

# Medieval Universities, Legal Institutions, and the Commercial Revolution

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## Abstract

Europe experienced a “Commercial Revolution” in the late Middle Ages. We present new data that document this transformation using information on city incorporation and market establishment. We then test whether universities played a causal role in expanding economic activity, examining the consequences of their exogenous establishment in Germany following the Papal Schism in 1378. We find that the trend rate of market establishment breaks upward just when the first German university was established; this break is greatest where the distance to a university shrank most. We argue that the link between universities and greater economic activity involved the development of formal legal and administrative institutions.

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The late Middle Ages saw the first stirrings of the “Rise of the West.”<sup>1</sup> Between the years 900 and 1500, Europe experienced a Commercial Revolution and awoke from centuries of economic slumber, with cities growing and trade expanding. This flowering of the European economy set the stage for modern Europe’s exploration and colonization of the world, and its institutional and political development on the path toward modern growth.<sup>2</sup>

Economic historians have documented this story of remarkable change using a variety of sources: from the rise of fairs (Epstein, 2000), to the physical expansion of cities (Verhulst, 1999), the increased output of books (Buringh and van Zanden, 2009), or the growth of population and urbanization (McEvedy and Jones, 1979; Bairoch et al., 1988). While informative, the existing data on the Commercial Revolution are often limited in their frequency, in their geographic coverage, or in their ability to capture economic change directly, making them difficult to use for hypothesis testing. Most importantly, they do not allow us to identify the causal factors that transformed Europe from a poor, rural, backward society (relative to the Chinese and Islamic civilizations), into an urban and commercial one.<sup>3</sup>

Of particular interest is understanding the role played by institutional change in the process of Europe’s economic transformation. The Middle Ages saw not only economic transformation in Europe, but also the establishment of the first universities—first in Bologna in the 11th century, then fifty more in the following four centuries—and the development of formal legal institutions and state administrative systems. Educational and legal institutional change may have played a causal role in promoting economic activity, or they may have been an endogenous response to economic change due to some other source.

On the one hand, it is clear that factors other than institutional change were important to Europe’s economic revival: Mokyr (1990, ch. 3) discusses the important technological improvements that took place in the Middle Ages, and Morris (2010) focuses on climate change—the Medieval

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<sup>1</sup>See, for example, Lopez (1976), North and Thomas (1973), Buringh and van Zanden (2009).

<sup>2</sup>Studies linking medieval and early modern institutional and economic development to modern growth include Acemoglu et al. (2005) and Allen (2009).

<sup>3</sup>Morris (2010), among others, ranks China’s economic development in the Song Dynasty (960–1279 A.D.) ahead of Europe’s and Mokyr (1990, ch. 9) explicitly compares Chinese and European technologies, noting China’s “technological supremacy” in the Middle Ages (p. 209). Bosker and van Zanden (2008) compare urbanization rates between Western Europe and the Arab world, and show that they were much higher in the latter until the late Middle Ages.

Warm Period—that made agriculture more productive. On the other hand, institutional change has been highlighted by many scholars: Greif (1989, 1993) discusses the case of the Maghribi traders' coalition and its role in supporting the enforcement of contracts. De Long and Shleifer (1993) emphasize the importance of constraints on executives, which were developed in some of the new city-states that arose in the Middle Ages. Epstein (2000) similarly points to important administrative changes underlying the expansion of commercial activity. Van Zanden (n.d.) follows Berman (1983) in arguing that the development of European legal systems in the Middle Ages set the stage for Europe's political and economic development. Finally, Huff (2003) argues that the European university was an institution that was uniquely suited to promoting technical change, and that the rise of universities can be seen as an important institutional turning point in the history of European science.

Existing work on medieval Europe has not been able to rigorously test claims about the causal effect of institutions on growth, relying on historical descriptions of the *association* between institutional and economic change. North and Thomas (1973, p. 12), while clearly viewing institutional change as a crucial causal factor in Europe's economic development, make it clear how difficult it is to disentangle the relationship between institutions and economic growth in the Middle Ages, writing "The revival of trade and commerce in the eleventh and twelfth centuries led not only to the proliferation of towns but to a host of institutional arrangements designed to reduce market imperfections. As new towns developed their own governments for administration and protection, they necessarily evolved bodies of law to adjudicate disputes arising from these new conditions". The institutions that reduced market imperfections and increased trade in the Middle Ages were likely both *cause and consequence* of increased economic activity. The difficulty of disentangling the causality nexus is also emphasized by Berman (1983, p. 336), who writes, "Thus the Commercial Revolution helped to produce commercial law, but commercial law also helped to produce the Commercial Revolution."

The first purpose of this paper is to address the current paucity of direct, systematic and quantitative evidence on the timing and spread of the Commercial Revolution. We present data on the

establishment dates of 2,256 German<sup>4</sup> cities, as well as the dates when these cities received grants to hold markets, collected from the *Deutsches Städtebuch*, several volumes edited by Erich Keyser (1939–1964).<sup>5</sup> The grants to hold markets are direct indicators of increased economic activity; the markets established under the grants took a variety of forms, and they were granted to cities large and small. This dataset thus captures economic changes in medieval Europe that occurred inside and outside large, urban areas, spanning a large region, over a long period of time.

The second purpose of this paper is to test whether increased economic activity was caused by institutional change in medieval Europe. Our data on market establishments in Germany throughout the Middle Ages allow us to test the role of institutional change in encouraging medieval economic activity due to a unique natural experiment: Church politics—the Papal Schism of the late 14th century—resulted in the arguably exogenous foundation of Germany’s first universities.

We test whether this institutional change affected rates of market establishment in medieval Germany and, indeed, find evidence that the rate of market establishment sharply increased following the foundation of Germany’s first universities. Importantly, this change in the rate of market establishment appeared just when the first German university was founded, and this effect is monotonically increasing in the change in distance to a university that resulted as a consequence of the Papal Schism. On the other hand, we find no effect of the Schism on market establishment rates in Italy, where the Schism did not lead to increased establishment of new universities.

Germany’s first universities may have affected trade through several channels, but we present historical evidence indicating that the role of universities in developing formal legal institutions was likely an important one: universities trained lawyers, who became administrators, codified laws and regulations, and staffed and guided others through the legal systems that they helped to develop.<sup>6</sup> While universities likely had other beneficial consequences, the evidence is consistent with legal institutional development in the Middle Ages playing a key role in increased commer-

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<sup>4</sup>The modern state of Germany did not exist in the period under consideration; our data cover the regions of Germany within its 1937 borders (excluding East and West Prussia, which were not considered part of the Holy Roman Empire). For brevity, we use the anachronism “Germany” throughout the paper.

<sup>5</sup>To be included, a “city” must have been incorporated prior to the compilation of the *Städtebuch*; the sizes of these cities today vary greatly from several hundred inhabitants to millions.

<sup>6</sup>Murphy et al. (1994) argue that more lawyers are not always beneficial for growth, but we find it plausible that a small number of lawyers can be economically useful.

cial activity.

We proceed as follows. In Section 1, we provide an overview of the Commercial Revolution, presenting data collected by other scholars that point to a dramatic change in Europe's economy, and presenting our newly-collected data on economic change in late medieval Germany. In Section 2, we describe how the Papal Schism can be seen as an exogenous shock leading to the foundation of new universities, present our empirical strategy, and use our data on market establishment to test for a causal effect of changing educational institutions on commercial activity. In Section 3, we present historical evidence of the strong link between medieval universities and the development of formal legal systems in Europe, and argue that these legal systems played an important role in supporting economic activity in medieval Germany. In Section 4, we discuss our findings and offer some concluding thoughts.

## 1 Documenting the Commercial Revolution

### 1.1 Existing Evidence

Beginning around the tenth century, there was a revival of trade within the European continent and growth of trade with nations outside Europe.<sup>7</sup> Increased trade and improved farming technology (which produced agricultural surpluses) allowed for larger urban populations. Robert Lopez (1976, p. 56) describes the Commercial Revolution as follows: "When food surpluses increased, it became possible to release more people for governmental, religious, and cultural pursuits. Towns re-emerged from their protracted depression. Merchants and craftsmen were able to do more than providing a fistful of luxuries for the rich."

Unfortunately, only very limited data for the period are available to support this grand narrative. Thus, to compare economic development across European regions during the Middle Ages, Buringh and van Zanden (2009) rely on the fraction of a region's population living in cities with populations greater than 10,000, and on manuscript production. Each should be correlated with

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<sup>7</sup>After the decline of the (Western) Roman Empire (in 476), there was little trade throughout Western Europe. There seems to have been a revival of economic activity in the Carolingian Empire, but it was not sustained. See van Zanden (n.d.).

the volume of economic activity: higher urbanization rates depend on trade, as goods must move from the country to the city; manuscript production would have been greater when incomes were higher and the demand for books (a luxury) was greater.<sup>8</sup> In Figure 1, we present Buringh and van Zanden's (2009) data on these indicators of economic activity. They clearly indicate the dramatic changes experienced in Europe between the years 900 and 1500: in 900, Western Europe had only about 1% of its population living in cities with more than 10,000 people; by 1500, the urbanization rate for Western Europe stood at over 8%, with peaks of over 10% and 20% in the Netherlands and in Belgium, respectively. Similarly, manuscript production soared in the late Middle Ages, rising from less than 100,000 manuscripts per century to over 4 million.

In fact, aggregate urbanization figures for Western Europe conceal regional variations. Figure 2 plots urbanization rates for four European regions, Italy, France, the Netherlands (including Belgium), and Germany. While Italy took off early in the 11th and 12th centuries, and remained at a stable level of 13% urban population afterwards, France had a smoother path of moderate increases in urbanization rates. By this measure, Germany's urbanization rate remained constant at 5% during the period 900–1500, whereas Belgium and the Netherlands increased their share of urban population strongly and consistently over time.

*[Figure 1 about here]*

*[Figure 2 about here]*

The data presented in Figures 1 and 2 match the narrative presented above: Europe changed dramatically between 900 and 1500. Yet, the data presented are only partially reflective of economic activity; moreover, they are extremely coarse measures of economic change, available only at long time intervals, and completely ignoring the developments that likely affected most Europeans at the time: the establishment of local markets and incorporation of smaller towns and cities.<sup>9</sup>

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<sup>8</sup>De Long and Shleifer (1993) use city growth as a measure of economic development, and Acemoglu et al. (2005) and Cantoni (2010) use urbanization rates.

