murray (1999), Kinder and Hilgemann (1982), Spufford (2002)

Table A.3 – *Continued*

Constance	Konstanz	Germany	Davies and Moorhouse (2002), Stier et al. (1956)	Dietze (1923), Schulte (1966), Spufford (2002)
Dortmund	Dortmund, District-Free City	Germany	Stier et al. (1956)	Dollinger (1966)
Einbeck	Northeim	Germany	Stier et al. (1956)	
Erfurt	Erfurt, District-Free City	Germany	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Dietze (1923), Kinder and Hilgemann (1982)
Frankfurt (Oder)	Frankfurt (Oder), District-Free City	Germany	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	
Frankfurt (Main)	Frankfurt am Main, District-Free City	Germany	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Fulda	Fulda	Germany	Stier et al. (1956)	
Görlitz	Görlitz, District-Free City	Germany	Magocsi (2002)	Spufford (2002)
Greifswald	Greifswald, District-Free City	Germany	Stier et al. (1956)	Dollinger (1966)
Hamburg	Hamburg	Germany	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Ammann (1955), Dollinger (1966), Kinder and Hilgemann (1982), Spufford (2002)
Hannover	Region Hannover	Germany	Magocsi (2002), Stier et al. (1956)	
Hildesheim	Hildesheim	Germany	Stier et al. (1956)	Dollinger (1966)
Leipzig	Leipzig, District-Free City	Germany	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Ammann (1955), Kinder and Hilgemann (1982), Spufford (2002)
Lübeck	Lübeck, District-Free City	Germany	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Ammann (1955), Dietze (1923), Dollinger (1966), Kinder and Hilgemann (1982) and Hunt and Murray (1999)
Lüneburg	Lüneburg	Germany	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Dollinger (1966), Kinder and Hilgemann (1982), Spufford (2002)

Table A.3 – *Continued*

Magdeburg	Magdeburg, District-Free City	Germany	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Dollinger (1966), Kinder and Hilgemann (1982)
Minden	Minden-Lübbecke	Germany	Stier et al. (1956)	
Münster	Münster, District-Free City	Germany	Stier et al. (1956)	
Nuremberg	Nuremberg, District-Free City	Germany	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Ammann (1955), Dietze (1923), Kinder and Hilgemann (1982), Spufford (2002)
Osnabrück	Osnabrück, District-Free City	Germany	Stier et al. (1956)	Dollinger (1966)
Paderborn	Paderborn	Germany	Stier et al. (1956)	Dollinger (1966)
Ravensburg	Ravensburg	Germany	Stier et al. (1956)	Dietze (1923), Spufford (2002)
Regensburg	Regensburg, District-Free City	Germany	Davies and Moorhouse, Magocsi (2002), Stier et al. (1956)	Schulte (1966), Spufford (2002)
Rostock	Rostock, District-Free City	Germany	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Dollinger (1966),Kinder and Hilgemann (1982)
Soest	Soest	Germany	Stier et al. (1956)	Dollinger (1966)
Stralsund	Stralsund, District-Free City	Germany	Magocsi (2002), Stier et al. (1956)	Dollinger (1966)
Ulm	Ulm, Urban District	Germany	Davies and Moorhouse (2002), Stier et al. (1956)	Dietze (1923), Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Wismar	Wismar, District-Free City	Germany	Stier et al. (1956)	Dollinger (1966)
Budapest	Budapest	Hungary	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Spufford (2002)
Pecs	Baranya	Hungary	Magocsi (2002)	

Table A.3 – *Continued*

Ancona	Ancona	Italy	Magocsi (2002), Stier et al. (1956)	Spufford (2002)
Bari	Bari	Italy	Magocsi (2002), Stier et al. (1956)	Spufford (2002)
Bologna	Bologna	Italy	King (1985), Magocsi (2002), Stier et al. (1956)	Schulte (1966)
Bozen	Bolzano-Bozen	Italy	Magocsi (2002), Stier et al. (1956)	Dietze (1923), Kinder and Hilgemann (1982), Schulte (1966)
Como	Como	Italy	Stier et al. (1956)	Schulte (1966)
Florence	Firenze	Italy	Magocsi (2002), King (1985), Stier et al. (1956)	Dietze (1923), Kinder and Hilgemann (1982), Hunt and Murray (1999), Spufford (2002)
Genoa	Genova	Italy	Davies and Moorhouse (2002), King (1985), Stier at al. (1956)	Ammann (1955), Dietze (1923), Hunt and Murray (1999), Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Lucca	Lucca	Italy	Stier et al. (1956)	Dietze (1923), Spufford (2002)
Mantua	Mantova	Italy	Magocsi (2002)	
Milan	Milano	Italy	Davies and Moorhouse (2002), King (1985), Stier et al. (1956)	Dietze (1923), Hunt and Murray (1999),Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Naples	Napoli	Italy	King (1985), Magocsi (2002), Stier et al. (1956)	Hunt and Murray (1999), Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Padua	Padova	Italy	Magocsi (2002)	Schulte (1966)
Parma	Parma	Italy	Magocsi (2002)	
Pisa	Pisa	Italy	King (1985), Stier et al. (1956)	Spufford (2002)
Prato	Prato	Italy	King (1985)	Spufford (2002)
Rome	Roma	Italy	King (1985), Magocsi (2002), Stier et al. (1956)	Hunt and Murray (1999),Kinder and Hilgemann (1982), Spufford (2002)

Table A.3 – *Continued*

Siena	Siena	Italy	King (1985),Magocsi (2002), Stier et al. (1956)	Spufford (2002)
Trento	Trento	Italy	Magocsi (2002)	Schulte (1966)
Treviso	Treviso	Italy	Magocsi (2002)	Schulte (1966)
Udine	Udine	Italy	Magocsi (2002)	
Venice	Venezia	Italy	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Dietze (1923),Hunt and Murray (1999), Kinder and Hilgemann (1982), Schulte (1966), Spufford (2002)
Verona	Verona	Italy	Magocsi (2002), Stier et al. (1956)	Schulte (1966)
Klaipeda	Klaipedos apskritis	Lithuania	Davies and Moorhouse (2002), Magocsi (2002)	
Kovno	Kauno apskritis	Lithuania	King (1985), Magocsi (2002)	Kinder and Hilgemann (1982)
Palanga	Klaipedos apskritis	Lithuania	Stier et al. (1956)	
Amsterdam	Groot-Amsterdam	Netherlands	King (1985), Stier et al. (1956)	Dollinger (1966), Kinder and Hilgemann (1982), Spufford (2002)
Deventer	Zuidwest-Overjissel	Netherlands	King (1985), Stier et al. (1956)	Dollinger (1966)
Dordrecht	Zuidoost-Zuid-Holland	Netherlands	King (1985), Stier et al. (1956)	Dollinger (1966), Spufford (2002)
Kampen	Noord-Overjissel	Netherlands	King (1985)	Dollinger (1966), Spufford (2002)
Maastricht	Zuid-Limburg	Netherlands	Stier et al. (1956)	
Rotterdam	Groot-Rijnmond	Netherlands	Stier et al. (1956)	
Utrecht	Utrecht	Netherlands	Stier et al. (1956)	
Braniewo	Elblaski	Poland	Stier et al. (1956)	Dollinger (1966)
Cracow	Miasto Kraków	Poland	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Ammann (1955), Kinder and Hilgemann (1982), Spufford (2002)
Elblag	Elblaski	Poland	Magocsi (2002), Stier et al. (1956)	Kinder and Hilgemann (1982)

Table A.3 – *Continued*

Gdansk	Gdanski	Poland	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Ammann (1955), Dietze (1923), Dollinger (1966), Kinder and Hilgemann (1982), Spufford (2002)
Malbork	Starogardzki	Poland	King (1985)	
Piotrków Trybunalski	Piotrkowski	Poland	Davies and Moorhouse (2002)	
Plock	Ciechanowsko-plocki	Poland	Magocsi (2002)	
Poznan	Poznanski	Poland	Davies and Moorhouse (2002),Magocsi (2002), Stier et al. (1956)	Ammann (1955)
Torun	Bydgosko-Torunski	Poland	Davies and Moorhouse (2002), King (1985), Magocsi (2002), Stier et al. (1956)	Dollinger (1966), Spufford (2002)
Warsaw	Miasto Warszawa	Poland	Davies and Moorhouse (2002), Magocsi (2002), Stier et al. (1956)	Ammann (1955) and Kinder and Hilgemann (1982)
Wroclaw	Miasto Wroclaw	Poland	Davies and Moorhouse (2002), King(1985), Magocsi (2002), Stier et al. (1956)	Ammann (1955), Dietze (1923), Kinder and Hilgemann (1982), Spufford (2002)
Stargard	Szczeciński	Poland	Stier et al. (1956)	Dollinger (1966)

Table A.4: Medieval Trade Cities and Regions with Long-run Trade Activity

Trade City	NUTS-3 Region	country	mentioned earliest by	earliest period mentioned
Linz	Linz-Wels	Austria	Humnicki and Borawska (eds.) (1969)	9th century
Vienna	Wien	Austria	Dietze (1923)	before 14th century
Antwerp	Arr. Antwerpen	Belgium	Heyd (1897b)	14th century
Bruges	Arr. Brugge	Belgium	Heyd (1897b)	14th century
Ghent	Arr. Ghent	Belgium	Dollinger (1966)	12th century
Brno	Jihomoravský kraj	Czech Republic	Humnicki and Borawska (1969)	9th century
Olomouc	Olomoucký kraj	Czech Republic	Humnicki and Borawska (1969)	9th century
Prague	Hlavní mesto Praha	Czech Republic	Humnicki and Borawska (1969)	9th century
Avignon	Vaucluse	France	Heyd (1879b)	high medieval
Bordeaux	Gironde	France	Dollinger (1966)	15th century
Limoges	Haute-Vienne	France	Heyd (1879a)	before 12th century
Lyon	Rhône	France	Dollinger (1966)	15th century
Marseille	Bouches-du-Rhône	France	Heyd (1879a)	before 10th century
Metz	Moselle	France	Heyd (1879b)	14th century
Montpellier	Hérault	France	Heyd (1879a)	before 12th century
Narbonne	Aude	France	Heyd (1879a)	before 12th century
Paris	Paris	France	Dollinger (1966)	15th century
Strasbourg	Bas-Rhin	France	Dollinger (1966)	before 1250
Troyes	Aube	France	Dietze (1923)	before 9th century
Augsburg	Augsburg, District-Free City	Germany	Dietze (1923)	before 9th century
Berlin	Berlin	Germany	Dollinger (1966)	15th century

Table A.4 – *Continued*

Brunswick	Braunschweig, District-Free City	Germany	Dietze (1923)	before 9th century
Bremen	Bremen, District-Free City	Germany	Heyd (1879a)	before 12th century
Bremerhaven	Bremerhaven, District-Free City	Germany	Heyd (1879a)	before 12th century
Cologne	Cologne, District-Free City	Germany	Dietze (1923)	before 9th century
Constance	Konstanz	Germany	Dietze (1923)	before 9th century
Dortmund	Dortmund, District-Free City	Germany	Dollinger (1966)	Treaty of Smolensk (1229)
Erfurt	Erfurt, District-Free City	Germany	Heyd (1879a)	before 12th century
Frankfurt (Oder)	Frankfurt (Oder), District-Free City	Germany	Heyd (1879a)	before 12th century
Frankfurt (Main)	Frankfurt am Main, District-Free City	Germany	Dietze (1923)	before 9th century
Görlitz	Görlitz, District-Free City	Germany	Rutkowski (1980a)	14th century (1370)
Greifswald	Greifswald, District-Free City	Germany	Dietze(1923)	before 14th century
Hamburg	Hamburg	Germany	Dollinger (1966)	before 1250
Hildesheim	Hildesheim	Germany	Dollinger (1966)	13th – 14th century
Lübeck	Lübeck, District-Free City	Germany	Heyd (1879a)	Treaty of Smolensk (1229)
Lüneburg	Lüneburg, District	Germany	Dollinger (1966)	13th – 14th century
Magdeburg	Magdeburg, District-Free City	Germany	Heyd (1879a)	before 10th century
Minden	Minden-Lübbecke	Germany	Dollinger (1966)	13th – 14th century
Münster	Münster, District-Free City	Germany	Dollinger (1966)	Treaty of Smolensk (1229)
Nuremberg	Nuremberg, District-Free City	Germany	Dietze (1923)	before 9th century
Osnabrück	Osnabrück, District-Free City	Germany	Dollinger (1966)	13th – 14th century
Paderborn	Paderborn	Germany	Dollinger (1966)	13th – 14th century
Ravensburg	Ravensburg	Germany	Schulte (1923) and Schelle (2000)	late 14th century
Regensburg	Regensburg, District-Free City	Germany	Dietze (1923)	before 9th century
Rostock	Rostock, District-Free City	Germany	Dollinger (1966)	13th – 14th century
Soest	Soest	Germany	Dollinger (1966)	Treaty of Smolensk (1229)
Stralsund	Stralsund, District-Free City	Germany	Dietze (1923)	before 14th century
Ulm	Ulm, Urban District	Germany	Dietze(1923)	before 9th century
Wismar	Wismar, District-Free City	Germany	Dollinger (1966)	13th – 14th century
Budapest	Budapest	Hungary	Wojtowicz (1956)	14th century

Table A.4 – *Continued*

Ancona	Ancona	Italy	Heyd (1879a)	before 12th century
Bari	Bari	Italy	Heyd (1879a)	before 12th century
Bologna	Bologna	Italy	Heyd (1879b)	14th century
Florence	Firenze	Italy	Heyd (1879b)	14th century
Genoa	Genova	Italy	Heyd (1879a)	before 12th century
Lucca	Lucca	Italy	Heyd (1879a)	before 13th century
Milan	Milano	Italy	Heyd (1879b)	14th century
Naples	Napoli	Italy	Heyd (1879b)	before 12th century
Parma	Parma	Italy	Heyd (1879b)	14th century
Pisa	Pisa	Italy	Dietze (1923)	before 14th century
Rome	Roma	Italy	Heyd (1879a)	before 12th century
Siena	Siena	Italy	Heyd (1879b)	13th century (1209)
Venice	Venezia	Italy	Heyd (1879a)	before 12th century
Kovno	Kauno apskritis	Lithuania	Dollinger (1966)	between 1350 and 1500
Deventer	Zuidwest-Overjissel	Netherlands	Dollinger (1966)	14th century
Kampen	Noord-Overjissel	Netherlands	Dollinger (1966)	14th century
Cracow	Miasto Kraków	Poland	Humnicki and Borawska (1969)	9th century
Gdansk	Gdanski	Poland	Dollinger (1966)	13th – 14th century
Malbork	Starogardzki	Poland	Wojtowicz (1956)	14th century
Piotrków Trybunalski	Piotrkowski	Poland	Wojtowicz (1956)	14th century
Plock	Ciechanowsko-plocki	Poland	Wojtowicz (1956)	14th century
Poznan	Miasto Poznan	Poland	Wojtowicz (1956)	14th century
Torun	Bydgosko-Torunski	Poland	Dollinger (1966)	13th – 14th century
Warsaw	Miasto Warszawa	Poland	Wojtowicz (1956)	14th century
Wroclaw	Miasto Wroclaw	Poland	Dollinger (1966)	13th – 14th century

A.2 Robustness Checks

The results have proven to be robust to the inclusion of many important covariates and to endogeneity issues. However, there remain some additional concerns about the robustness of the obtained estimates. To account for these issues, I conduct various robustness checks.

There is a considerable amount of uncertainty in the historical sources and information on which the identification of important medieval trade centers is based. For example, there is a different degree of uncertainty about the extent and location of trade activities, and the course of main routes, i.e. the actual importance of a particular trade route at a certain point in time is not always clear. This uncertainty is a natural result of the qualitative —and therefore to some extent always subjective—nature of the collected information and the scarce amount of general information about the medieval period and the trade activities during that time. In consequence, it is adequate to test whether the empirical results hold, when alternative sample of trade cities are used in the regressions. I therefore re-estimate the results that depend on the trade center dummy (in Panel A of Table 2.2 and 2.6) using the four different alternative samples of trade regions.

At first, I recode cities mentioned by only one of my sources as having no trade city. Second, I recode cities reported in some of the maps or sources that do not actually lie on a well-known and important trade route; were not important members of the Hanseatic League; or are not mentioned by any of my other historical sources as being of notable importance in later medieval trade. What is more, I also conduct the empirical analysis with a sample of trade cities including additional cities mentioned by some of the sources, but for which I—having consulted several different sources about the history of the respective places—are in doubt of their actual importance during the middle ages, at least over a longer period.[5] Finally, I try to ensure that I do not include trade cities that only experienced significant trade activities for a short period —and thus not long enough to result in a lock-in to a superior development path. To achieve this, I construct a fourth alternative sample of trade centers considering only those cities for which I found records of recognizable trade activities in periods before the late 15th century. These cities and the respective sources providing the information are listed in

[5] In the Data Appendix I provide more detailed information on every of these alternative samples, i.e. the recoded cities and the exact criteria on which the recoding is based.

Table A.4. The Results are depicted in Table A.5.

As one can infer from this table, the results typically change only marginally with the alternative trade center variables. However, with the last sample of trade cities containing cities with reported trade activities in earlier periods, the coefficient of the trade center dummy becomes considerably smaller and actually becomes insignificant—at least in the cross-sectional regression. However, this might also be due to the loss of much of the variance and the introduction of additional noise in the trade center variable. In sum, none of my conclusions and general results are invalidated by the alternative samples of trade cities or by systematic differences in the size of NUTS-3 regions. As such, the results are robust to considerable changes in the sample due to uncertainty of historical information and underlying data selection criteria.

Another robustness check accounts for the obvious considerable differences in the size of the NUTS-3 regions resulting from political decisions as well as differences in population density across the included countries. In the previous estimations, I already included the area of a individual NUTS-3 region as a control variable. However, the size of the NUTS-3 regions probably varies more between than within countries. In consequence, I include a country's average NUTS-3 region area as a supplementary control and re-estimate the specifications in column (6) of Table 2.2. The results are shown in Table A.6 Panel A. An alternative way to account for the considerable differences in the size of NUTS-3 regions and to test robustness to different sub-samples is to run the regressions in Table 2.2 column (6) without Belgium, Germany and the Netherlands (the countries with small NUTS-3 regions). This is done in Table B.2 Panel B. Finally, I weight the observations by the ln of the area of the NUTS-3 region and re-estimate the regression in Table 2.2 column (6). The results of this task are reported in Table A.6 Panel C. Finally, I only consider regions located in the 40th to 80th percentile of the region area distribution to look whether the results still hold if only relatively equally large regions are included. The results of this exercise are reported in Panel D of Table A.6.[6] None of these modifications does lead to insignificant medieval trade measures. In the case of the weighted regressions in Panel C the coefficients actually become even larger.

Furthermore, in Table A.7, I estimate the regressions including neighbor GDP per capita

[6]Since the number of observations is reduced to 251 in this case I substitute NUTS-2 dummies with the NUTS-1 dummies.

using a spatial lag, a spatial error and a mixed spatial model.[7] Those are employed to show that spatial autocorrelation (whether explicitly modelled or in the error term) does not bias the estimates and also that simultaneity arising from the spatial lag variable does not lead to a distortion of the results. This is necessary as Moran's I tests of the OLS specification in Table 2.2 column (6) show that there is spatial autocorrelation.[8] However, Lagrange Multiplier (LM) tests of spatial autocorrelation in the error and of the spatial lag variables reveal that a spatial error model is suitable as the impact of the spatial lag is not statistically different from zero.[9]. I nevertheless run a spatial lag model and a mixed spatial model as I include neighbor GDP per capita also due to other reasons than controlling for autocorrelation, namely to account for a region's second nature geography. Thus, I have to know whether and how the simultaneity problem created by including neighbor characteristics biases the estimates. The resulting coefficients of the medieval trade measures are about the same as in the standard OLS case, although they marginally smaller in all cases. Usually, the coefficients of the spatial error model are slightly lower than those obtained by the other two models.

In Table A.8 I do the same for the city level panel estimates in Table 2.6 column (1). Here, Moran's I again indicate the presence of spatial autocorrelation regardless of which trade measure is used.[10] Moreover, the LM tests always indicate that there is a significant impact both of the spatial lag and the spatial error variable, so that the spatial mixed models is suitable. However, in Table A.8 I again show the estimates of all three models (spatial lag, spatial error and spatial mixed model). In any case, the included spatial lags and or errors are highly significant. Nevertheless, the coefficients of the trade measures are virtually identical to those obtained in Table 2.7, column (1) using standard estimation techniques for panel data. Moreover, they

[7] This means I estimate equations (1) and (2) using Maximum Likelihood procedures as implemented by the Stata command spmlreg. In case of the spatial lag model, the procedure generates the spatially lagged variable generated based on a spatial weights matrix with inverse distance weights. In the case of the spatial error model, I assume a spatial autoregressive model in the error term and in the case of mixed spatial model I allow for both.

[8] In Panel A column (6) where the trade center dummy serves as dependent variable I$= 7.524$, in Panel B (distance to nearest trade center) it is 7.533 and in Panel C (centuries of trade) it is 7.524 ($p - value < 0.01$ in each case). The values are based on OLS regression of Table 2.2 column (6) but without the Neighborhood GDP variable.

[9] Values and standard errors of the robust LM test are available from the author upon request.

[10] The exact Moran's I values are 2.317 ($p - value = 0.024$) in the case of the trade center dummy; 2.23 ($p - value = 0.024$) in the case of the distance to trade center variable and 2.215 ($p - value = 0.027$) for the century of trade variables. The values are based on the regressions in Table 2.6 column (1) Panels A–C without the Urban Potential measure.

are more or less identical regardless of which spatial model is used.

In Table A.9 finally, I account for that I do not include trade cities in some of the neighbors of the considered countries (e.g., I do not include Spain in the analysis, but France). For the border regions to these not included countries the distance variable therefore might be biased as the actually closest trade center is located in Spain and not in France (but I do not have included cities in Spain). To overcome this issue, I delete the 50 regions that are located at a border to a country that is not included in the analysis and re-estimate the specifications in Table 2.2 Panel B. They reveal that most often, the point estimates are actually larger or approximately the same than in the standard OLS case, implying that if there is a bias resulting from this issue it is not large and downward biased the estimates.

Table A.5: Robustness of the Results to Alternative Codings of the Trade City Dummy

	(1)	(2)	(3)	(4)
Modified Trade Variable	Without cities mentioned by only one source	Without cities for which importance is in doubt	With additional trade cities for which importance is in doubt	Only with cities for which trade activities in earlier centuries are reported
	Panel A: Specification of Panel A, column (6) of Table 2.3 (OLS)			
Dep. Var.	ln(GDP per capita)			
Trade Center	0.0837***	0.110***	0.104***	0.0676**
(0.0289)	(0.0293)	(0.0250)	(0.0318)	
Obs.	839	839	839	839
Adj. R^2	0.852	0.853	0.853	0.851
	Panel B: Specification of Panel A, column (4) of Table 2.7 (FE)			
Dep. Var.	ln(Population)			
Trade City	0.216**	0.268***	0.224**	0.191*
	(0.1)	(0.096)	(0.089)	(0.111)
Obs.	1,533	1,533	1,533	1,533
Overall R^2	0.367	0.370	0.368	0.364

Notes. In Panel A robust Standard errors and in Panel B standard errors cluster on city level are are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region in Panel A and a city in Panel B. The included controls are identical to those reported in the panel headings. The reader is referred to the notes in Table 2.2 and 2.6 for further information. Each regression includes a constant not reported.