<sup>9</sup>Epstein (2000, p. 74) notes that "[t]he daily and weekly markets where most small-scale retailing took place" are often ignored by scholars.

## 1.2 New Evidence on the Commercial Revolution in Germany

The *Deutsches Städtebuch* compiles, for all of Germany, information on each incorporated city, including the date it was first mentioned, the date it was formally incorporated, and the dates when it received one or more “market privileges” from the Emperor or a local lord to hold markets and fairs.<sup>10</sup> The market privilege was a formal document that gave a local lord the right to tax trade in a formal market, to coin money and to require its use in the market; in exchange for these rights, it required the lord to guarantee the protection of merchants en route to, and present at, the market—this included the provision of courts and the establishment of standard measures.<sup>11</sup>

We treat the granting of a market privilege as an event marking market establishment and as an indicator of increased economic activity. Indeed, historians of medieval Europe studying such grants have argued that royal charters were often associated with the actual creation of new markets, and were not simply the formal recognition of existing ones.<sup>12</sup> Of course, this measure is imperfect; it might, in some instances, indicate changes in the formality of economic institutions, rather than changes in economic activity itself. That is, improvements in a state’s capacity to tax trade and protect merchants, or an increased desire or ability to formally structure economic activity may have led to an increase of market grants, even if economic activity had not changed. However, simply providing a formal structure to markets that had previously existed only on a customary basis may have had salutary consequences for commercial exchanges; thus, even cases in which existing markets were formalized by a market privilege represent an interesting and meaningful economic outcome.

For all 2,256 cities in the *Deutsches Städtebuch*, we collected data on their date of incorporation, and on all of the years in which they were granted one or more market privileges, throughout the Middle Ages, up to the year 1700. The spatial distribution of these cities within Central Europe is displayed in Figure 3. This information provides direct evidence of the establishment of hundreds

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<sup>10</sup>Missing information, and uncertainty regarding some dates are undeniable problems. However, it is generally clear when there is such uncertainty, and we do not include in our analysis market or city establishments whose dates are uncertain.

<sup>11</sup>Epstein (2000, p. 82); Britnell (1978, p. 192); Schmieder (2005, p. 49).

<sup>12</sup>Britnell (1981, p. 211) discusses the case of England and Epstein (2000) uses legal documents as indicators of economic activity in Italy.

of cities and markets during the Middle Ages.

[Figure 3 about here]

In Figure 4 we show the number of city incorporations and market establishments. The top graph displays absolute numbers of incorporations and market grants in 10-year moving averages; the bottom graph displays the cumulative number of cities incorporated or markets established at each point in time. The figure reveals a dramatic rise in city incorporations in the German lands in the 13th century; the average number of cities incorporated per year increased from less than one to approximately four. The granting of market rights also accelerated during the 13th century, albeit considerably more slowly. In many cases, the incorporation of a city was explicitly linked to the creation of a market; if evidence of both could be found in the *Städtebuch*, this will be reflected both in our city incorporations and market grants time series. But in many cases, no explicit mention of markets is made in the *Städtebuch* when a city incorporation is reported; to the extent that the city charters explicitly or implicitly included the rights to hold a certain number of markets or fairs, therefore, our time series of market grants will underestimate the actual number of markets.<sup>13</sup>

During the 14th century, the comovement of city incorporations and market grants becomes evident, indicating a clear tendency toward both greater urbanization and expanded economic activity; a tendency which is not even reversed by the Black Death of 1348. Toward the end of the 14th century, however, the two series begin to diverge. City incorporations subside, while the number of markets granted per year remains high, varying between approximately 2–6 markets per year.

[Figure 4 about here]

Importantly, the trends displayed in Figure 4 are not limited to large urban areas, but are experienced much more broadly, reflecting economic activity and urbanization over the whole of Germany. A comparison of our city establishment time series with Buringh and Van Zanden's

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<sup>13</sup>To take into account this degree of ambiguity, in our empirical analyses below we consider two dependent variables: the market establishment rate on its own, and the rate of market establishments and city incorporations combined.

(2009) urbanization data for Germany is quite striking: from a comparison of Figures 2 and 4, one can see that while the proportion of Germans living in large cities (over 10,000 inhabitants) was not increasing throughout the 13th and 14th centuries, hundreds of smaller cities were being established at that time. Markets were being regularly established as well, indicating a much more dynamic German economy at the time than would be inferred from simply looking at the urbanization rates.

Our efforts represent the first attempt known to us to compile a comprehensive dataset on the establishment of markets over a large region in late medieval Europe. We now use these data to examine the impact of institutional change—the establishment of Germany’s first universities—on economic activity in medieval Germany.

## 2 Empirics: Universities and Market Establishment

### 2.1 Universities and the Commercial Revolution

At precisely the time when it experienced its Commercial Revolution, Europe also saw the creation of the first universities.<sup>14</sup> The first university, the University of Bologna, was founded in the eleventh century by foreign students who were receiving training in the law: the Justinian Code of Roman civil law had just been “rediscovered” at this time, and Bologna had become a preeminent site of legal scholarship. Students in Bologna, many of them foreigners, formed a corporation of scholars (*universitas*) to obtain official recognition and protection of their rights.<sup>15</sup>

The spread of universities throughout Europe during the period of the Commercial Revolution is striking. There were no universities in all of Europe before the Commercial Revolution began in the tenth century. By the year 1500, there were more than 50 (Verger, 1992, pp. 62–65). In Table 1, we provide a list of some of the universities founded in the Middle Ages, along with their foundation dates.

[Table 1 about here]

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<sup>14</sup>Good references on the medieval universities include Rashdall (1895) and DeRidder-Symoens, ed (1992).

<sup>15</sup>In Paris, it was the *teachers* who incorporated themselves, establishing a second organizational model for the university.

These medieval universities may have supported economic activity during the Commercial Revolution through a variety of channels: first, they generated increased human capital: training in the liberal arts was comprised of logic, grammar and rhetoric (the *trivium*) as well as arithmetic, geometry, music, and astronomy (the *quadrivium*), skills that may have been commercially useful. Second, they encouraged the formation of networks of individuals who were mobile, who spoke Latin, and who were trained in common subjects, using common texts. Perhaps most importantly, medieval universities trained a large number of individuals in canon and civil law.<sup>16</sup> This specific type of human capital was especially important in medieval Europe, where the development of merchant, administrative and civil law, the staffing of courts, and the enforcement of contracts was critical to solving the “fundamental problem of exchange” (Greif, 2000): the resolution of uncertainty in economic transactions due to highly disaggregated political institutions, high costs of transportation and communication, and thus high risk of expropriation by the state or by one’s agent.<sup>17</sup>

Of course, institutions that helped to develop legal institutions were very much a response to improving economic conditions—this was certainly true of medieval universities, and it is clear from Figure 4 that market establishment began to increase well before any German universities were established. The question underlying this paper is whether universities played *a* causal role in increasing economic activity. Without identifying a source of exogenous variation in the establishment of universities, it is difficult to credibly establish a causal link between them and increased economic activity. One might be concerned, for example, that areas with more productive farmland are better able to support towns and traders, and are also better able to support faculty and students at university. In this case, a spurious correlation would exist between universities and economic activity. We claim that the Papal Schism of 1378 represents an exogenous source of variation in the creation of universities, and focus on the period around the Schism to identify universities’ contribution to Germany’s economic development.<sup>18</sup>

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<sup>16</sup>Medieval universities provided training in the arts (comprising the trivium and quadrivium), theology, and medicine, along with legal training. A large minority of students studied law, hundreds per year during the period of the Commercial Revolution. See DeRidder-Symoens, ed (1992).

<sup>17</sup>See Greif (1993, 2000, 2006), Greif et al. (1994), and van Zanden (n.d.) for discussions of the institutions developed to solve problems of insecure property rights and uncertain contract enforcement in the Middle Ages.

<sup>18</sup>Thus, we do *not* argue that universities were the cause of all economic activity in late medieval Europe. We use the

## 2.2 The Papal Schism as a Natural Experiment in University Establishment

Prior to the establishment of the first German university in 1386, German students had to travel abroad, to the Universities of Paris, Bologna, or Prague, to receive a university education.<sup>19</sup> However, by 1409, there were four universities in Germany: one in Heidelberg (founded in 1386), one in Cologne (1388), one in Erfurt (1392), and one in Leipzig (1409);<sup>20</sup> these four schools are displayed in Figure 3. In a brief period of time, the distance to a university—and so the cost of university attendance—shrank significantly for individuals across Germany. The shade of city markers on the map in Figure 3 indicates the distance to a university; lighter colors correspond to shorter distances. The reason for the sudden foundation of several German universities was the Papal Schism, an event which was arguably exogenous with respect to the German economy, and thus provides a natural experiment to evaluate the causal impact of university establishment on economic activity.

From 1309 to 1378, a period known as the “Avignon Papacy,” Popes resided in Avignon, France, rather than in Rome. In 1378, Pope Gregory XI moved the Papal Court back to Rome, and died shortly thereafter. The election to replace Gregory XI resulted first in the selection of Pope Urban VI, who remained in Rome, and then in the selection of (anti-Pope) Clement VII, who maintained his court in Avignon. Thus, beginning in 1378, there were two rival Popes; secular lords chose to pledge allegiance to one or the other. France and Spain were loyal to the French Pope, while the Holy Roman Empire and the Italian states were loyal to Rome.<sup>21</sup>

The split in the Church had important consequences for university students and faculty from Germany. Because there were no German universities, many of them had studied and taught at French universities, such as the universities of Paris and Orléans. However, following the Schism (especially after the declaration in support of Clement VII in February 1383), the University of

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German natural experiment to single out the causal effect of universities—which might generally be established as an endogenous response to improved economic conditions—on growth.

<sup>19</sup>Prague was part of the Holy Roman Empire at that time. However, in following the convention of this paper, we use the anachronism “German” to refer only to the territory covered by our dataset, which does not encompass Prague and the Kingdom of Bohemia.

<sup>20</sup>Another university of the Holy Roman Empire, the University of Vienna, was officially established in 1365, but actual teaching there did not begin until after the Schism (in 1383). At that time, the famous theologian Henry of Langenstein arrived from the University of Paris and attracted the students necessary for the university to function.