Table A.6: Robustness to Accounting for Different NUTS-3 Region Size and Sub-Samples

Dep. Var.	ln(GDP per capita)		
	(1)	(2)	(3)
Trade Measure	Trade Center Dummy	ln(Distance to Trade Center)	Centuries of Trade
	Panel A: Including Average Area		
	0.105***	-0.107***	0.0131***
	(0.025)	(0.041)	(0.003)
Obs.	839	839	839
Adj. R^2	0.853	0.8852	0.853
	Panel B: Without Germany, Belgium and the Netherlands		
	0.139***	-0.166***	0.0159***
	(0.03)	(0.049)	(0.004)
Obs.	326	326	326
Adj. R^2	0.937	0.935	0.936
	Panel C: Observation weighted by NUTS-3 region area		
	0.118***	-0.121***	0.0144***
	(0.024)	(0.039)	(0.003)
Obs.	839	839	839
Adj. R^2	0.874	0.873	0.874
	Panel D: Region Area in 40–80% percentile		
	0.153***	-0.136**	0.0203***
	(0.037)	(0.061)	(0.005)
Obs.	251	251	251
Adj. R^2	0.706	0.693	0.706

Notes. Robust Standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region. The included controls are identical to those in Table 2.2 column (6). In Panel A a variable reporting the average area of a country's NUTS-3 regions is added to the specification. In Panel C, the observations are weighted (with analytical weights) by the ln of the NUTS-3 region's area. Each regression includes a constant not reported.

Table A.7: Spatial Regression Models of Table 2.3, column (6)

Dep. Var.	ln(GDP per capita)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Model	Spatial Lag Model	Spatial Error Model	Spatial Mixed Model	Spatial Lag Model	Spatial Error Model	Spatial Mixed Model	Spatial Lag Model	Spatial Error Model	Spatial Mixed Model
Trade Center	0.105***	0.105***	0.106***						
	(0.023)	(0.026)	(0.026)						
ln(Distance to Trade City)				-0.108***	-0.108***	-0.109***			
				(0.036)	(0.04)	(0.04)			
Centuries of Trade							0.0131***	0.0131***	0.0132***
							(0.003)	(0.003)	(0.003)
Variance Ratio	0.882	0.830	1.811	0.881	0.823	1.728	0.883	0.833	1.792
Squared Correlation	0.882	0.879	0.021	0.881	0.877	0.026	0.883	0.880	0.022
Obs.	839	839	839	839	839	839	839	839	839

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region. The controls are identical to that included in Table 2.3 column (6) in the main text. Each regression includes a constant not reported.

Table A.8: Spatial Regression Models of Table 2.7, column (1)

Dep. Var.	ln(GDP per capita)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Model	Spatial Lag Model	Spatial Error Model	Spatial Mixed Model	Spatial Lag Model	Spatial Error Model	Spatial Mixed Model	Spatial Lag Model	Spatial Error Model	Spatial Mixed Model
Trade City	0.350***	0.351***	0.320***						
	(0.035)	(0.032)	(0.032)						
ln(Distance to Trade City)				-0.0757***	-0.0761***	-0.0696***			
				(0.008)	(0.007)	(0.007)			
Centuries of Trade							0.0596***	0.0597***	0.0564***
							(0.006)	(0.005)	(0.005)
Variance Ratio	0.464	0.471	0.804	0.459	0.462	0.888	0.467	0.473	0.735
Squared Correlation	0.464	0.439	0.292	0.459	0.441	0.262	0.467	0.444	0.318
Obs.	1,533	1,533	1,533	1,533	1,533	1,534	1,533	1,533	1,533

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The controls are identical to that included in Table 2.6 column (1) in the main text. Each regression includes a constant not reported.

Table A.9: Distance to Trade Center and Contemporary Economic Development—Without External Border Regions

Dep. Var.	ln(GDP per capita)					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(Distance to Trade Center)	-0.261***	-0.127***	-0.134***	-0.149***	-0.0979***	-0.101**
	(0.04)	(0.033)	(0.041)	(0.033)	(0.03)	(0.041)
NUTS-1 Dummies	Yes	Yes	Yes	Yes	Yes	No
NUTS-2 Dummies	No	No	No	No	No	Yes
Basic Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Regional Environment and Location	Yes	No	No	No	Yes	Yes
Region Characteristics	No	Yes	No	No	Yes	Yes
Historical Region Characteristics	No	No	Yes	No	Yes	Yes
Growth Covariates	No	No	No	Yes	Yes	No
Obs.	789	789	789	501	501	789
Adj. R^2	0.719	0.795	0.727	0.870	0.9	0.814

*Notes.*Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region. The basic geographic controls include a region's latitude, longitude and altitude. The "Regional Environment and Location" controls include the ln distances of a region's centroid to the nearest border, coast point or river as well as the distance weighted sum of the GDP per capita of all NUTS-3 region in a radius around 150 kilometers around the considered NUTS-3 region and four variables indicating the number of medieval trade regions 0–50,50–100, 100-150 and 150–250 kilometers away. Region characteristic controls include dummies for regions including a country's capital, are classified as mountain regions and with ore or coal mines (this latter variable is not included in column (6) as it would be collinear with the NUTS-2 fixed effects). Furthermore, it encompasses the ln of a regions area and the ln of a regions agricultural suitability. The historical region characteristics consist of a dummy variables indicating regions with a city serving as seat of a bishop in 1500 AD, with a university founded before 1500 AD, that adopted printing technology before 1500 AD, contain cities that were members of the Hanseatic League, with former imperial cities, that were residence cities of a secular ruler or were located on an Imperial road. Moreover it includes the ln of the distance of a regions centroid to the closest Roman road. The growth covariates encompass a region's unemployment rate, number of registered patents, average firm ln fixed capital stock, average worker compensation. Furthermore, it includes the share of people aged between 25-64 with tertiary education on NUTS-2 level, the quality of government index on NUTS-1/ NUTS-2 level and the ratio of an average workers compensation to a region's GDP per capita as inequality measure. Each regression includes a constant not reported.

A.3 Discussion of Exceptional Cases and Additional Historical Evidence

A.3.1 Discussion of Exceptional Cases

Obviously, there are exceptions to this story, i.e. cities and regions becoming large and important agglomerations without being important centers of medieval trade. For example, this is true for Stuttgart (the sixth largest German city today) and Munich two of the richest and economically most prosperous cities and agglomeration areas in present day's Germany. Stuttgart only became important after the Napoleonic Wars when it became the capital of the newly founded kingdom of Württemberg. The rise of Munich (today the third largest city in Germany) followed a similar pattern, albeit as the capital of a kingdom and residence of a bishop for a longer period (and later archbishop) Munich only began to become a large city after the late 18th century. Again, it experienced significant population growth in the nineteenth century after the Napoleonic Wars until World War I. Bavaria, and Munich as its center, remained relatively poor until the 1950s (when, e.g., the Siemens corporation moved its headquarter from Berlin to Munich). Additionally, the Ruhr Area, the largest agglomeration in Germany, largely results from its rich endowments in coal and iron making it one of the most important nucleus of German industrialization.

A.3.2 Additional Historical Evidence

A.3.2.1 Evidence on the Functioning of Marktes and the Existence of an Urban Rural Wage Gap

Of course, the medieval city was a highly cartelized and regulated economy with dominant guilds and significant rent-seeking activities (e.g., Braudel 1986). However, as Braudel (1986) concludes, since the 13th century something akin to market integration (to some extent) existed with prices varying in the markets of cities every week according to supply and demand. Furthermore, the increasing spread of the "Verlagssystem" might have limited the power of the guilds. Concerning the urban rural wage differential, evidence in general is limited for this period. Braudel (1986) notes that, in general, and due to the power of guilds, the wages in the city can usually be considered as higher than those in rural areas. Indeed Munro (2002), when comparing the real wages in England and Flanders between 1300 and 1500, found that

the real wages in the cities were higher than in rural areas and showed a higher downward rigidity. In addition, van Bavel and van Zanden (2004) notice that in pre-industrial societies the relationship between city size and nominal wages was usually positive.

A.3.2.2 Further Evidence on the Importance of the Church for Economic Development in the Middle Ages

King (1985) describes the importance of the church for commercial activities and trade, i.e. he mentions that in many cases the local fairs and markets are managed and organized by the church. Pounds (2005) and Nicholas (1997) additionally emphasize the importance of bishops for the development of cities in the Early Middle Age, when traditional trade declined during the economic depression in the eighth and ninth century. Finally, Hunt and Murray (1999) notice the significance of the church for city development and commerce arising from fostering ecclesiastical tourism and pilgrim activities. Pilgrim activities are also identified by Escher and Hirschmann (eds.) (2005) as an important factor of city development and urban centrality.

A.4 Additional Results

A.4.1 The Determinants of Medieval Trade

For a valid empirical investigation of the impact of medieval trade on economic development it is essential to know about the determinants of medieval trade activities. Therefore, I have a look at the factors determining whether a city became a trade city during the medieval or not.

Based on the literature on the origins of European cities (Bosker and Buringh 2012, Hohenberg and Lees 1996) and medieval trade (e.g., Lopez 1976, Pounds 1974, Dollinger 1966) one can identify four type of factors that potentially had an impact on the location of medieval trade activities: (i) location fundamentals (first-order geography) like location on the coast (ii) second nature geography (a city's position in the urban network/ market potential) (iii) a city's importance and history with regard to political or ecclesiastical aspects, like being the seat of an archbishop or having a university and (iv) a city's political environment (e.g. presence or absence of institutions of self-governance, being a city state etc.).

Each of these kind of factors intuitively should have an influence on the patterns of medieval trade centers. It is evident that trade cities frequently emerged on rivers or on the coast because transport via water was fast and cheap. Archbishops and the administration they come along with were an important source of demand and universities provided both the human capital and the population increase necessary for trade. Institutions of self-governance on the other hand probably delivered the institutional and political prerequisites for trade (e.g. Greif 2006, Stasavage 2011). Concerning second-nature geography the direction of the impact is not a priori clear, on the one hand a high urban or market potential (i.e. location in a densely populated and highly urbanized area) could be favorable for trade as there is more potential demand to satisfy. On the other hand, already existing large cities or trade centers could hamper the development of a city and leading it to remain in the shadow of its more important neighbors (e.g, Bosker and Buringh 2012).

To answer the question about the actual importance of each of these factors for medieval trade patterns I constructed a cross sectional data set based on the panel data set used in section 4.3 of the main paper. Basically, I take the Bosker et al. (2013) data set and supplement it with time-variant versions of the three medieval trade variables. The data set is used for the regressions is then constructed as follows: First, for each city the century in which it became

a trade city is recognized. Next, the values of the variables before this century are included in the data set to circumvent reverse causality issues. For cities that did not become trade cities the values of 1500 AD are included in the data set. For example, Gdansk became an important trade city in the 14th century. In consequence, for Gdansk the data set contains the variable values in 1300 AD. The German city of Flensburg on the other hand, is not considered as a trade city and I include the variable values of 1500 AD for Flensburg. Consequently, I do not include cities that already were trade cities in 800 AD—the first period in the data—as for them, no previous period is available.[11]. This leaves me with 346 of the 362 cities in the data set.

To measure location fundamentals I include dummies for location on the coast or a river, as well as variables documenting a city's elevation, terrain ruggedness (standard deviation of elevation), the probability that a city will be cultivated (depending on soil quality and climatic conditions) and a categorical variable classifying the study area in four different ecological zones according to their agricultural productivity (depending on the maximum production of grain equivalents of potential agricultural land) where zone two represents the highest productivity and zone five the lowest. Second nature geography is measured by a cities Christian urban potential (i.e., the population of all the other Christian cities in the sample inversely weighted by their distance to the considered city) and Muslim urban potential as well as three dummy variables reporting the number of trade cities 50km, 50–100km and 100–150km away from the city under consideration.[12] To capture relevant city characteristics I include dummy variables indicating the presence of a bishop or archbishop and the existence of a university. Furthermore, I include a variable reporting the number of times a city was plundered in the century before. At last, the political environment of the city is captured by a dummy variable reporting whether a city had a city council or not, was located in a large territorial state and had an non-absolutist political regime (the De Long and Shleifer "Free-Prince" variable). A descriptive overview of the variables is given in Table A.10.