<sup>21</sup>Some exceptions to this pattern are described in Swanson (1979).

Paris did not tolerate individuals loyal to the Roman Pope, as were German students and faculty. Forced to leave the French universities, students and faculty returned to Germany, where universities were established to take them in.<sup>22</sup> Roman popes were happy to grant bulls for the foundation of new universities as a means of weakening the theological monopoly held by the faculty of Paris, now affiliated with the Avignon pontiffs (Rashdall, 1895, p. 247).

Notable faculty who were forced to return to the Holy Roman Empire by the Schism, such as Marsilius of Inghen, who taught at the University of Heidelberg, attracted students to the new universities. The decreased cost of university attendance did so as well. Rashdall (1895, p. 214) wrote,

*“The bulk of Germans at foreign universities [before the Schism] were probably young nobles and well-born or well-beneficed ecclesiastics. . . . The career open to merit was [after the Schism] brought within reach of sons of the tradesmen and the artisan. Martin Luther could have hardly enjoyed a university education if he had had to go to Paris for it.”*

Thus, as a result of the Papal Schism, Germany was rapidly transformed from a land with no universities, and relatively few graduates, into a land with several universities and many graduates.<sup>23</sup> Importantly, the cause of this transformation was not economic: the Papal Schism was a political event that did not coincide with any dramatic economic shifts of which we are aware. In Table 2, we list several important economic changes that affected Germany in the centuries surrounding the Papal Schism: important institutional innovations, discoveries of precious metals, and the massive demographic shock of the Black Death were all important events that *did not* coincide with the Papal Schism.<sup>24</sup> Thus, we believe that the Schism was a truly exogenous shock leading to university establishment in Germany.

*[Table 2 about here]*

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<sup>22</sup>Swanson (1979) discusses the debates within the university of Paris that eventually led to the exodus of German academics.

<sup>23</sup>An important question regarding the rise in the number of German graduates is why was there no university establishment before the Schism, given the apparent demand? One possible reason is that the Church wanted to limit the number of centers of theological and canon law training to prevent heterodox teachings. This constraint was loosened by the Schism, because the Roman Church lost the University of Paris, which had been the preeminent university for the study of theology until then.

<sup>24</sup>It is also worth adding that there was no dramatic change in Germany’s political structure at the time of the Papal Schism. De Long and Shleifer (1993) discuss the importance of the structure of government to urbanization in medieval Europe, but they do not note any change in Germany’s government in the time period we study.

## 2.3 University Foundation and Market Establishment in Germany

We now examine changes in economic activity at the time when Germany's first university was founded (Heidelberg, in 1386). The outcome variable we use is the granting of a market privilege to a city in a given year, using information from the *Deutsches Städtebuch*. In some specifications, we consider both city incorporations and market establishments as the dependent variable, as city establishments may have included the right to hold a market.

Because most of the variation in market establishment in which we are interested occurs across time—before and after universities were established—we reduce our city-year panel dataset to a time series of market establishments in each year. Our unit of observation is therefore a single year, with the outcome variable (total market rights granted), coming from a set of cities—in the baseline, the set includes all of Germany, but we split the sample of cities in some of our analysis, below. To ensure comparability of coefficient magnitudes across samples, we always standardize the number of market establishments in a given year by the size of the area considered. In practice, we divide the number of market establishments in a given year by the total number of cities ever established in the sample area; thus, our outcome variable will be the rate of market establishment (markets per 1,000 cities) in each year. Note that the denominator in this rate does not vary across time. Our empirical strategy will be to examine whether there is a change in the level and trend rate of market establishment at the time when Germany's first universities were established.

This runs into an important concern regarding university establishment: even if university establishment was exogenously driven by the Papal Schism, why were universities established precisely when and where they were? We cannot prove that the timing and location of university establishment within the Papal Schism was exogenous, but we conduct a series of tests below to address concerns that unobservable variations in economic conditions in certain places at certain times drive our results.

To begin, we present the basic patterns of market establishment before and after universities were founded in Germany. We estimate a specification which compares mean levels and trends of market establishment rates before and after university foundation:

$$markets_t = \beta_0 + \beta_1 \cdot Post_t + \beta_2 \cdot Year_t + \beta_3 \cdot Year_t \cdot Post_t + \epsilon_t \quad (1)$$

The dependent variable is the number of markets established in year  $t$ , divided by the number of cities ever established in the region considered. In our baseline specification, the sample is all 2,256 German cities in our dataset.  $Year_t$  is simply the year of the observation. In practice, we normalize  $Year_t$  so that it is equal to 0 in the pivot year, to ensure comparability of coefficient magnitudes across regressions.  $Post_t$  is a dummy variable, equal to 1 when  $t$  is larger than a pivot year. The pivot year can vary across specifications: in the baseline specification it corresponds to the year 1386, as this is the year when Germany's first university was founded. We prefer 1386 over 1378 (the actual date of the schism) as the pivot year, as we expect the break in market establishments to occur only when a university is in fact created in the German lands.<sup>25</sup>

Equation (1) examines whether there is a discrete jump in the market establishment rate at the pivot year (the coefficient on  $Post_t$ ) and whether there is a change in the trend rate of market establishment (the coefficient on  $Year_t \cdot Post_t$ ). We expect the coefficient  $\beta_3$  to be positive if the Schism increases rates of market establishment, relative to the pre-existing trend  $\beta_2$ . Moreover, if the effect of the Schism works through the creation of universities and the formation of human capital (for example, legal training and the consequent improvement in legal institutions), we do not expect the coefficient  $\beta_1$  to be significantly different from zero, as this would imply an implausible sudden change in economic conditions. Rather, we expect the effect to occur gradually over time and be reflected in the change of trend,  $\beta_3$ .

We begin our analysis by considering all of Germany from 20 years before through 20 years after the first university, Heidelberg, was founded in 1386. In Table 3, Panel A, column 1, we present results from equation (1), which allows the rate of market establishment to vary linearly over time, at different rates before and after the foundation of the University of Heidelberg in 1386. We find that the trend rate of market establishment sharply changed in 1386; while the rate of market establishment was decreasing prior to 1386 (indicated by the negative coefficient on  $Year_t$ ),

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<sup>25</sup>The 8-year delay between the Schism and the foundation of the University of Heidelberg is due to the fact that the expulsion of German academics from French universities did not occur before 1381–1384, and to the time needed to grant a papal bull and set up a new institution of higher learning (Swanson, 1979, pp. 58–74)

there is a significant, positive change in the trend in 1386 (indicated by the positive, significant coefficient on  $Year_t \cdot Post_t$ ). The point estimate of  $\beta_3$  is equal to 0.151, large enough to reverse the negative trend (of  $-0.061$ ) present before 1386. This relationship is displayed graphically in Figure 5.

[Table 3 about here]

[Figure 5 about here]

To test the robustness of this finding, we next vary the window of years around 1386 that we examine. We present estimates of equation (1) using windows of  $\pm 15$  and  $\pm 25$  years around 1386 in columns 2 and 3.<sup>26</sup> As in the case of the  $\pm 20$  year window, there is a positive change in the trend using both alternative windows (the coefficient on  $Year_t \cdot Post_t$  is always positive): using the  $\pm 15$  year window, one finds a positive change in trend significant at the 5% level, while using the  $\pm 25$  year window, the estimated change in trend is positive, but not statistically significant.

Next, we repeat the estimates from Panel A, but now using the sum of market establishments and city incorporations in a given year as the dependent variable. We present results using this outcome variable, and windows of  $\pm 20$ ,  $\pm 15$  and  $\pm 25$  years, in Panel B, columns 1–3, respectively. The results using this alternative outcome variable are consistent with those in Panel A: falling market and city establishment rates prior to 1386 are reversed after universities are first established. This positive change in trend is statistically significant in all of the three time windows analyzed.

An important concern with the above regressions is that the timing of university establishment in Germany was endogenous: we might simply be capturing changes in trends that began before university establishment; or, we may be capturing the effects of some broad change in market establishment rates of which the change in 1386 was only a small part.

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<sup>26</sup>The choice of the length of the time window is constrained by two considerations. On the one hand, the time window has to be long enough to allow students to graduate and to affect market activity in their new positions. On the other hand, if the time window is too long, it is more likely that other economic shocks are captured in the data; moreover, our linear approximation of trend rates (and breaks thereof) might be inappropriate for longer time frames.

To examine whether either of these possibilities is likely to have been true, we estimate equation (1) 21 times: in each regression, we change the pivot year, testing for a break in the trend rate of market establishment for every year between 1376 and 1396, using a window of  $\pm 20$  years around each pivot year. We plot the coefficients on  $Year_t \cdot Post_t$  from these regressions, along with their 95% confidence intervals, in Figure 6.<sup>27</sup> One can see that the largest, most significant trend breaks occur very close to 1386. Ten years before Germany's first university was established, market establishment rates were not experiencing any sharp break in trend, as evidenced by the point estimate being close to 0. Analogously, after 1386 there is progressively less evidence of a change in trend. The sharp change in the trend rate of market establishment is quite specific to the time of university establishment in Germany.

[Figure 6 about here]

## 2.4 Access to Universities and Market Establishment: Cross-Sectional Evidence

Our results above indicate that the trend of market establishment rates in Germany increased in 1386, when the first German university was founded. It is natural to ask whether this result could be due to some other, unobserved, factor. It is therefore important to establish a strong link between markets and university establishment *per se*. If the change in market establishment rates were observed even in parts of Germany that did not get closer to a university as a result of the foundation of the first German universities, one would suspect that some change other than university foundation drove the change in the trend rate of market establishment in 1386. On the other hand, if the break in market establishment was greater in areas with improved access to university training, evidence of a link between university training and market establishment would be stronger.

To link the increased proximity to universities to economic change, we divide our sample of German cities into several categories. We first examine separately those cities that experienced a reduction in the distance to the nearest university following the establishment of the first German universities, and those cities that did not (because their closest university, even after the Schism,

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<sup>27</sup>The coefficients and standard errors are available from the authors upon request.

remained Prague's). If education in the newly-founded German universities caused the change in the trend rate of market establishment, one would expect to observe this change only in areas where universities were, in fact, made more accessible. On the other hand, if one observed a large change in the trend of market establishment in areas that were no closer to a university following the creation of German universities, one would be concerned that the break in trend we observed in 1386 for all of Germany was driven by factors other than university creation.<sup>28</sup> We thus estimate equation (1) separately on these two groups.