[11] I also conducted the regressions including these cities and the results are virtually identical. Regressions not shown but available upon request

[12] As in the main text, urban potential is calculated according to the methodology of De Vries (1984). Further explanations on this are available in the main text (section 4.3). To include the three different distance bands separately follows the approach of Bosker and Buringh (2012) who found that 2nd nature geography has a non-linear effect on the development of cities.

I conduct probit regressions using the trade city dummy as dependent variable and the proxy variables discussed above as explanatory variables and additionally add country dummies to each regression to account for unobserved heterogeneity between countries. The results of the estimations are reported in Table A.11. In columns (1)–(4) of Table A.11 I consider each type of factors separately and in column (5) I add all variables jointly to the regression.

The results show that all four types of factors contribute to the explanation of medieval trade. Location fundamentals, with exception of soil quality and terrain ruggedness, show large and highly statistically significant average marginal effects. Hence, cities with favorable geographic and bio-geographic location had a considerably higher probability of becoming a trade city than others. The same holds true for second nature geography. Both urban potential measures as well as the number of trade cities in different distance bands have a significantly negative impact on the probability to become a trade city. This is in line with the notion of an "urban shadow effect" where the presence of existing trade cities or larger urban centers hampers the development of a city. Looking at city characteristics, only the presence of a bishop or archbishop seem to have a significant positive effect on the probability of being a trade center. This confirms historical evidence on the importance of the church for medieval commerce and city development (Baker and Holt 2004, Bosker and Buringh 2012). To the contrast, universities and being plundered have no robust impact. Finally, among the variables representing the political environment of a city the existence of institutions of self-governance has a positive impact on becoming a trade city and being located in a large state has a negative impact. Both confirms findings of previous research (e.g. Bosker et al. 2013, Greif 2006, Stasavage 2011) on these matters as it is evident from the historical literature that city states with more or less pronounced political independence often became trade cities as they were economically more prosperous than cities governed by territorial rulers.

Table A.10: Descriptive Data Overview—Data Set to Explain Location of Medieval Trade Cities

Variable	Obs	Mean	Std. Dev.	Min	Max
Archbishop	346	0.095	0.294	0.00	1.00
Bishop	346	0.361	0.481	0.00	1.00
Christian Urban Potential	346	13.274	7.616	1.28	60.60
Communal Institutions	346	0.491	0.501	0.00	1.00
Ecozones	346	3.882	0.868	2.00	6.00
Elevation	346	132.962	149.148	-4.00	1085.00
Free-Prince	346	0.728	0.445	0.00	1.00
Large State	346	0.506	0.501	0.00	1.00
Muslim Urban Potential	346	1.734	0.979	0.73	5.92
No. of Trade Cities (0-50km)	346	0.416	0.706	0.00	4.00
No. of Trade Cities (100-150km)	346	4.211	2.967	0.00	14.00
No. of Trade Cities (50-100km)	346	2.520	2.283	0.00	11.00
Plundered	346	0.029	0.168	0.00	1.00
River	346	0.633	0.483	0.00	1.00
Sea	346	0.162	0.369	0.00	1.00
Soil Quality	346	0.779	0.210	0.02	1.00
Terrain Ruggedness	346	57.228	73.705	0.47	559.45
Trade City	346	0.217	0.413	0.00	1.00
University	346	0.075	0.264	0.00	1.00

Notes. This table shows the descriptives of the data set used for the regressions in Table A.11. This data set is constructed as follows: First, for each city the century in which it became a trade city is recognized. Then the values of the variables before this century are included in the data set to circumvent reverse causality issues. For cities that do not become trade cities that values of 1500 AD are included in the data set.

Table A.11: Determinants of Medieval Trade—Probit Regressions

Dep. Var.	Trade City				
	(1)	(2)	(3)	(4)	(5)
	Location Fundamentals	Second Nature Geography	City Characteristics and History	Politics	All
Sea	0.170***				0.553***
	(0.06)				(0.107)
River	0.208***				0.332***
	(0.055)				(0.055)
Elevation	-0.0005**				-0.0004***
	(0.000)				(0.000)
Terrain Ruggedness	-0.0001				0.0002
	(0.000)				(0.000)
Soil Quality	0.0212				0.0528
	(0.117)				(0.077)
Ecozone=3	-0.123				-0.180**
	(0.144)				(0.079)
Ecozone=4	0.0560				-0.102*
	(0.088)				(0.058)
Ecozone=5	0.0362				-0.126
	(0.125)				(0.086)
Muslim Urban Potential		0.0177			-0.146***
		(0.0286)			(0.039)
Christian Urban Potential		-0.0139**			-0.0339***
		(0.006)			(0.005)
No. of Trade Cities (0-50km)		-0.0877**			-0.0219
		(0.042)			(0.025)
No. of Trade Cities (50-100km)		-0.0316*			-0.0173**
		(0.017)			(0.009)
No. of Trade Cities (100-150km)		-0.0294***			-0.0164**
		(0.01)			(0.007)
Bishop			0.195***		0.0928***
			(0.05)		(0.03)
Archbishop			0.339***		0.135***
			(0.067)		(0.04)
University			-0.0156		0.0065
			(0.083)		(0.044)
Plundered			0.234**		0.0889
			(0.106)		(0.055)
Communal Institutions				0.125**	0.0608*
				(0.052)	(0.036)
Free-Prince				-0.386***	-0.0268
				(0.068)	(0.059)
Large State				-0.0590	-0.116***
				(0.061)	(0.035)
Obs.	346	346	346	346	346
Pseudo-R^2	0.1856	0.2965	0.1703	0.1769	0.6782

Notes. Robust standard errors are reported in parentheses. Average marginal effects are reported. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. Each regression includes a constant not reported.

A.4.2 Baseline Regression Specification with Conley's (1999) Standard Errors

First, I present bivariate OLS regressions of the natural logarithm of a NUTS-3 region's GDP per capita on medieval trade measures. Afterwards, I estimate equations one and two using NUTS-2 fixed effects. They are included to exploit within NUTS-2 region variation and thus reducing heterogeneity. I then also add a set of basic geographic controls, including latitude, longitude and altitude of a NUTS-3 region. The latter set of variables should capture the general geographic pattern of development in central Europe. This means, that economic development roughly increases from South to North (i.e., with increasing latitude) and decreases, in the sample, from West to East (i.e., with increasing longitude). Furthermore, it is widely acknowledged that regions with higher altitude are more difficult to reach—which seems especially relevant for trade—and have less favorable climates, thus I expect a negative influence of altitude.

The results of these regressions are shown in Table A.12. There, I report two different standard errors above each coefficient. First, in parentheses, heteroskedasdicity robust standard errors are reported. Below those, in brackets, I present standard errors accounting for the possible presence of spatial autocorrelation using Conley's (1999) method.[13]

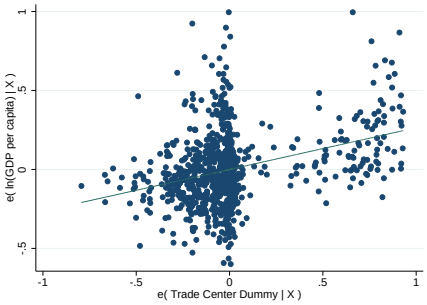
A glance at the estimation results confirms my expectations. Regions with medieval trade centers (cities) show a significantly higher GDP per capita than regions without such cities. The coefficient of the trade center dummy remains stable and significant at 1% level, regardless of which combination of control variables and fixed effects is used. According to column (3) of Table A.12, where I include the region dummies as well as the basic geographic controls, regions with medieval trade centers have a GDP per capita that is on average around 30% higher than regions without medieval trade centers. This means that the effect of medieval trade is not only statistically but also economically of considerable significance.

This also holds true for the coefficients of the distance to trade center. They are always highly significant and, quantitatively, are in the same range as that of the trade center dummy

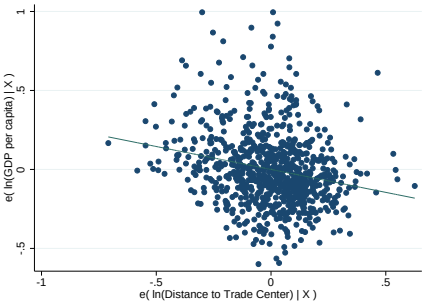
[13] I tested the existence of spatial autocorrelation in the dependent variable using Moran's I. An I of 0.151 (p-value=0.000) indicates the presence of positive spatial autocorrelation. Conley's (1999) standard errors are obtained using a cutoff point of three degrees (approx. 330 km) after which the spatial correlation is assumed to be zero. I experimented with several different cutoff points and this cutoff produced the most conservative standard errors.

(apart from the bivariate case in column (4)). Furthermore, they show the anticipated negative sign. At last, the centuries since importance in trade variable is always significant and shows the theoretically proposed positive sign. The clear positive relationship between contemporary GDP per capita and medieval trade centers is also illustrated graphically in Figure 1a, a partial regression plot of the Trade Center Dummy based on the full baseline specification in column (3). In Figure 1b the same is done for the negative relationship between the distance to a medieval trade center and the present GDP per capita and in Figure 1c for the relationship between centuries since importance in trade and GDP per capita.

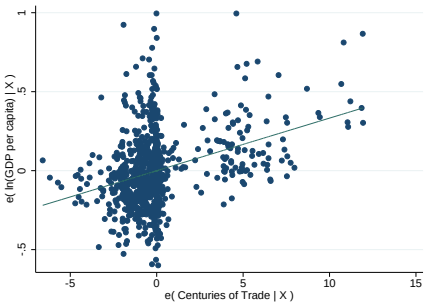
In general, the two different types of standard errors do not vary substantially (apart from the bivariate case). In view of this, heteroskedasdicity robust standard errors are used for all remaining specifications.



(a) GDP p.c and Trade Centers



(b) GDP p.c. and Distance to Trade Centers



(c) GDP p.c. and Centuries of Trade

GDP p.c. and Medieval Trade—Partial Regression Plots

Table A.12: Medieval Trade and Contemporary Economic Development—Baseline Estimates

Dep. Var.	ln(GDP per capita)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Trade Center Dummy	0.180***	0.272***	0.264***						
	(0.051)	(0.028)	(0.028)						
	[0.056]	[0.029]	[0.027]						
ln(Distance to Trade Center)				-0.621***	-0.310***	-0.290***			
				(0.077)	(0.046)	(0.046)			
				[0.141]	[0.045]	[0.044]			
Centuries of Trade							0.0257***	0.0343***	0.0333***
							(0.006)	(0.003)	(0.003)
							[0.006]	[0.003]	[0.003]
NUTS-2 Dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Basic Geographic Controls	No	No	Yes	No	No	Yes	No	No	Yes
Obs.	839	839	839	839	839	839	839	839	839
Adj. R^2	0.014	0.778	0.778	0.103	0.762	0.763	0.019	0.779	0.780

Notes. Below each coefficient two standard errors are reported. First, heteroskedasdicity robust standard errors are reported in parentheses. Second, standard errors adjusted for two-dimensional spatial correlation according to Conley's (1999) method are reported in brackets. The standard errors are constructed assuming a window with weights equal to one for observations less than 3 degrees apart and zero for observations further apart. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The basic geographic controls include a NUTS-3 region's latitude, longitude and altitude. Each regression contains a constant not reported.