We present results from these estimates in Table 4, columns 1 and 2. They suggest that increased access to a university played a crucial role in the changing rate of market establishments in 1386: in areas with decreased distance to the nearest university after 1386, there is a significant and large break in the trend rate of market establishment (the coefficient  $\beta_3$  on  $Year_t \cdot Post_t$  is positive and significant); in those areas where German university establishment brought universities no closer, there is no break in the trend. Figures 7 and 8 give a visual impression of the starkly different patterns.

*[Table 4 about here]*

*[Figure 7 about here]*

*[Figure 8 about here]*

One might wonder if the effect in Table 4, columns 1 and 2, was simply due to regional differences in market establishment patterns across Germany: the group of cities without a decrease in distance to a university are all located in Germany's southeast. We therefore split our sample into finer categories. Among those cities that experienced a reduction in the distance to a university during the Papal Schism, we split the cities into mutually exclusive groups based on the magnitude of the reduction: those for which the reduction was less than 100 km; those for which the reduction was between 100 and 200 km; those for which it was 200–300 km; and those for which it

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<sup>28</sup>One might be concerned that Papal Schism had economic consequences other than the establishment of German universities, for example.

was between 300 km and the maximum reduction of 415 km. We then test for a break in the trend of market establishment in 1386 for each of the groups.

In Table 4, columns 3–6, we present the results from estimating equation (1) for each group of cities. One can again see strong evidence that the break in the trend of market establishment was a result of greater access to universities: the areas that experienced greater reductions in distance to a university consistently show greater positive trend changes in 1386. Interestingly, the point estimate for the coefficient  $\beta_3$  on  $Year_t \cdot Post_t$  increases monotonically from column 3 to column 6, conforming to our hypothesis that a change in the accessibility of higher education lies behind the trend break observed in 1386. The results using the rate of market and city establishment as the dependent variable are presented in Table 4, Panel B; they, too, provide strong evidence that areas that experienced the greatest reduction in distance to a university during the Papal Schism experienced the largest changes in their rates of city and market establishment.<sup>29</sup>

## 2.5 Endogeneity of University Location

The results above reveal a positive break in the trend in market establishment in 1386—when Germany’s first university was established—and that this break in trend was most evident in areas that experienced the greatest reduction in the distance to a university during the Papal Schism. This suggests that universities themselves played a causal role in market establishment.

However, one might wonder whether the results above were merely due to a correlation between good leadership, or good local economic conditions, and university foundation. That is, a territorial lord may have founded a university, then founded many markets nearby; a prescient lord may have founded a university in anticipation of good economic times ahead. Both of these alternative stories would explain a sharp change in market establishment rates precisely when universities were founded, and *near* those universities.<sup>30</sup>

We thus estimate equation (1) excluding from our analysis cities that are within 10, 25, or

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<sup>29</sup>Results are qualitatively similar using a  $\pm 15$  or  $\pm 25$  years’ window around 1386 (available upon request).

<sup>30</sup>Note that the results in the previous subsection did not refer directly to the proximity to universities: the correlation between the *change* in distance to a university (as a result of the Schism) and the actual distance to the newly founded universities is  $-0.554$ .

50 km of the four German cities where universities were established during the Papal Schism. If (anticipated) good local economic conditions drove university establishment, dropping these cities should eliminate the break in trend found above.

In Table 5, columns 1–3, we present the results of estimating equation (1) without cities within 10 km, 25 km, or 50 km of the four German universities established during the Schism. Even excluding these cities one can see a large, positive coefficient  $\beta_3$  on  $Year_t \cdot Post_t$ —a positive break in the trend of market establishment.<sup>31</sup> Consistent with the hypothesis that there is some endogeneity in the location of universities (though also consistent with the hypothesis that the effect of universities on the stock of human capital will be greater closer to universities), the point estimate on the estimated change in trend decreases from 0.151 (in the baseline case of table 3, column 1) to 0.121 when all cities within 50 km of a university are excluded; still, this decrease is small relative to the magnitude of the estimated coefficient.

In Panel B we repeat these estimates, but use the measure of market establishments that includes city incorporations as our outcome variable. Again, we find a positive change in the trend rate of market establishment that decreases only slightly when cities close to universities are excluded.<sup>32</sup>

[Table 5 about here]

Next, using information on local territorial lords collected for each of our cities from the *Deutsches Städtebuch*, we exclude from our analysis the four lords' territories containing a university city: these are the Rhenish Palatinate (Heidelberg), the Archbishopric of Cologne (Cologne), the Archbishopric of Mainz (Erfurt) and the Electorate of Saxony (Leipzig).<sup>33</sup> If the break in the trend of market establishment was due entirely to differences in economic activity within the territories of lords whose territories received universities, one would be concerned that these territories

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<sup>31</sup>This finding suggests that it is unlikely that the causal channel through which universities affected markets was increased demand for goods in an area due to increased populations, or agglomeration economies due to the concentration of human capital. See Glaeser and Saiz (2004) and Florida (2002).

<sup>32</sup>As before, results (available upon request) are qualitatively similar using a  $\pm 15$  or  $\pm 25$  years' window around 1386.

<sup>33</sup>The Holy Roman Empire in the late Middle Ages was a complicated array of partly overlapping layers of sovereignty. For each city in our dataset we coded the highest liege lord (other than the Emperor) to which it was subject.

were different from others in ways unobservable to us, and that these differences drove university foundation and market establishment. On the other hand, one might expect universities to have increased human capital or improved legal institutions more in the territories of the lords who established them; thus, dropping these territories also provides something of a lower bound on universities' impact on economic activity.

In Table 5, column 4, we present the results from estimating equation (1) using only cities whose territory did not include a university established during the Schism. The results are somewhat weaker in both magnitude and statistical significance (the relevant point estimate on the change in trend falls from 0.151 in the baseline estimate to 0.111). This suggests that there may have been some unobserved characteristics in the territories with a university which biased our baseline coefficient estimate upward, or simply that territories in which universities were established benefited more from them. It is important to note that we continue to observe a positive break in the trend of market establishment even in this restricted sample. In Panel B, we use the joint city and market establishment rates as the dependent variable and yet again find evidence of a positive change in trend after 1386, even outside of the territories in which universities were established.

## **2.6 Placebo Regressions: The Economic Impact of Papal Politics**

We next ask whether some other effect of the Papal Schism was likely to have changed economic activity and caused some part of the trend break we found above.<sup>34</sup> Changes in the residence of the Pope may have affected trade patterns; shifts in papal politics may have had broader impacts on Western Christendom. We search for evidence of economic consequences of shifts in Church politics by testing for breaks in market establishment trends at the beginning of the Avignon papacy, in 1309, and the end of the Papal Schism, in 1417. Finding significant changes in market establishment rates at these dates would indicate that papal politics affect economic activity even in the absence of university establishment, confounding our interpretation of the increased rate of

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<sup>34</sup>Note that to account for the changes in market establishment found above, these other, unobserved economic effects would have to be correlated with the reduction in distance to a university.

market establishment in 1386.

In Table 6, columns 1–2, we present estimates of equation (1), but with the pivotal dates set at 1309 (column 1) and 1417 (column 2), respectively. In Panel B, we repeat these estimates using our outcome measure that counts city incorporations and market establishments. We do not find strong or consistent evidence that market establishment patterns changed when the Pope moved to Avignon or when the Schism was resolved.

*[Table 6 about here]*

As a final test of the Schism’s impact through channels other than university establishment, we examine market establishment in Italy around the time of the Schism.<sup>35</sup> Unlike Germany, Italy had many universities prior to the Schism, and only one university foundation during the years of the Schism. Finding a break in the trend of market establishment in Italy would indicate that the Schism affected economic activity through channels other than university establishment. We thus estimate equation (1) using data from Italy.<sup>36</sup> The results, presented in Table 6, column 3, indicate that there was no change in the level or trend of the rate of market establishment in Italy.

### **3 Universities, Legal Training, and the Commercial Revolution**

How might the establishment of medieval universities have promoted the expansion of economic activity observed during the Commercial Revolution? We argue that the most important channel through which universities affected economic activity likely was the development of formal legal institutions through the education in Roman and canon law that they provided.

#### **3.1 Universities and Legal Training**

Although not all university students studied the law (as noted above, universities also provided training in the arts, in theology, and in medicine), a large fraction did. It is difficult to obtain

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<sup>35</sup>The market establishment data we were able to collect for Italy are for Naples, Sicily, and Lombardy, and come from Mira (1955), Grohmann (1969), and Epstein (1992).

<sup>36</sup>We present estimates using 1386 as the pivot year, but the results are very similar if we use 1378, the year of the Schism itself.

precise estimates about the number of students graduating with a law degree from any university, before or after the Schism. However, one can look at matriculation records and count the number of students enrolled at a certain university at one point in time.<sup>37</sup>

If we consider the number of matriculated students, the following picture emerges. In 1389, one year after its foundation, the university of Cologne had 759 matriculated students, of whom 156 (20.5 percent) were studying law (García y García, 1992, p. 400). According to estimates, 15 percent of German university students in the second half of the fifteenth century were enrolled in law, or about 1,000 students in any given year.<sup>38</sup> This was a substantial increase compared to the number of German students enrolled in foreign universities before the Schism.

For the case of the university of Bologna it is known that 489 German students were enrolled there (across all disciplines) over the course of the entire 13th century, and 1650 students in the 14th century (Coing, 1964, p. 48). Figures from other universities in France and in Italy (for example, Padua, Paris, and Orléans) are not available, but are likely much smaller. Assuming, rather conservatively, that foreign students spent, on average, eight years at a university, this would imply that during the 14th century there were about 125 German students enrolled in Bologna at any point in time. Bologna had the largest contingent of German students abroad, so it is likely that the total number of German students enrolled in foreign universities was never close to the 1,000 students enrolled just in law in the German universities of the late fifteenth century. It seems safe to say, therefore, that the establishment of the universities as a consequence of the Schism substantially increased—perhaps by an order of magnitude—the number of individuals in the German lands trained in the law.

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<sup>37</sup>Note that counting graduates of universities would be problematic: many students who were enrolled did not ultimately graduate, as graduation was a costly procedure, involving the purchase of new robes for all professors and the organization of a rich banquet. However, even students who had only attended a university for some years without achieving the doctorate degree certainly acquired human capital and were employed in positions where their education was put to use.

<sup>38</sup>Coing (1964, p. 66) reports some attempts to estimate the actual number of *graduating* students: over the entire period 1386-1540, more than 1,800 students graduated in law from German universities, the largest shares of which graduated from Leipzig (504 graduates), Erfurt (427), Cologne (388), and Heidelberg (219).

### 3.2 The Establishment and Importance of a System of Laws

The time of the Commercial Revolution was also the time of the rediscovery of Roman law in Europe.<sup>39</sup> The Justinian Code, “rediscovered” in the eleventh century, provided the foundation for a legal system that could enforce contracts and define the relationship between the rulers and the ruled. The Code became the core curriculum at Europe’s first university, in Bologna, and over the centuries it formed the basis of the civil law curriculum in universities throughout Europe. Doctors of law at the universities wrote glosses on (interpretations of) the Code and lectured on these; as their students spread throughout Europe, the legal system in which they were trained spread, too.

Roman law represented a significant improvement over the pre-existing systems of customary laws. Whereas customary law was very local, Roman law was universally known across Europe; whereas customary law was highly traditional, based on kinship and superstition, Roman law was an authoritative yet flexible system, that had been enriched by centuries of scholarship; whereas traditional law was informal and feuds were often preferred to trial, Roman law was written—contributing to the increasing importance of written evidence in the Middle Ages<sup>40</sup>—and based on a process of rational pursuit of truth (Berman, 1983). In the particular context of Germany, with its highly fractionalized territories, these advantages of Roman law were particularly salient (Wieacker, 1967, pp. 105, 112). Broadly-applied, rule-based, written laws effectively reduced the uncertainty faced in economic transactions.

Though our primary focus is on Roman law, the importance of canon law in all spheres of public life in medieval times should not be neglected. In particular, the Church’s competence in cases which would today be regarded as purely belonging to secular law was substantial. The Church’s tribunals dealt with *causae saeculares* in the following cases: *ratione peccati*, i.e., cases in which the subject matter was considered a sin and hence had to be confessed to a priest; *privilegium fori*, i.e., the participation of a cleric as a plaintiff or defendant, or other special categories, such as Jews and

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<sup>39</sup>We join legal scholars in attaching preeminent importance to the rediscovery of the Justinian code, as opposed to other codifications of that epoch, such as the *Sachsenspiegel*.

<sup>40</sup>See Mostert, ed (1992) on this process, known as *Verschriftlichung/verschriftelijking*. On the written component of canon law, see Coing (1964, p. 79), and on the increasing use of written records in city and maritime courts, see Berman (1983, p. 355).

sometimes even university students; and *denuntiatio evangelica*, i.e., the evident necessity to apply moral or theological reasoning (Wieacker, 1967, p. 76). Because contracts relied on promises and sworn oaths, the church played a role in contract enforcement, even when the parties to the contract were not clerics. As pointed out by Berman (1983, p. 250), “the canonists were able, with the help of Romanist legal science, to create a subsystem of contract law within the system of canon law as a whole.” In fact, most students enrolled in medieval universities would study both canon and Roman law—*utrumque ius* (both laws), as it was commonly expressed.

The introduction of Roman and canon law, and their increasing application across all spheres of public life, could have had a series of positive effects on economic development. The broadest argument along these lines has been put forward by the legal historian Harold Berman, who suggested that the rediscovery of Roman law, and the increasing development and sophistication of European legal systems (canon, Roman, and merchant law), brought a new approach to the solution of conflicts between secular and religious authorities which had plagued Europe during the better part of the Middle Ages (Berman, 1983, pp. 160–162). This helped solve disputes that existed between various jurisdictions, distinguish between conflicting legal claims, even within the various secular polities, and ultimately served to support and stabilize the process of state formation. Stronger states, in which multiple layers of sovereignty were simplified and overlapping entitlements solved, found it easier to organize economic activity and establish markets.

Second, law can serve as a coordination device (Postema, 1982; McAdams, 2000). This is true even in the absence of effective sanctions by a governmental authority: even when states are weak, resorting to a shared set of legal concepts, as represented by Roman and canon law, can facilitate interaction between parties. Fixed typologies of contracts, or provisions determining the default rules in the absence of explicit provisions, could serve as focal points. Referring to the older Roman law, Berman (1983, p. 245) writes, “[it] had achieved a very high level of sophistication in the field of contracts, and much of its vocabulary in that field, as well as many of its solutions to individual questions, could be applied in the twelfth century to the newly burgeoning commercial life in Western Europe.” This legal toolkit would have been even easier to apply as it spread and gained acceptance in the thirteenth and fourteenth centuries. Vinogradoff (1929, p. 138, 143–144)

writes that in the Middle Ages “it became more and more usual for parties to a suit to submit the points in dispute to the arbitration of doctors of law,” and that the influence of Roman law was “especially manifest in the law of contracts.”

Finally, the spread of Roman legal thinking could have supported market exchange by making adjudication more predictable. If judges are increasingly trained following a common curriculum of studies, and are thus expected to follow those principles when passing judgments, contracting is made easier in the expectation of more certain procedures of adjudication. Greater access to information about these rules may have been important, too: judges relying on written law were more predictable than judges relying on unwritten principles.

For all of these reasons—more clearly defined state institutions and jurisdictions, greater simplicity of writing of contracts, and more predictable adjudication—a better-developed formal legal system should have increased commercial exchange, and provided stronger incentives for the creation of new urban centers and markets.

### **3.3 Jurists and Their Employment in the German Lands**

Universities arose and Europe’s formal legal institutions were developed during the Commercial Revolution. These developments were not merely coincidental: the penetration of formal (Roman and canon) legal thinking in the German lands of the Holy Roman Empire can be traced back to the establishment of the first universities as a result of the Papal Schism. Moreover, empirical evidence supports the hypothesis that the channels put forward in the previous discussion, linking the development of Roman and civil law to the economic development of Europe, were at work in late medieval Germany.

As a first step, we consider the role universities played in developing Germany’s formal legal systems, examining the careers of university students after they left school. Kuhn (1971) collected information on 1,627 students from Tübingen University from the years 1477 to 1534. Although this time period is slightly later than that on which we focus, it is likely representative of German university students’ careers in the late fourteenth and early fifteenth centuries. Around 20 percent of students in Kuhn’s sample served in public administration jobs (see Table 7)—a surprisingly

high number given that many of these students did not study law, but the arts or theology. In addition, this percentage understates university students' impact on administration to the extent that some members of the clergy (e.g., prince-bishops) exercised temporal powers as well. In the subsample of students who attended both Tübingen and an Italian university (69 students)—these were overwhelmingly students of law—an even larger fraction of students, around 30 percent, pursued public administration careers (Table 7, Panel B), and again, others may have been administrators within the Church.

The Tübingen University data have several drawbacks: first, for the larger sample, we do not know whether the students actually studied law; second, we do not have specific information on students' occupations, so we cannot easily identify jobs in the Church that were related to institutional development (i.e., administrators applying canon law). Thus, we next consider the careers of 1,212 law graduates from the University of Bologna (of all nationalities), from 1070 through 1619, as recorded by Alidosi (1623). We find that 21 percent of the graduates pursued careers in public administration (very similar to the number found in Kuhn's sample); in addition, another 31 percent pursued non-clergy administrative careers in the church (see Table 7, Panel C).

*[Table 7 about here]*

Of course, it remains to be shown that secular and Church administrators trained in the law in fact worked to develop formal legal systems. Roman law was slowly introduced in the Holy Roman Empire in the late Middle Ages. While formal adoption did not occur until the late 15th century, typical institutions of Roman law entered the political, judicial and commercial spheres earlier than that, thanks to the large number of legally trained individuals; this process is known as *Frührezeption* (early reception).<sup>41</sup>

Most students of the law in medieval times studied both canon and Roman law. It is not surprising, therefore, that many of them found employment in the Church, as evidenced by the statistics in Table 7 above. Entering the clergy was not necessarily equivalent to becoming a priest; in fact, many trained jurists were only conferred the minor orders. They would then be active for

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<sup>41</sup>See Trusen (1962), Coing (1964), Wieacker (1967).

the Church in administrative positions—many territorial lords in the Empire were bishops with temporal powers—or in Church tribunals.

Ecclesiastical tribunals—*Offizialatgerichte*—were widespread in medieval Germany, starting in the 13th century. In those tribunals, trained jurists would be active as lawyers, judges, or procurators (agents representing one of the parties in a transaction). As described in the previous section, the competence of ecclesiastical tribunals, and of canon law, was wide, applying to many cases that would today be considered the realm of civil law. Moreover, cases were often brought to the attention of ecclesiastical tribunals even if they did not strictly belong to their field of competence because of their perceived independence and better ability to enforce sentences. Ecclesiastical tribunals were also very active in the authentication of documents (Coing, 1964, §25).

In the late Middle Ages, at the time the first universities were created in the German lands of the Holy Roman Empire, jurists started to find employment in secular positions as well. Peter Moraw (1992, p. 273) writes, “[a]s far as most modern [legal] careers are concerned, leadership passed to the secular authorities. . . . [T]here was something like a legal, secular, administrative and judicial ‘career path’ which it was possible to choose on the basis of appropriate study.” García y García (1992) provides a similar description of law graduates’ careers: “[L]aw graduates, both clerics and laymen, held official posts with various authorities, from the imperial and royal chanceries downwards. Both in the church and in civilian employment men of law held economic as well as administrative posts.”