A.4.3 Medieval Trade, Population Density and Regional Economic Development

To explicitly establish the relationship between medieval trade, contemporary economic agglomeration and regional economic development it is a straightforward strategy to conduct a causal mediation analysis following Imai et al. (2010). Mediation analysis enables to disentangle direct and indirect effects—via determining agglomeration—of medieval trade on contemporary development. Since I cannot rule out the possibility that there are direct effects or—amounting to the same—indirect effects of medieval trade working via other channels, this methodology seems to be appropriate for my setting. The estimation of mediation effects is based on a set of three different linear estimation equations (Imai et al. 2010):

$$Y_{cijk} = \alpha_1 + \beta_1 T_{cijk} + \gamma'_{11} \mathbf{X}_{cijk} + \lambda_j + \epsilon_{cijk1} \tag{A.1}$$

$$M_{cijk} = \alpha_2 + \beta_2 T_{cijk} + \gamma'_{21} \mathbf{X}_{cijk} + \lambda_j + \epsilon_{cijk2} \tag{A.2}$$

$$Y_{cijk} = \alpha_3 + \beta_3 T_{cijk} + \pi M_{cijk} + \gamma'_{31} \mathbf{X}_{cijk} + \lambda_j + \epsilon_{cijk3} \tag{A.3}$$

Where Y_{cijk} represents the ln of a region's average night light intensity in a NUTS-3 region (as a proxy for regional economic development) , T_{cijk} represents one of the three medieval trade measures (treatment variables).[14] M_{cijk} represents the mediating variable, that is ln population density as agglomeration measure.[15] $\mathbf{X}_{cijk}$ is defined as before and stands for a set of NUTS-3 level covariates and λ_j are NUTS-2 region fixed effects. The epsilons represent the error terms.

[14] A region's average night light intensity is obtained from a shapefile of the National Geophysical Data Center (NGDC) (available here: http://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html; accessed on August 2th, 2014). There are shapefiles visualizing the average visible, stable nighttime lights and cloud free coverages for every year between 1992 and 2012. I choose—as in the cross sectional analysis in the main text—the shapefile for 2008. We use the version of the shapefile where ephemeral events such as fires and background noise are removed and only light from cities, towns and other sites with persistent lightning are included. It also includes gas flares, however, for the area of this study no gas flares are detected. Night light intensity is measured by integer numbers ranging from 1–63 and the resolution of the data are 30x30 arcseconds (i.e., one value represents the average night light intensity of an area of 0.86 km squared). For the presented results, we aggregate the data on NUTS-3 region level using the ArcGIS zonal statistics tool. For a more comprehensive description of the night light data and a detailed discussion of technical issues the reader is referred to Henderson et al. (2012).

[15] The results would be similar if one would use relative GDP density as agglomeration/ industry concentration measure instead. Results not shown but available from the author upon request.

The "average causal mediation effect" (ACME) is estimated by the product of the coefficients β_2 and π ($\beta_2\pi$) or as the difference $\beta_1 - \beta_3$ and is obtained through a two-step procedure described in detail in Imai et al. (2010). The ACME represents the indirect effect of medieval trade on average night light intensity, i.e. that part of the overall effect of medieval trade running through agglomeration. Correspondingly, β_1 measures the total (average) effect of medieval trade on average ln night light intensity and β_3 represents the direct effect of medieval trade, i.e. that part of the effect not mediated by agglomeration (but perhaps by other factors). In consequence, this methodology of separating direct and indirect effects enables to calculate how far the total effect of medieval trade works via increased agglomeration. I expect $\beta_2 > 0$ in the case of the trade center dummy and the centuries of trade variable and $\beta_2 < 0$ in the case of the distance to trade center variable. Moreover, I also hypothesize that, on average, the majority of the effect of medieval trade should run through agglomeration. This leads me to expect the ACME to be significantly different from zero and greater than the direct effect ($|\beta_2\pi| > |\beta_3|$). Moreover, since it holds that $\beta_1 = \beta_2\pi + \beta_3$ equation (1) is redundant given equations (2) and (3) and therefore only those two equations are estimated by a regression.[16] Last, I assume $\pi > 0$, i.e. a significant positive direct effect of agglomeration on regional GDP per capita.

The results of the mediation analysis are presented in Table A.13.

Columns (1) to (3) show the results for the estimation of equation (1), i.e. the total effect of medieval trade on ln night light intensity. They show a economically and statistically significant impact of the medieval trade measures on current night light intensity.

Turning to the estimation of equation (4) (columns (4) to (6)) I see, as expected, that all three measures of medieval trade are strong predictors of contemporary population density. The coefficients are both significant from a statistical and economical point of view. The coefficient of the trade center dummy for instance implies that regions with an important medieval trade center shows on average around a 55% higher relative GDP density than non trade center regions. What is more, the results clearly show that a higher distance to a trade center corresponds to a higher distance to areas that are densely populated. Thus, according to those estimates, there is a significant and robust positive relation between present day's spa-

[16] From this it follows that the coefficients for equation (2) are calculated according to above formula and the corresponding standard errors are estimated using the delta method.

tial distribution of population and medieval trade. Moreover, from the estimations of equation (3) (columns (7) to (9)) I see that the significant effect of the medieval trade measures on a region's average night light intensity does completely disappear when I include population density in the regression estimation. Population density by contrast, enters with a positive and significant sign in each of the three regressions. Thus, areas with a high concentration of population are also the regions with higher economic development (as measured by night light intensity). Most importantly, this also implies that most of the observed strong effect of medieval trade on regional development levels works through its impact on the patterns of agglomeration. In line with this, the ACME is always significant and often even larger than the total effect of medieval trade as shown in the first four columns, indicating that the insignificant remaining direct effect of medieval trade is quite small and even negative in some cases.

Thus, it is fair to conclude that the effect of medieval trade indeed runs through agglomeration as proposed in this paper.

Table A.13: Medieval Trade, Population Density and Regional Economic Development—Mediation Analysis Using Night Light Intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Estimation of Equation (1) (Total Effect)			Estimation of Equation (2)			Estimation of Equation (3) (Direct Effect)		
Dep. Var.	ln(Night Light Intensity)			ln(Population Density)			ln(Night Light Intensity)		
ln (Population Density)							0.5161***	0.5166***	0.5137***
							(0.013)	(0.013)	(0.013)
Trade Center	0.1723***			0.3369***			-0.0021		
	(0.047)			(0.064)			(0.019)		
ln(Distance to Trade Center)		-0.2002***			-0.4123***			0.0121	
		(0.07)			(0.1)			(0.03)	
Centuries of Trade			0.0235***			0.042***			0.0019
			(0.006)			(0.008)			(0.002)
NUTS-2 Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Basic Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City Environment and Location	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Historical Region Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ACME (Total Effect-Direct Effect)							0.1749***	-0.2116***	0.0216***
							(0.041)	(0.063)	(0.005)
R^2				0.895	0.893	0.895	0.972	0.972	0.973
Obs.	839	839	839	839	839	839	839	839	839

Notes. Robust standard errors are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a NUTS-3 region. The "Regional Environment and Location" controls include the ln distances of a region's centroid to the nearest border, coast point or river as well as the distance weighted sum of the GDP per capita of all NUTS-3 region in a radius around 150 kilometers around the considered NUTS-3 region and four variables indicating the number of medieval trade regions 0–50,50–100, 100-150 and 150–250 kilometers away. Region characteristic controls include a dummies for regions including a country's capital and are classified as mountain regions. Furthermore it encompasses the ln of a regions agricultural suitability. A region's area is not included in the regressions of columns (4)–(6) as area is mechanically correlated with population density. The historical region characteristics consist of a dummy variables indicating regions with a city serving as seat of a bishop in 1500 AD, with a university founded before 1500 AD, that adopted printing technology before 1500 AD, contain cities that were members of the Hanseatic League, with former Imperial cities, that were residence cities of a secular ruler or were located on an imperial road. Moreover, it includes the ln of the distance of a regions centroid to the closest Roman road. Each regression includes a constant not reported. All results originate from a mediation analysis using the method developed in Imai et al. (2010,2011). ACME means "Average Causal Mechanism Effect" and is calculated as shown in the table. The coefficients in column (1)–(3) are calculated as $\beta_1 = \beta_2\pi + \beta_3$ (i.e. as sum of the ACMEs and the respective coefficients in column (7)–(9)). Standard errors for them and the ACME are estimated using the delta method. It represents the effect of medieval trade on ln average night light intensity running through its impact on relative GDP density (i.e., the indirect effect of medieval trade).

B

Appendices to Chapter 3

B.1 Data and Descriptive Statistics

B.1.1 Variable Definitions and Coding

The three main independent variables introduced in this section are all based on the sources and constructed according to the methodology introduced and discussed in the previous section (see also Table B.1).

Participative Election. A dummy variable indicating whether the citizens of a town could elect all or parts of the city government (i.e., one of the councils, magistrates, judges etc.) either directly or indirectly (through a community assembly or through an electoral collage. In Germany, Austria and Switzerland the citizens most often participated in the election of the city council (or one of them, usually the so called "Großer Rat" [great council]). In Belgium and the Netherlands, conversely, the burghers would often elect the magistrate of the city via a sworn council (in the German lands the magistrate was most often was elected by the council or appointed by the ruler of the city). The following cities are coded as having such a inclusive/ participative election procedures (the period in which it existed is given in parentheses):

Austria, Belgium and France

Salzburg (around 1500), Leuven (1400–1800), Strasbourg (1500–1800)

Germany

Aachen (1600–1800), Bamberg (1400–1800), Bautzen (1400–1800), Brunswick (1400–1800), Bremen (around 1200), Cologne (1400–1800), Dessau (1400–1800), Elberfeld (1400–1800), Frankfurt am Main (1700 and 1800), Freiberg (around 1400), Halle (around 1400), Münster (Westphalia) (1300–1500), Nuremberg (1400–1800), Osnabruck (1400–1800), Potsdam (1400 and 1500), Schwerin (1400–1600), Soest (1300–1800), Ulm (1400–1500), Würzburg (1300–1500)

Netherlands and Switzerland

Arnhem (1300–1800), Deventer (1300–1800), Dordrecht (1300–1600), Hoorn (1500–1800), Leeuwarden (1500–1800), Middelburg (1300–1500), Zwolle (1300–1800), Basel (1300–1800), Geneva (1400–1800)

Burgher Representation. Dummy variable equal to one if there was some form of institutionalized burgher representation in a city. "Institutionalized" means that it is not enough, that (as it seems to be the case in many cities) the citizens sometimes (i.e., not on a regular basis) had the possibility to voice their opinion in a meeting of the council or that representatives of the citizens could give advice or meet with the government of the town in specific situations (times of crisis, a new constitution etc.). Instead, there should be a community assembly, or e.g., a "Großer Rat" ("Great Council") or "Äußerer Rat" ("Outer Council") that meets regularly and that has at least constitutionally guaranteed the citizens a say in some matters of city politics. The following cities are coded as having such institutionalized burgher representation in the city government (with the period in which it existed in parentheses):

Austria, Belgium and France

Innsbruck (1400–1800), Linz (1600–1800), Salzburg (1500–1800), Vienna (1300–1500), Bruges (1400–1800), Ypres (1500–1800), Colmar (1400–1800) *Germany*

Berlin (around 1500), Bonn (1300–1800), Bremen (1500–1800), Dessau (1400–1800), Düsseldorf (1500–1700), Emden (1500–1800), Erfurt (1400–1600), Flensburg (1500–1800), Frankfurt am Main (1700 and 1800), Frankfurt an der Oder (1600–1800), Goslar (1500–1800), Gotha (1500–1800), Halberstadt (1200–1600), Halle (around 1400), Hamburg (1700 and 1800),

Hanau (1600–1800), Hanover (1300–1800), Heidelberg (1500–1800), Hildesheim (around 1200), Kassel (around 1300 and 1500–1800), Krefeld (1500–1800), Leipzig (1400–1500), Lüneburg (1700–1800), Magdeburg (around 1200a and 1400–1800), Mainz (around 1400), Mannheim (1700–1800), Münster (Westphalia) (around 1200 and 1500 to 1600), Munich (around 1400 and around 1800), Nördlingen (1300–1500), Nuremberg (1300–1500 and around 1800), Passau (1500–1800), Potsdam (1400–1700), Quedlingburg (1300 and 1400), Regensburg (1300–1800), Rostock (1600–1800), Schwerin (1700–1800), Soest (1300–1800), Stralsund (1600–1800), Ulm (1300–1600), Würzburg (1300–1500)

Netherlands and Switzerland

Geneva (1400–1800)

Guild Participation Index. A categorical variable equal to zero if (craft) guilds were not allowed to participate in the city council (the "Kleine Rat" ("Small Council"/ "Inner Council") which was usually the most important and powerful political institution of the city. The variable is equal to one if the guilds participate in the council, i.e., had a constitutionally guaranteed number of council members, but not the right to hold more than half of the seats. The variable is equal to two in cities with a so-called "Zunftverfassung" ("guild constitution"), which is where the majority or even all members of the city council were representatives (masters, members) of a guild. The following cities are coded as having craft guilds participating in the city council (=1 or =2 indicates whether guild members were in the majority or not in the city council; period in which this was the case in parentheses):

Austria, Belgium and France

Graz (1400 and 1500=1; 1500=2), Innsbruck (1400–1800=1), Vienna (1400 and 1500=1), Antwerp (1400–1800=1), Bruges (1400–1800=2), Brussels (1500–1800=1), Gent (1400 and 1500=2), Ypres (1400–1800=1), Liege (1400–1700=2), Leuven (1400–1800=1), Namur (1400–1800=1), Tournai (1500–1800=1), Colmar (1400–1800=2), Strasbourg (1300 and 1400=1; 1500–1800=2)

Germany

Aachen (1500=1;1600–1800=2), Ansbach (1500–1800=1), Augsburg (1400 and 1500=2), Bamberg (1500–1800=1), Berlin (1300 and 1500=1), Brunswick (1400=1, 1500–1800=2), Chemnitz (1300 and 1500–1800=1), Cologne (1400–1800=2), Dresden (1500–1800=1), Erfurt (1300–1600=1), Frankfurt am Main (1300–1800=1), Freiburg (1300 and 1400=1; 1500 and 1600=2),

Goslar (1300–1800=2), Halberstadt (1300 and 1400=1), Hanover (1400–1800=1), Hildesheim (1400–1800=1), Kassel (1300 and 1500–1800=1), Leizig (1300–1500=1), Magdeburg (1400–1800=2), Mainz (1400=1), Nördlingen (1400=1; 1500=2), Osnabrück (1400=1; 1500–1800=2), Speyer (1400–1800=2), Trier (1400 and 1500=1; 1600–1800=2), Ulm (1400–1500=2; 1600–1800=1), Worms (1300 and 1400=1; 1500=2), Würzburg (1300–1500=1)

Netherlands and Switzerland

Arnhem (1500, 1600 and 1800=1), Dordrecht (1400–1800=1), Hoorn (1500–1800=1), Middelburg (1500=1), Utrecht (1400 and 1500=2), s-Hertogenbosch (1400–1600=1), Basel (1400–1800=2), Bern (1300–1500=1), Zurich (1400–1800=2)

B.1.2 Definition and Sources of the Additional Variables

ln(Population). Reports the natural logarithm of a cities population in thousands of people in a particular year. City population figures are taken from Bosker et al. (2013). They are based on updated population figures from Bairoch et al. (1988) and other sources (see the Data Appendix of Bosker et al. (2013) available at `http://www.mitpressjournals.org/doi/suppl/10.1162/REST_a_00284/suppl_file/REST_a_00284_data_appendix.pdf`;
accessed on February 9th, 2014) However, because Bosker et al. (2013) only report city population values above 5,000 inhabitants smaller values are supplemented by resorting to Bairoch et al. (1988) and De Vries (1984)—both commonly used sources for historical city populations (also used in Cantoni 2013, Acemoglu et al. 2002, Acemoglu et al. 2005, Dittmar 2011 and Nunn and Qian 2011, among others). In some estimations we also use the interpolated figures for missing values between 1500 and 1800 from the University of Utrecht's Centre of Global Economic History (CGEH) City Population Database (available from `http://www.cgeh.nl/sites/default/files/def%20europe.xls]`;
accessed on February 9th, 2014).

Printing Press before 1500 AD. Dummy variable equal to one if a city had adopted printing technology before 1500 AD. The coding is based on information in Benzing (1982), Clair (1976) and the Incunabula Short Title Catalogue (ISTC) of the British library (`http://`

www.bl.uk/catalogues/istc/index.html; accessed on November 18th, 2012). A region is included if any of these sources mention a city in this region.

Trade City. Dummy variable equal to one if a city is considered to be an important (i.e., international or over-regional) trade center in the pre-modern period. The variable is coded according to various different sources (e.g., historical trade route maps, and monographs about medieval trade activities). The exact construction and the sources used are extensively discussed in chapter 3 and the accompanying Data Appendix.

Table B.1: Descriptive Overview of the Economic and Social Outcome Variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
ln(Population)	596	2.537	0.812	0.693	5.513
Printing Press before 1500 AD	1144	0.143	0.351	0	1
Trade City	1144	0.194	0.396	0	1

Table B.2: Sources on Participative Political Institutions in Medieval Cities—Overview

City	Literature Sources	Internet Sources
Aachen	Hermandung (1908)	
Altona	Rohde (1974)	
Amsterdam	Lis and Soly (2006), Lucassen and Prak (1998), Prak (1994), Prak (2006a)	
Ansbach	Hof (1992), Van Dülmen (1992)	
Antwerp	Auty (ed.) (2002), Lis and Soly (2006), Prak (2006a)	
Arnhem	Prak (2006b), Lucassen and Prak (1998)	
Augsburg	Czok (1966), Planitz (1966)	http://www.stadtlexikon-augsburg.de/index.php?id=114&tx_ttnews%5Btt_news%5D=5980&tx_ttnews%5BbackPid%5D=136&cHash=68e48bc1c0; http://www.stadtlexikon-augsburg.de/index.php?id=114&tx_ttnews[tt_news]=5105&tx_ttnews[backPid]=113&cHash=c99f5d65fe
Bamberg	Eckerlein (2008), Göldel (1999)	http://www.historisches-lexikon-bayerns.de/artikel/artikel_4509
Basel	Czok (1966), Egger (ed.) (2005), Planitz (1966)	
Bautzen	Borgolte (1992), Knothe (1884)	
Berlin	Haus (1992), Wallenborn (2007)	
Bern	De Capitani (1982), Bürgergemeinde Bern (1993), Feller (1946)	http://www.hls-dhs-dss.ch/textes/d/D26422.php
Brandenburg	Geiseler and Heß (eds.) (2008)	

Table B.2 – *Continued*

Bremen	Hegel (1891), Henning (1957), von Bippen (1892), Planitz (1966), Schwarzwälder (1995)	
Bruges	Auty (ed.) (2002), Dumolyn and Hamers (2005), Hegel (1891), Lis and Soly (2006), Planitz (1966), Prak (2006b)	
Brunswick	Hegel (1891), Planitz (1966)	www.braunschweig.de/leben/stadtportraet/geschichte/auseinandersetzungen.html
Brussels	Escher and Hirschmann (2005), Hegel (1891), Lis and Soly (2006)	
Chemnitz	Bräuer (1994), Viertel and Weingart (2002), Weber (2000)	
Colmar	Escher and Hirschmann (2005), Hunckler (1838), Planitz (1966)	
Cologne	Czok (1966), Herborn (1994), Ennen and Eckertz (eds.) (1970), Hegel (1891), Planitz (1966), Von Loesch (1907)	
Dessau	Wäschcke (1901)	
Deventer	Lucassen and Prak (1998), Prak (1994), Prak (2006b)	
Dordrecht	Hegel (1891), Lucassen and Prak (1998), Prak (2006b)	
Dresden	Posse (1876)	
Düren	Schoop (1901)	
Düsseldorf	Wisplinghoff (1988)	
Elberfeld	Schell (1900)	

Table B.2 – *Continued*

Emden	Loesing (1843)	
Erfurt	Raßloff (2012)	
Flensburg	Kraack (1969), Schütt (1958)	
Frankfurt a.d.O	Planitz (1966), Spieker (1853)	
Frankfurt a.M.	Escher and Hirschmann (2005), Kriegk (1862), Planitz (1966), Roth (1996)	http://www.frankfurt.de/sixcms/detail.php?id=3949&_ffmpar%5B_id_inhalt%5D=59661
Freiberg	Kasper and Wächtler (1986)	
Freiburg	Czok (1966), Escher and Hirschmann (2005), Planitz (1966)	
Fürth	Ohm (2007), Windsheimer (2007)	www.stadtmuseum-fuerth.de/desktopdefault.aspx/tabid-699/1187_read-17961/
Geneva	Auty (ed.) (2002)	http://www.hls-dhs-dss.ch/textes/d/D9917.php;http://www.hls-dhs-dss.ch/textes/d/D2903.php;
Ghent	Dumolyn and Hamers (2005), Hegel (1891), Lis and Soly (2006), Planitz (1966), Prak (2006b)	http://www.hls-dhs-dss.ch/textes/d/D7398.php
Görlitz	Jecht (1908)	www.goerlitz.de/de/stadtleben/stadtgeschichte/sagen/von-goerlitzer-zuenften.html
Goslar	Czok (1966), Hegel (1891), Planitz (1966)	
Gotha	Beck (1870), Galetti (1779), Raschke (1998)	
Graz	Popelka (1959), Schierer (2003)	
Groningen	Hegel (1891), Lucassen and Prak (1998), Prak (2006b)	

Table B.2 – *Continued*

Halberstadt	Militzer and Przybilla (1980)	
Halle	Hegel (1891)	
Hamburg	Bolland (1977), Planitz (1966)	http://www.hamburg.de/senat-geschichte/
Hanau	Lübbecke (1951), Dielmann (1972)	
Hanover	Mylnek and Röhrbein (eds.) (1992)	
Heidelberg	Scheuerbrandt (1996)	
Hildesheim	Borck(1988), Planitz (1966)	http://lexikon.unserhildesheim.de/Aemter+Gilden+Zuenfte+und+Innungen.html; http://www.hildesheim.de/staticsite/staticsite.php?menuid=503&topmenu=404
Hoorn	Lucassen and Prak (1998), Prak (2006b)	
Ieper	Dumolyn and Hamers (2005), Hegel (1891), Lis and Soly (2006), Prak (2006b)	
Innsbruck	Forcher (2008), Schneider (2008), Stolz (1959)	
Kassel	Feldner (2010)	http://www.kassel.de/stadt/geschichte/chronik/info/09467/index.html
Klagenfurt	Jandl (2002)	
Krefeld	Feinendegen and Vogt (eds.) (1998)	
Leeuwarden	Lucassen and Prak (1998), Prak (2006b)	
Leiden	Hegel (1891), Prak (2006a)	
Leipzig	Keller (1994), Czok (1966)	
Leuven	Escher and Hirschmann (2005), Hegel (1891), Lis and Soly (2006)	
Liege	Escher and Hirschmann (2005), Hegel (1891)	

Table B.2 – *Continued*

Linz	Danninger (1981), Ehmer (2002), Mayrhofer and Katzinger (1990)	http://www.linz.at/geschichte/de/1135.asp
Lübeck	Fritze (1994), Hegel (1891), Planitz (1966)	
Lüneburg	Hegel (1891)	
Magdeburg	Planitz (1966), Hegel (1891)	
Mainz	Escher and Hirschmann (2005), Hegel (1882), Planitz (1966)	
Mannheim	Probst (2008)	
Mechelen	Auty (2002), Escher and Hirschmann (2005), Hegel (1891), Prak (2006a,b)	
Mecklenburg		
Metz	Escher and Hirschmann (2005), Planitz (1966), Pundt (1998)	
Middelburg	Lucassen and Prak (1998), Prak (2006b)	
Mühlheim a.d. Ruhr	Von Zuccalmaglio (1846)	
Munich	Reichlmayr (2013), Stahleder (1995)	
Münster	Hegel (1891)	
Namur	Escher and Hirschmann (2005)	
Nördlingen	Buhlmann (2005), Rabe (1966)	
Nuremberg	Czok (1966), Endres (1994), Planitz (1966), Pfeiffer (ed.) (1971), Schubert (2008)	
Osnabrück	Philippi (1890)	
Passau	Weithmann (2004)	
Potsdam	Assing (1992), Kimmel and Oesterreich (2003), Schulte (1987)	