The rise of territorial states within the Empire was a fundamental factor favoring the reception of Roman law. As described by Berman (1983), Roman law gave states the tools and the language to enforce their powers and settle claims with other states and with the Church. In the particular case of Germany, the legal standing of cities and territories rested upon a myriad of privileges, grants, contracts and other legal acts—city incorporation grants and market rights were among those. Jurists were therefore needed to formulate those documents and enforce the states’ rights vis-à-vis other polities, and in their activities as legal counselors and advisers to princes and city governments jurists acted as both lawyers and diplomats (Wieacker, 1967, pp. 101–112; Coing, 1964, §26). Even those who were not able to complete their university degree were able to find

employment in positions of relative economic importance, working as chroniclers, notaries or procurators, and representing cities in official political and commercial transactions.<sup>42</sup>

Over the course of the 15th century, individuals trained in the law were also employed in the jurisdiction of secular territories. Roman law became a legitimate source of legal thinking; this was reflected in the judgments of court councilors—increasingly trained at universities—who gave rulings on behalf of the local territorial lords. The adoption of Roman law culminated in the creation of special courts, such as the one in Leipzig (founded 1432), which was composed of faculty members of the local university, and supreme courts within the states of the Empire (Palatinate 1472, Saxony 1483, Württemberg 1495), which were organized in a fashion similar to the Empire's highest court, the *Reichskammergericht*, and adjudicated according to Roman law (Wieacker, 1967, pp. 177–180).<sup>43</sup>

The central administration of the Holy Roman Empire was also a substantial employer of university graduates trained in the law: between 1273 and 1493, at least 230 jurists served in the Imperial Court. Most of these served in the century following the establishment of the first universities in Germany, both in an administrative capacity and in a judicial court, the *Reichskammergericht*.<sup>44</sup>

In addition to employment in the Church and in the administration of secular government, it should be noted that the influence of jurists on market establishment may have been more direct. For the duration of a market, merchants normally assembled a court composed of their peers, but professional jurists were increasingly part of such committees; the same was true for private lay courts (*Schöffentühle*) and arbitration courts (*Schiedsgerichte*), where legally trained individuals could be active as arbitrators, assessors, or procurators (Berman, 1983, p. 346; Wieacker, 1967,

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<sup>42</sup>Wieacker (1967, p. 159). Vinogradoff (1929, p. 133) writes that “the persons who had recourse to Roman texts ... [were] town-clerks acting as jureconsults to cities and to princes, and taking part in the discussions of ordinary tribunals as assessors.” On jurists serving cities and territories in Germany, and influencing their jurisdiction as well as their economic policy, see also Dotzauer (1977) and Nicholas (1977, pp. 156–159).

<sup>43</sup>It is interesting to observe that in nearby Austria, where Roman law was *not* taught, it did not enter the public sphere either. The university of Vienna taught only Canon law during the whole 15th century; as a consequence, the use of Roman law in the administration of the Austrian territories diffused only much later, in the 16th and 17th centuries (Baltl, 1962, pp. 64–70).

<sup>44</sup>Moraw (1986, p. 143). Other sources that document the rise of trained jurists within the public administration of late medieval Germany are so-called *Dienerbücher*, compilations of all people employed by a court. Such collections are available for the states of Hesse, Württemberg, and the Palatinate (Gundlach, 1930–1932, Pfeilsticker, 1957–1974, Krebs, 1942).

pp. 179–180; Coing, 1964, p. 90). Public notaries, who helped to secure property rights and were often linked to the Church, were yet another vehicle through which Roman legal concepts entered the public sphere in Germany (Wieacker, 1967, p. 117). Finally, important administrative regulations may have been shaped by individuals trained in the law: Boerner and Quint (2007) present evidence that the number of written regulations of market brokers—who linked buyers and sellers in medieval markets—was sharply higher in Cologne just after the local university was founded.

University training in the law was thus closely linked to occupations that were likely to affect commercial activity in medieval Europe. The establishment of a legal system improved the public bureaucracy as well as supported the writing and enforcement of private contracts; these consequences may have resulted in commercial expansion, namely the rise of markets and fairs.<sup>45</sup> Legal training thus increased the demand for formal markets and their supply: merchants facing less uncertainty would demand opportunities to trade; cities and local lords could more effectively administer markets, and would therefore provide those opportunities.

## 4 Conclusion

Understanding the “Rise of the West” is a monumental task, made more difficult by the fragmentary data available for the late medieval period when it began. To begin to study the economic aspects of the transformation of Europe requires systematic evidence on economic activity. Our evidence on German city incorporation and market establishment from the late medieval period is a first step, indicating a striking change in urbanization and economic activity: hundreds of cities were incorporated and hundreds more markets established during the Commercial Revolution in Germany.

These data also provide some answers to a fundamental question about the Commercial Revolution: did institutional changes observed in the Middle Ages play a causal role in the economic

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<sup>45</sup>Acemoglu and Johnson (2005) draw a distinction between “property rights institutions” and “contracting institutions.” It is worth noting that the legal institutions we describe supported both property rights (protection of one’s property from the state and elites) and contract enforcement (*vis-à-vis* one’s peers). The former were promoted by having administrators trained to uphold a system of laws; the latter were promoted when administrators trained in the law ensured that individuals fulfilled their contractual obligations.

changes observed during this time? In the context of the increase in commercial exchange, an especially confounding question is: how were contracts enforced, in an age with extremely fragmented political units and high transportation and information costs? How did individuals in medieval Europe solve the “fundamental problem of exchange”?

Prior work in this area has concentrated on informal, private institutions, such as coalitions of trader-merchants and guilds (Greif, 1989, 1993; Greif et al., 1994)—cooperation was promoted by threats of punishment and reputational concerns. On the other hand, Berman (1983) argued that a common formal legal system spread throughout (Western) Christendom in the Middle Ages, facilitating Europe’s economic and institutional development.<sup>46</sup> Similarly, Greif (2006) argued that as the scale of trade increased in the late medieval and early modern periods, formal legal institutions were necessary to support trade.

Our work provides quantitative evidence about the importance of formal institutions: medieval Germany experienced an exogenous shock to its educational and legal institutions—through the universities established there during the Papal Schism. Following this shock, market establishment rates sharply changed course. The break in trend was largest in areas that saw the greatest decrease in distance to a university during the Papal Schism, and did not occur in cities that were no closer to a university at the end of the Schism than at the beginning. These results suggest an important, causal role for universities in the development of markets in medieval and early modern Germany. Historical evidence on the link between universities and legal institutions—through the legal training provided in Roman and canon law in medieval universities—as well as the importance of formal law in supporting public administration and reducing the uncertainty of trade, suggest a role for legal institutions in promoting economic transformation.

The “natural experiment” in university establishment that we analyze occurred well into the late Middle Ages, and outside the most commercially successful parts of medieval Europe. Still, we think that the experience of Germany in the late fourteenth and early fifteenth century not only provides an ideal testing ground due to the exogenous introduction of universities, but we also believe that these insights reveal the importance of universities and legal institutional develop-

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<sup>46</sup>The contrast between the view that informal, bottom-up institutions were paramount, and the view that formal legal institutions were the critical innovation is drawn in van Zanden (n.d.).

ment throughout Europe in the Middle Ages. The channel from universities to legal training, to careers in public administration and Church administration was clearly exhibited among the University of Bologna's medieval graduates, who came from across Europe. With regard to France, Swanson (1979, p. 15) writes that "universities became the training schools for the bureaucrats of both secular and ecclesiastical chanceries; . . . from the beginning of the thirteenth century the law graduates of the French provincial universities dominated the personnel of the French chancery." These public administrators (including those within the Church) helped to establish the political institutions that Berman (1983), Epstein (2000), and De Long and Shleifer (1993) argue were crucial to Europe's medieval economic growth.

Other research questions regarding the Commercial Revolution remain open: the development of legal institutions is just one of many factors that may have driven economic change. Deeper analysis of the patterns of city incorporation and market establishment may yield new insights about these factors. In addition, understanding the links, if any, between medieval economic change and the economic changes of the modern era would be valuable.

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## Figures and Tables

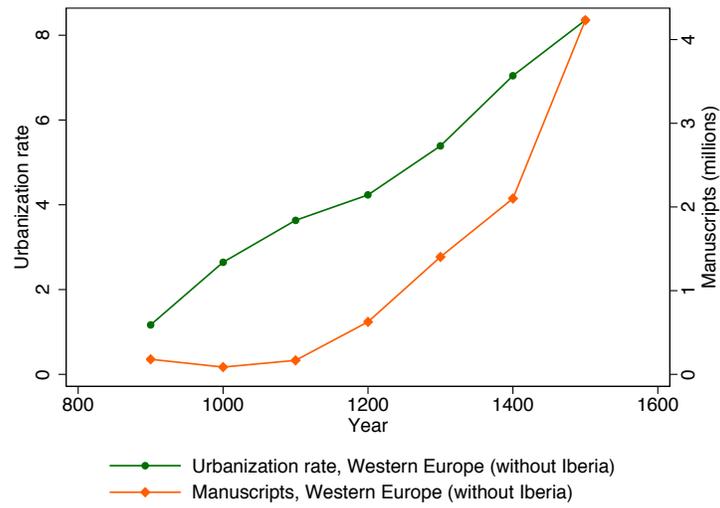


Figure 1: Indicators of economic development in the Middle Ages (source: Buringh and van Zan- den, 2009)

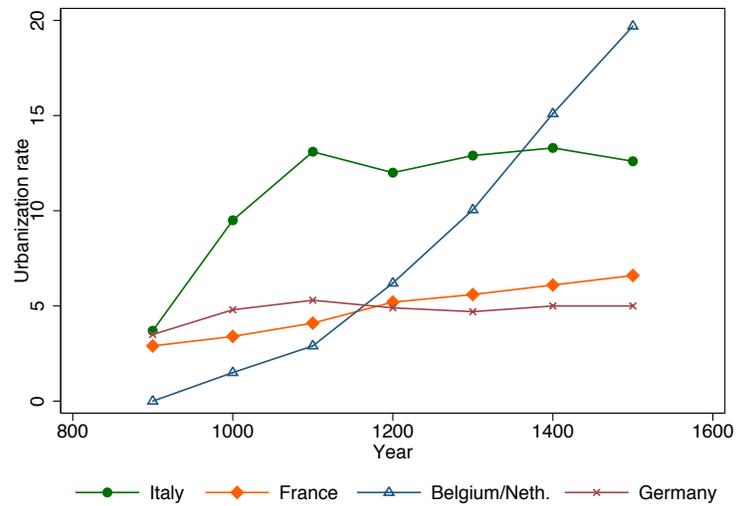


Figure 2: Urbanization rates (% of the population living in cities with more than 10,000 inhabitants) in European regions (source: Buringh and van Zanden, 2009)

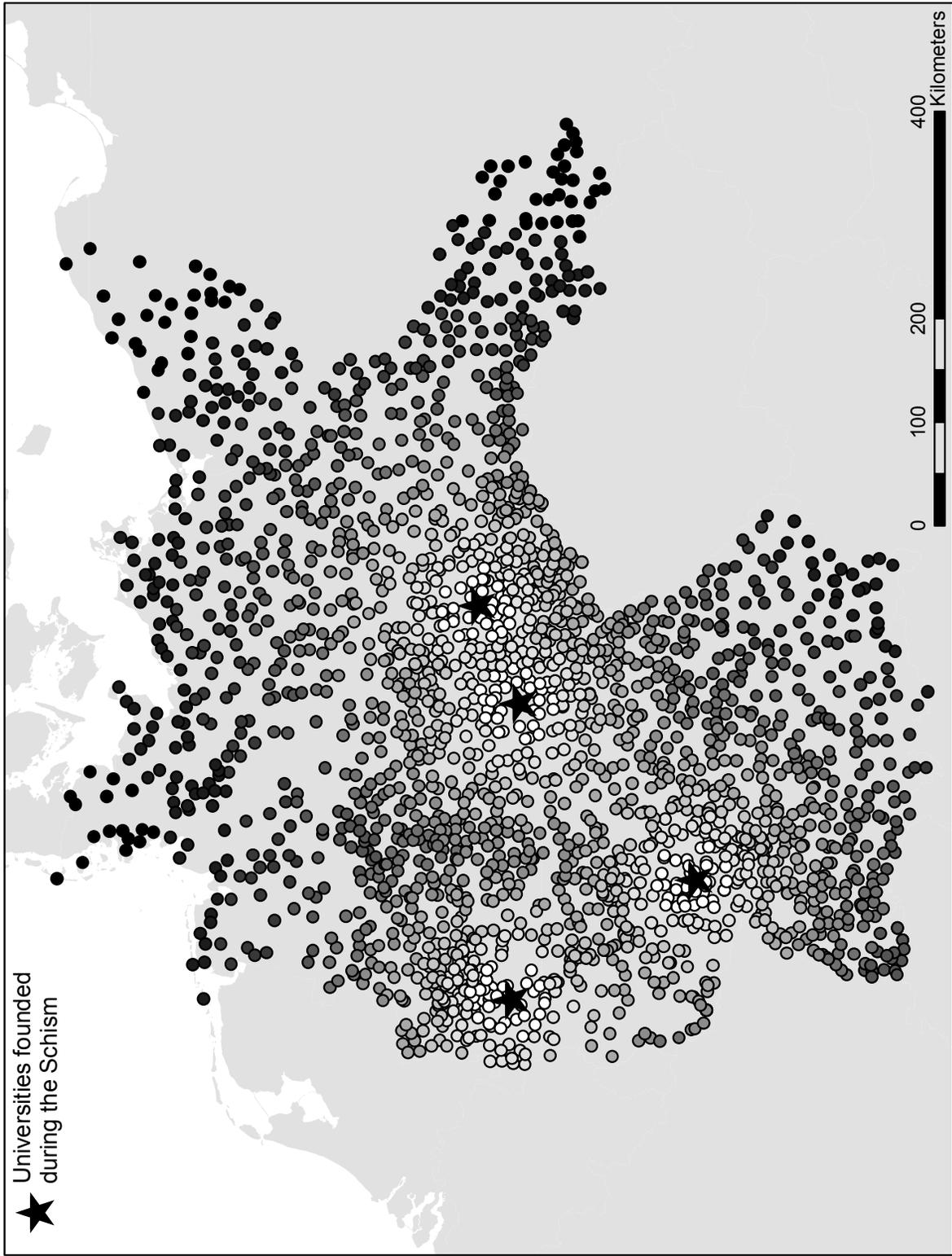


Figure 3: Cities in the dataset. Lighter colors indicate smaller distances to any of the four universities founded during the Papal Schism (Heidelberg, Cologne, Erfurt, Leipzig)

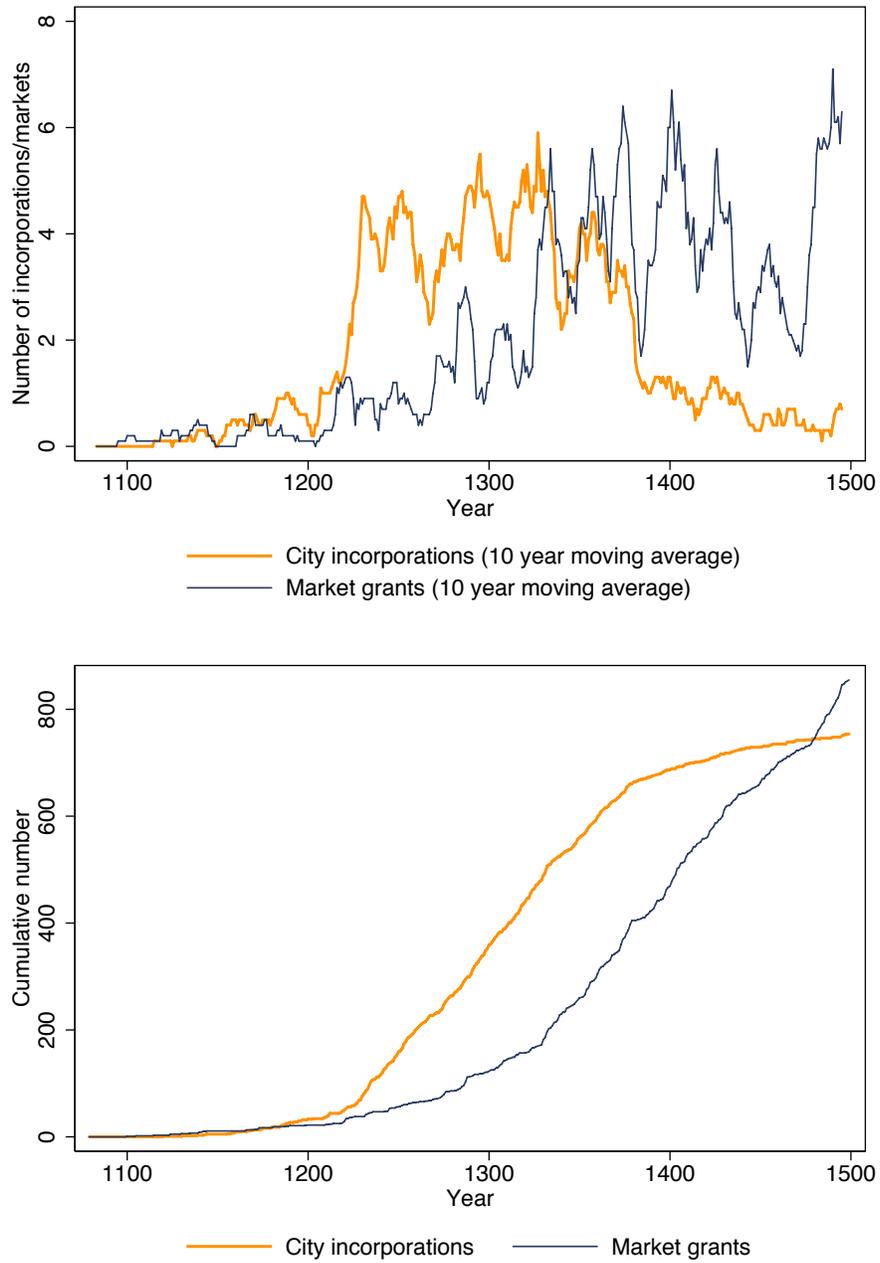


Figure 4: Absolute (10 year moving average) and cumulative number of city incorporations and market grants, Germany

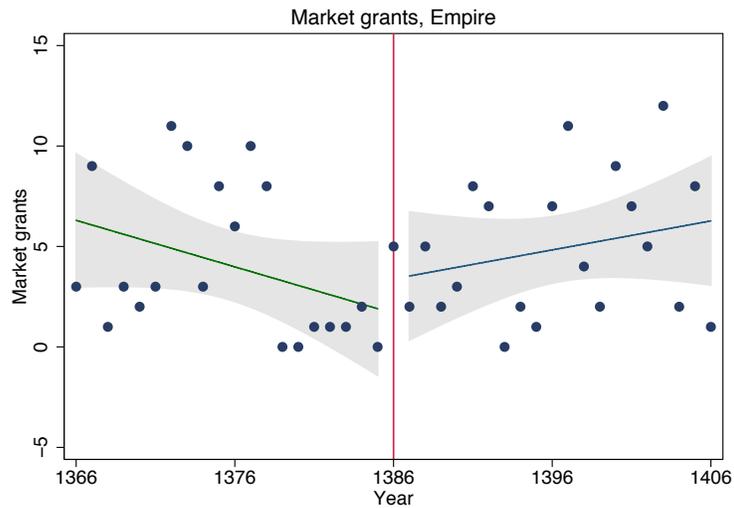


Figure 5: Changes in the trend rate of market establishment, whole sample (corresponding to the regression in Table 3, column 1, Panel A.)



Figure 6: Changes in the trend rate of market establishment (coefficient on year · post-dummy) under varying pivot years (1376–1396)

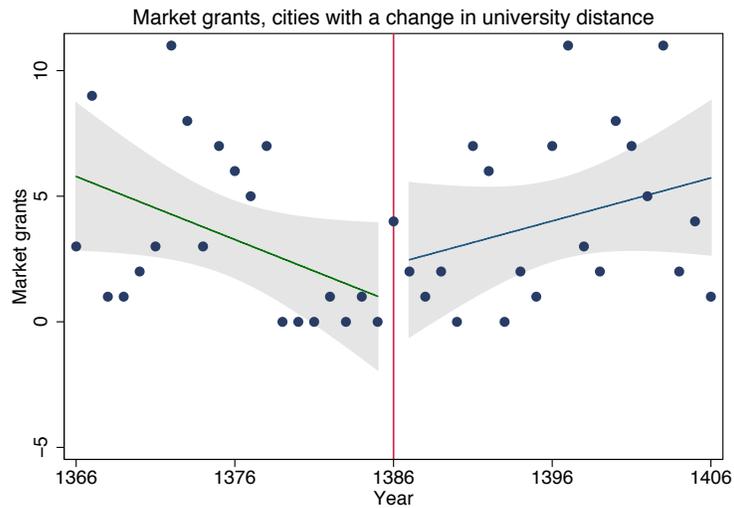


Figure 7: Changes in the trend rate of market establishment, cities with a change in distance to the closest university (corresponding to the regression in Table 4, column 1, Panel A.)