Table B.2 – *Continued*

Prenzlau	Helbig (1973)	
Quedlinburg	Militzer und Przybilla (1980)	
Regensburg	Czok (1966), Planitz (1966), Morré (1935), Schmied (2000)	
Rostock	Fritze (1994), Römer (1932)	http://www.rostock.de/rostock-warnemuende-ostsee/geschichte-der-hansestadt-4.html
Rotterdam	Prak (1994), Prak (2006b)	
Salzburg	Dopsch and Lipburger (1983), Lipburger (1987)	
Schwerin	(1913), Kasten and Rost (2005)	
s-Hertogenbosch	Lucassen and Prak (1998), Prak (2006b)	
Soest	Reininghaus (1989), Hegel (1891)	
Speyer	Escher and Hirschmann (2005), Planitz (1966)	
Stralsund	Ewe (ed.) (1984), Fritze (1994), Planitz (1966)	http://de.wikipedia.org/wiki/Geschichte_der_Hansestadt_Stralsund#13._bis_16._Jahrhundert
Strasbourg	Planitz (1966), Von Heusinger (2009), Schmoller (1879)	
Stuttgart	Borst (1986), Pfaff (1845)	
Tournai	Auty (ed.) (2002), Hegel (1891)	
Trier	Matheus (1984), Planitz (1966), Pundt (1998)	
Ulm	Specker (1977), Planitz (1966)	http://www.ulm.de/kultur_tourismus/stadtgeschichte/ulm_in_der_reichsstadtzeit.70584.3076,3963,4236,34709,70583,70584.htm

Table B.2 – *Continued*

Utrecht	Planitz (1966), Lucassen and Prak (1998), Praak (2006a,b), Van Winter (1994)	
Vienna	Bled(2002), Csendes and Opll (2001), Ehmer (2002), Planitz (1966), Sachslehner (2006)	http://www.wien.gv.at/kultur/archiv/geschichte/ueberblick/recht.html
Worms	Escher and Hirschmann (2005)	
Würzburg	Gramich (1882), Planitz (1966)	http://www.historisches-lexikon-bayerns.de/artikel/artikel_4548
Zurich	Czok (1966), Planitz (1966), Staatsarchiv des Kantons Zürich (ed.) (2000)	http://www.hls-dhs-dss.ch/textes/d/D30735.php
Zwolle	Lucassen and Prak (1998), Prak (2006b)	

B.2 Coding Examples and Special Cases

B.2.1 Coding of Schwaz

Schwaz is part of the "Österreichisches Städtebuch" and I consulted several existing publications about the history of the city (of which none reports the existence of any participative political institutions—in accordance with the "Österreichisches Städtebuch"), I decided to include Schwaz in the sample.

B.2.2 Coding of Geneva

The same holds true for Geneva. Although I carefully searched for existing German or English publications about the city history, I found little information. However, there is evidence provided by the encyclopedia "Historisches Lexikon der Schweiz" (Historical Encyclopedia of Switzerland) which is edited by "Schweizerisches Gesellschaft für Geschichte" ("Swiss Society of History") and the "Schweizerischen Akademie der Geistes- und Sozialwissenschaften" ("Swiss Academy for Philosophy and Social Science") and is available in a printed and a web-based version (which I consulted). This encyclopedia clearly classifies Geneva as a city ruled by patricians. According to these source (and the other sources e.g., about Basel and Zurich) there were only four major Swiss cities with a strong participation of the guilds in the city government (Basel, Zurich, Schaffhausen and St. Gallen). I therefore also chose to include Geneva and to code it as not having guilds participation in the city council. Despite this, the "Historisches Lexikon der Schweiz" also contains an article for the city of Geneva (as for most other cities in Switzerland) that provides detailed and source-based information about the government and the political institutions of Geneva from the beginning of its history until today. From this I inferred that the citizens of Geneva could elect (beginning in 1309) political representatives—the so-called "Syndics" (or "Prokuratoren")—via a "general council" that could act in the name of the citizens of Geneva in various political measures and also played the role of judges. Therefore, I code Geneva as having elections and some kind of burgher representation from 1400 onward. None of the results would change if I were to exclude Schwaz and Geneva from the sample of countries.

B.2.3 Coding of Mecklenburg

Another special case is Mecklenburg, which is today a small village (with around 3000 inhabitants). It was of certain importance during the earlier Middle Ages as the Princes of Schwerin built their castle at Mecklenburg which is why later the whole principality/ duchy came to be named after this village. This is why later the whole the principality/ duchy was called after this place. However, the castle was destroyed in the early 14th century and nothing other than a village developed there (the residences of the princes and later dukes of "Mecklenburg" were at Schwerin and Stargard). This explains why I was unable to find any source of information about it and why it is not even contained in the "Deutsche Städtebuch". However, since Mecklenburg did not even have city rights I decided to include it in the data set and to code the three variables under consideration as zero throughout the whole observation period.

C

Appendices to Chapter 4

C.1 Data Appendix

C.1.1 Guild Revolt and Participative Political Institutions Variables

Participative Election. A dummy variable indicating whether the citizens of a town could elect all or some parts of the city government (i.e., councils, magistrates, judges etc.) either directly or indirectly (through a community assembly or through an electoral college. In Germany, Austria and Switzerland the citizens most often participated in the election of the city council (or one of them, usually the so called "Großer Rat" [great council]). In Belgium and the Netherlands, conversely, the burghers would usually elect the magistrate of the city via a sworn council (in the German lands the magistrate was most often elected by the council or appointed by the ruler of the city). Following cities are coded as having such participative election procedures (the period in which it existed is in parentheses):

Burgher Representation. Dummy variable equal to one if there existed some form of institutionalized burgher representation in a city. "Institutionalized" means that it is not enough, that—as seems to be the case in many cities—the citizens are sometimes (i.e., not on a regular basis) given the possibility to voice their opinion in a meeting of the council or that representatives of the citizens could give advice or meet with the government of the town in specific

situations (crisis, new constitution etc.). Instead there should be a community assembly, or e.g., a "Großer Rat" ("Great Council") or "Äußerer Rat" ("Outer Council") that meets regularly and that has at least constitutionally guaranteed the citizens a voice in some matters of city politics.

Guild Participation. A categorical variable equal to zero if (craft) guilds were not allowed to participate in the city council (the "Kleine Rat" ("Small Council"/ "Inner Council") which was normally the most important and powerful political institution of the city. The variable is equal to one if the guilds participate in the council, i.e., have a constitutionally guaranteed number of council members.

Guild Constitution. Dummy variable equal to zero if the guild were not allowed to participate in the city council or id they did not have the right to send more than half of the members. The variable is equal to one in cities with a so-called "Zunftverfassung" ("guild constitution"), that is where the majority or even all members of the city council were representatives (masters, members) of a guild.

Guild Revolt. Dummy variable equal to one if there was at least one guild revolt in a city regardless of whether it was successful (i.e., resulted in political participation) or not. The cities with at least one unsuccessful revolts were Bremen, Frankfurt an der Oder, Görlitz, Hamburg, Lübeck, Lüneburg, Mechelen, Nuremberg, Passau, Regensburg and Rostock.

Share of Cities with Guild Participation (within 150km). This set of variables reports the share of cities with guild participation (i.e., for which the guild participation variable is greater than 0) within a radius of 0–150km around the respective city. The variable is calculated using the Stata command nearstat. It should capture the possible existence of neighborhood or spillover effects of the guild revolutions for the nearby cities.

C.1.2 Explanatory Variables

C.1.2.1 Variables from the Bosker et al. (2013) Data Set

The following explanatory variables originate from the city-level panel data set constructed by Bosker et al. (2013) (and for example also used in Dincecco and Gaetano Onorato 2013).

Therefore the reader is referred to the Data Appendix of the study of Bosker et al. (2013), which provides a detailed and extensive description and discussion of each variable. The data appendix is available here: http://www.mitpressjournals.org/doi/suppl/10.1162/REST_a_00284/suppl_file/REST_a_00284_data_appendix.pdf (accessed on
February 9th, 2014). Thus, in what follows only a short definition of each variable from this data set will be provided.

Agricultural Productivity. Dummy variable reporting the soil quality of the fields surrounding a city. It combines information about climate (e.g., temperature, precipitation...) and soil quality (carbon density, water holding capacity etc.) in an index indicating the probability that a certain location will be cultivated.
Archbishop. Dummy variable equal to one if a city was the official residence of an archbishop.
Bishop. Dummy variable equal to one if a city was official residence of a bishop (but not an archbishop).
Urban Potential. Following De Vries' (1984) concept of "Urban Potential", the variable represents a city's (Christian) urban potential as the distance weighted sum of the size of all other Christian cities with a least 10000 inhabitants in the sample of Bosker et al. (2013) and taking into account whether or not one or both of two considered cities is located at a place favorable for long-distance trade (i.e, is located at sea or at a river). (For details of the construction the reader is referred to section 3.2.3 of the paper of Bosker et al. (2013) and to Table A.5 in the supplementary appendix available here: http://www.mitpressjournals.org/doi/suppl/10.1162/REST_a_00284/suppl_file/REST_a_00284_esupp.pdf; accessed on Feburary 9th, 2014).

C.1.2.2 Other Explanatory Variables

Imperial City. A Dummy Variable equal to one if a city was an imperial city in the Holy Roman Empire. The variable is coded following Oestreich and Holzer (1970a). They provide an annotated list of cities mentioned as imperial cities ("Reichsstädte") in the Reichsmatrikel of 1521 (sometimes called the "Wormser Matrikel"). This variable takes into account the

available information about when a city took on the status of an imperial city (the so-called "Reichsunmittelbarkeit"). Such information suffers from a marked amount of uncertainty. However, the German version of Wikipedia provides a list of imperial cities including information about the approximate date they bacome imperial cities. This information is often based on corresponding decrees of kings or emperors of the Holy Roman Empire available in the Regesta Imperii, an archive of all documentary and historiographic documents of the Roman-German kings until Maximilian I (`http://www.regesta-imperii.de/startseite.html`). This archive is maintained by the "Akademie der Wissenschaften und der Literatur Mainz" and is a reliable source of historical information.

Still, not all the dates in the list are validated by these sources. In these cases, I rely on available information from city history or other sources to assign a date. Despite these efforts, sometimes sources mention different dates or rely on other criteria. In such cases, I may proceed by assuming the date seems most plausible from what I infer from the city's history. Where it was impossible to find satisfactory information, the city is coded as an imperial city from 1500 AD onward.

Residence City. Dummy Variable equal to one if a city was the official residence (capital) of a secular or ecclesiastical ruler (an earl, a prince, a duke, an archbishop etc.). The variable is coded according to the information provided in the "Deutsche Städtebuch" and the various other sources listed in Table A.1. For robustness, a list of important residence cities in today's Germany is also consulted, available at the German wikipedia (`http://de.wikipedia.org/wiki/Residenzstadt` (accessed February, 24th 2013).

Proto-Industry. The variable is equal to one if a city can considered to be an important center of textile production *or* of metallurgy and equal to two if both industries were present. Otherwise it is equal to zero. The information on textile centers originates from Carus-Wilson (1952), Escher and Hirschmann (2005) and Gutmann (1988). Information on centers of the metal industry are from Escher and Hirschmann (2005), Gutmann (1988), Nef (1952) and Sprandel (1968).

Trade City. Dummy variable equal to one if a city is considered to be an important (i.e., international or over-regional) trade center in the respective century. The variable is coded according to various different sources like maps of historical trade routes as printed in Davies and Moorhouse (2002), Kinder and Hilgemann (1970), King (1985), Magocsi (2002) or Stier

et al. (1956) as well as monographs on medieval trade activities like Spufford (2002) or on the history of Hanseatic League (like Dollinger 1966). The cities listed as trade cities in the period before a revolt (or in 1500 AD if there was no revolt) are Altona, Amsterdam, Augsburg, Brunswick, Bremen, Cologne, Deventer, Erfurt, Frankfurt am Main, Frankfurt an der Oder, Ghent, Hamburg, Linz, Lübeck, Lüneburg, Magdeburg, Metz, Münster, Nuremberg, Regensburg, Rostock, Rotterdam, Salzburg, Soest, Stralsund, Ulm and Vienna.

Table C.1 provides an descriptive overview of all the variables used in the empirical analysis in the paper.

Table C.1: Descriptive Overview of the Data Set

Variable	Obs.	Mean	Std. Dev.	Min	Max
Agricultural Productivity	104	0.611	0.211	0.02	0.978
Archbishop	104	0.058	0.234	0	1
Bishop	104	0.202	0.403	0	1
Guild Constitution	104	0.212	0.410	0	1
Guild Participation	104	0.490	0.502	0	1
Guild Revolt	104	0.596	0.493	0	1
Imperial City	104	0.135	0.343	0	1
Institutionalized Burgher Representation	104	0.212	0.410	0	1
Participative Election	104	0.163	0.372	0	1
Proto-Industry	104	0.221	0.502	0	2
Residence City	104	0.144	0.353	0	1
Trade City	104	0.260	0.441	0	1
Textile Industry	104	0.154	0.363	0	1
Urban Potential	104	13.056	5.637	4.915	36.857

D

Appendices to Chapter 5

D.1 Descriptive Statistics and Data

The data set of participative political institutions in pre-modern Europe is described in detail iinh chapter 2 and most of the used control variables are explained in the Data Appendix to the Bosker et al. (2013) study which is available online at: `http://www.mitpressjournals.org/doi/suppl/10.1162/REST_a_00284/suppl_file/REST_a_00284_data_appendix.pdf` (accessed on February 9th, 2014). Therefore, these data is not described in detail here. I provide descriptive statistics for all the variables used in the analysis in Table D.1. For the variables not described in one of these papers, I provide a short description in in the next paragraphs.

Brethren of Common Life. Binary variable equal to one if a city had a house of the Brethren of Common Life by 1400 AD according to Akcomak et al. (2015).

Hanseatic League. Binary variable equal to one if a city was a member of the Hanseatic League. Coded according to Dollinger (1966). In most cases, information about when a city became a member of the Hanseatic League (as well as when the city left the League) is also provided in Dollinger (1966). If there was no information in Dollinger (1966), reliable information about the city's history was sought (e.g., form the official webpage of the city or the monographs about the history of the city reported in Table A.1).

Imperical Circle. The imperial circle dummies report in which imperial circle a city was located in 1500 AD. The data is from Rubin (2014). *Imperial City*. A Dummy Variable equal to one if a city was an imperial city in the Holy Roman Empire. The variable is coded following Oestreich and Holzer (1970a). They provide an annotated list of cities mentioned as imperial cities ("Reichsstädte") in the Reichsmatrikel of 1521 (sometimes called the "Wormser Matrikel"). This variable takes into account the available information about when a city took on the status of an imperial city (the so-called "Reichsunmittelbarkeit"). Such information suffers from a marked amount of uncertainty. However, the German version of Wikipedia provides a list of imperial cities including information about the approximate date they became imperial cities. This information is often based on corresponding decrees of kings or emperors of the Holy Roman Empire available in the Regesta Imperii, an archive of all documentary and historiographic documents of the Roman-German kings until Maximilian I (`http://www.regesta-imperii.de/startseite.html`). This archive is maintained by the "Akademie der Wissenschaften und der Literatur Mainz" and is a reliable source of historical information.

Still, not all the dates in the list are validated by these sources. In these cases, I rely on available information from city history or other sources to assign a date. Despite these efforts, sometimes sources mention different dates or rely on other criteria. In such cases, I may proceed by assuming the date seems most plausible from what I infer from the city's history. Where it was impossible to find satisfactory information, the city is coded as an imperial city from 1500 AD onward.

ln(Distance to Wittenberg. Variable reporting the natural logarithm (ln) of a city's geodetic distance (in kilometers) to the German city of Wittenberg from which Protestantism spread out. Variable is calculated using the geodist command in Stata.

Printingpress before 1500 AD. Dummy variable equal to one if a city had adopted printing technology before 1500 AD. The coding is based on information in Benzing (1982), Clair (1976) and the Incunabula Short Title Catalogue (ISTC) of the British library (`http://www.bl.uk/catalogues/istc/index.html`; accessed on November 18th, 2012).

Residence City. Dummy Variable equal to one if a city was the official residence (capital) of a secular or ecclesiastical ruler (an earl, a prince, a duke, an archbishop etc.). The variable is coded according to the information provided in the "Deutsche Städtebuch" and the var-

ious other sources listed in Table A.1. For robustness, a list of important residence cities in today's Germany is also consulted, available at the German wikipedia (http://de.wikipedia.org/wiki/Residenzstadt (accessed February, 24th 2013).

Staufer City. Dummy variable equal to one i a city was in the sphere of influence of the noble family of the Staufer. Variable is coded according to Jacob (2010) who provides information about cities in Germany that were founded by a member of the Staufer family. Furthermore information in the "Lexikon Geschichte Baden-Württemberg" (Historical Encylopedia Baden-Württemberg) available at this url http://www.s-line.de/homepages/m-ebener/KarteIII-4%20(Staufer).html (accessed on Feburary 26th, 201) about places with "'Königspfalzen" (royal palaces) of the Staufer is used and the information about Staufian palaces and city foundations given in Planitz (1966).

Trade City. Dummy variable equal to one if a city is considered to be an important (i.e., international or over-regional) trade center in the pre-modern period. The variable is coded according to various different sources (e.g., historical trade route maps, and monographs about medieval trade activities). For more information on the coding of this variable, the reader is referred to chapter 2.

Descriptive Overview of Panel Data Set

Variable	Obs	Mean	Std. Dev.	Min	Max
Agricultural Suitability	891	0.603	0.221	0.02	0.978
Archbishop	891	0.074	0.262	0	1
Bishop	891	0.209	0.407	0	1
Capital City	891	0.015	0.120	0	1
Free-Prince	891	0.456	0.498	0	1
Guild Constitution	891	0.065	0.247	0	1
Guild Participation	891	0.162	0.368	0	1
Guild Participation Index	891	0.232	0.566	0	2
Hanseatic League	891	0.079	0.269	0	1
Imperial City	891	0.111	0.314	0	1
Institutionalized Burgher Representation	891	0.395	0.489	0	1
Large State	891	0.473	0.500	0	1
ln(Distance to Wittenberg)	891	5.549	0.672	3.165	6.615
ln(Population)	457	2.442	0.789	0.693	5.513
Parliament	891	0.111	0.314	0	1
Participative Election	891	0.092	0.289	0	1
Plundered	891	0.025	0.169	0	2
Printingpress before 1500 AD	891	0.135	0.342	0	1
Residence City	891	0.116	0.320	0	1
River	891	0.852	0.355	0	1
Sea	891	0.086	0.281	0	1
Staufer City	891	0.071	0.256	0	1
Terrain Ruggedness	891	55.326	88.044	0.719	559.45
Trade City	891	0.208	0.406	0	1
University	891	0.071	0.256	0	1
Urban Potential	891	12.858	13.884	0.839	198.620

D.2 B. Additional Results and Robustness Checks

In Tables B.1 and B.2 I re-estimate Tables 4 and 5 including time-invariant variables, i.e. terrain ruggedness, soil quality and location at a river or at a sea that are interacted with century dummies to be used in a fix effects regression. Including these variables ensures that these time-invariant characteristics of cities—and their possibly time-varying effects—do not cause the results obtained in the regressions in the main text. The results obtained with these inter-

action terms included are virtually identical to those in the main text, if anything, the results are even stronger and the observed tendencies are more pronounced. Thus, the results are robust to the inclusion of these variables.

Temporal Heterogeneity in the Impact of Participative Political Institutions—Flexible Specification

Dep. Var.	ln(Population)			
	(1)	(2)	(3)	(4)
Interacted Variable	Guild Part. Index	Guild Constitution	Inst. Burgher Representation	Participative Election
1200 × Variable			-0.056	
			(0.362)	
1300× Variable	0.199	0.827***	-0.189	0.420**
	(0.151)	(0.267)	(0.206)	(0.206)
1400× Variable	0.017	-0.078	0.086	0.333**
	(0.112)	(0.159)	(0.117)	(0.155)
1500 × Variable	0.053	0.094	0.052	0.444***
	(0.087)	(0.138)	(0.110)	(0.129)
1600 × Variable	0.004	-0.196	0.170	0.362*
	(0.102)	(0.211)	(0.132)	(0.187)
1700 × Variable	-0.116	-0.523*	0.279*	0.393**
	(0.149)	(0.312)	(0.165)	(0.188)
1800 × Variable	-0.208	-0.764***	0.179	0.172
	(0.150)	(0.289)	(0.180)	(0.212)
City Fixed Effects	Yes	Yes	Yes	Yes
Century Fixed Effects	Yes	Yes	Yes	Yes
Century*Country Fixed Effects	Yes	Yes	Yes	Yes
Time-Invariant Controls*Century FEs	Yes	Yes	Yes	Yes
Robust Controls	Yes	Yes	Yes	Yes
Obs.	457	457	457	457
Within R^2	0.52	0.525	0.497	0.505

Notes. Standard errors clustered on city level are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The set of "Robust Controls" includes every variable that was significant (at 10 % level at least) in the regression including all sets of covariates jointly. These are the archbishop and bishop dummies, the residence city dummy, the capital, Hanseatic League, and trade city dummies as well as the urban potential measure. Each regression includes a constant not reported.

The Longer, the Worse? The Impact of Length of Existence

Dep. Var.	ln(Population)			
	(1)	(2)	(3)	(4)
Variable	Guild Participation	Guild Constitution	Inst. Burgher Representation	Participative Election
Variable × 1. Century	0.025	-0.108	0.085	0.399***
	(0.144)	(0.144)	(0.126)	(0.106)
Variable × 2. Century	0.178	-0.057	0.147	0.387**
	(0.166)	(0.179)	(0.117)	(0.149)
Variable × 3. Century	0.077	-0.358	0.238*	0.348**
	(0.186)	(0.250)	(0.139)	(0.162)
Variable × 4. Century	0.084	-0.599*	0.146	0.377*
	(0.224)	(0.329)	(0.209)	(0.203)
Variable × 5. Century	-0.158	-0.991**	0.161	0.032
	(0.293)	(0.487)	(0.188)	(0.213)
Variable × 6. Century	0.123	-1.125***	-0.033	-0.512**
	(0.385)	(0.318)	(0.342)	(0.239)
City Fixed Effects	Yes	Yes	Yes	Yes
Century Fixed Effects	Yes	Yes	Yes	Yes
Century*Country Fixed Effects	Yes	Yes	Yes	Yes
Time-Invariant Controls*Century FEs	Yes	Yes	Yes	Yes
Robust Controls	Yes	Yes	Yes	Yes
Obs.	457	457	457	457
Within-R^2	0.494	0.518	0.493	0.512

Notes. Standard errors clustered on city level are reported in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 % and *10 % level. The unit of observation is a city. The set of "Robust Controls" includes every variable that was significant (at 10 % level at least) in the regression including all sets of covariates jointly. These are the archbishop and bishop dummies, the residence city dummy, the capital, Hanseatic League, and trade city dummies as well as the urban potential measure. Each regression includes a constant not reported.

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