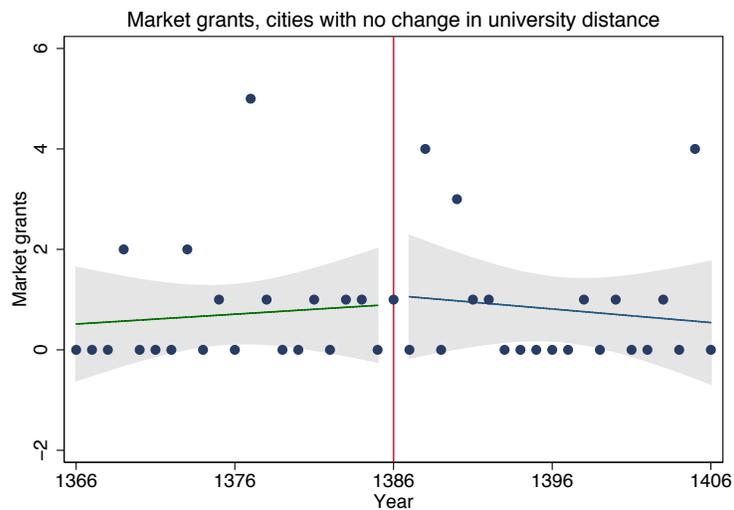


Figure 8: Changes in the trend rate of market establishment, cities with no change in distance to the closest university (corresponding to the regression in Table 4, column 2, Panel A.)

Table 1: University establishments

University Location	Foundation Date
Bologna	end of 12th Century
Vicenza	1204
Paris	beginning of 13th century
Oxford	beginning of 13th century
Montpellier	beginning of 13th century
Cambridge	1209–1225
Arezzo	1215
Salamanca	before 1218–1219
Padua	1222
Naples	1224
Vercelli	1228
Toulouse	1229
Orléans	around 1235
Siena	1246
Angers	1250
Lisbon	1290
Lerida	1300
Avignon	1303
Rome	1303
Perugia	1308
Pisa	1343
Prague	1347
Florence	1349
Pavia	1361
Cracow	1364
Orange	1365
Vienna	1365 (opens in 1383)
<i>Erfurt</i>	<i>1379 (opens in 1392)</i>
<i>Heidelberg</i>	<i>1386</i>
<i>Cologne</i>	<i>1388</i>
Turin	1404
<i>Leipzig</i>	<i>1409</i>
St. Andrews	1411
<i>Rostock</i>	<i>1419</i>
Louvain	1425
Basle	1459
<i>Tübingen</i>	<i>1476</i>

Source: Verger (1992), pages 62–65. Universities in the territory considered by the dataset in italics. The foundation dates come from Verger (1992). Note that there is some ambiguity in the foundation dates of many of the early universities, so the numbers may differ slightly from those reported elsewhere.

Table 2: Economic Shocks in Germany, 1200–1500

Date	Event
13th Century	Creation of “commercial” schools that teach reading, arithmetic, bookkeeping
Around 1250	Creation of the legal form of a corporation in Germany
1320	Discovery of gold in Hungary, decline of the Champagne fairs
by 1345	Financial instruments such as IOU widely used
1348	First wave of the Black Death hits Europe
1439	Invention of printing with movable types by Johannes Gutenberg in Mainz
1470-1490	Discovery of silver in Schwaz (Tyrol) and Schneeberg (Saxony)

Source: Cipolla (1976) and North (2000).

Table 3: Baseline estimates

	(1)	(2)	(3)
<i>Panel A</i>			
Dependent variable:	Rate of market establishment		
Post	0.084 [0.807]	0.933 [0.843]	0.368 [0.761]
Year	-0.061 [0.053]	-0.192* [0.095]	-0.035 [0.035]
Year · Post1386	0.151** [0.073]	0.274** [0.122]	0.064 [0.050]
Constant	1.225* [0.615]	0.418 [0.635]	1.410** [0.589]
<i>Panel B</i>			
Dependent variable:	Rate of market establishment and city incorporation		
Post	0.084 [0.904]	1.152 [0.886]	0.257 [0.892]
Year	-0.117* [0.062]	-0.302** [0.118]	-0.079* [0.044]
Year · Post1386	0.201** [0.084]	0.394** [0.145]	0.106* [0.059]
Constant	1.808** [0.750]	0.684 [0.713]	2.070*** [0.756]
Size of the window (years)	±20	±15	±25
Observations	40	30	50
Number of cities	2256	2256	2256

\*: Significant at 10%; \*\*: 5%; \*\*\*: 1%. Robust standard errors in brackets. The dependent variable is computed as market establishments per year per 1,000 cities (Panel A) or market establishments *and* city incorporations per year per 1,000 cities (Panel B).

Table 4: Spatial variation

Sample:							
Change in distance to a university city:	> 0 km	= 0 km	$\geq 0$ km < 100 km	$\geq 100$ km < 200 km	$\geq 200$ km < 300 km	$\geq 300$ km < 415 km	
	(1)	(2)	(3)	(4)	(5)	(6)	
<i>Panel A</i>							
Dependent variable:		Rate of market establishment					
Post	0.141 [0.801]	-0.385 [3.671]	2.809 [2.042]	-1.185 [1.018]	0.305 [0.774]	-1.786 [1.676]	
Year	-0.088 [0.055]	0.165 [0.117]	-0.043 [0.101]	-0.004 [0.044]	-0.077 [0.050]	-0.119 [0.097]	
Year · Post1386	0.199** [0.078]	-0.235 [0.300]	-0.125 [0.167]	0.164 [0.104]	0.186** [0.082]	0.400*** [0.143]	
Constant	0.814 [0.561]	4.579** [1.962]	2.073* [1.049]	0.948 [0.771]	0.542 [0.485]	1.273 [1.450]	
<i>Panel B</i>							
Dependent variable:		Rate of market establishment and city incorporation					
Post	0.199 [0.935]	-0.856 [3.725]	2.578 [2.122]	-1.508 [1.325]	-0.105 [1.239]	-0.808 [1.961]	
Year	-0.149** [0.065]	0.144 [0.127]	-0.048 [0.115]	-0.016 [0.071]	-0.107 [0.073]	-0.301** [0.133]	
Year · Post1386	0.248** [0.093]	-0.186 [0.303]	-0.149 [0.175]	0.176 [0.116]	0.242* [0.133]	0.559*** [0.178]	
Constant	1.422** [0.686]	4.964** [2.086]	3.030** [1.259]	1.631 [1.073]	1.313* [0.751]	1.169 [1.697]	
Size of the window (years)	±20	±20	±20	±20	±20	±20	
Observations	40	40	40	40	40	40	
Number of cities	2010	246	594	555	553	554	

\*: Significant at 10%; \*\*: 5%; \*\*\*: 1%. Robust standard errors in brackets. The dependent variable is computed as market establishments per year per 1,000 cities (Panel A) or market establishments *and* city incorporations per year per 1,000 cities (Panel B).

Table 5: Spatial endogeneity

Sample: Distance to a university city	$\geq 10$ km	$\geq 25$ km	$\geq 50$ km	not in the same territory
	(1)	(2)	(3)	(4)
<i>Panel A</i>				
Dependent variable:	Rate of market establishment			
Post	0.085 [0.812]	0.080 [0.811]	0.479 [0.793]	-0.011 [0.897]
Year	-0.061 [0.053]	-0.056 [0.051]	-0.049 [0.052]	-0.043 [0.059]
Year · Post	0.152** [0.074]	0.149** [0.071]	0.121 [0.073]	0.111 [0.079]
Constant	1.232* [0.619]	1.229* [0.623]	1.135* [0.566]	1.451* [0.716]
<i>Panel B</i>				
Dependent variable:	Rate of market establishment and city incorporation			
Post	0.117 [0.901]	0.041 [0.885]	0.565 [0.843]	-0.118 [0.999]
Year	-0.119* [0.062]	-0.115* [0.058]	-0.113** [0.054]	-0.108* [0.064]
Year · Post1386	0.203** [0.084]	0.208** [0.080]	0.185** [0.080]	0.178* [0.090]
Constant	1.786** [0.745]	1.754** [0.727]	1.558** [0.644]	2.062** [0.836]
Size of the window (years)	$\pm 20$	$\pm 20$	$\pm 20$	$\pm 20$
Observations	40	40	40	40
Number of cities	2242	2179	1966	1922

\*: Significant at 10%; \*\*: 5%; \*\*\*: 1%. Robust standard errors in brackets. The dependent variable is computed as market establishments per year per 1,000 cities (Panel A) or market establishments *and* city incorporations per year per 1,000 cities (Panel B).

Table 6: Placebo analyses

Sample:	Germany		Italy
	(1)	(2)	(3)
<i>Panel A</i>			
Dependent variable:	Rate of market establishment		
Post	-0.684 [0.441]	0.618 [0.863]	0.305 [2.581]
Year	0.065** [0.028]	-0.102** [0.050]	0.115 [0.097]
Year · Post	-0.068* [0.034]	0.098 [0.069]	-0.008 [0.236]
Constant	1.351*** [0.366]	1.260** [0.578]	2.521* [1.257]
<i>Panel B</i>			
Dependent variable:	Rate of market establishment and city incorporation		
Post	-0.327 [0.978]	0.943 [0.923]	—
Year	0.039 [0.065]	-0.125** [0.055]	—
Year · Post	-0.050 [0.085]	0.117 [0.077]	—
Constant	3.073*** [0.726]	1.439** [0.584]	—
Pivot year	1309	1417	1386
Observations	40	40	40
Size of the window (years)	±20	±20	±20
Number of cities	2256	2256	190

\*: Significant at 10%; \*\*: 5%; \*\*\*: 1%. Robust standard errors in brackets. The dependent variable is computed as market establishments per year per 1,000 cities (Panel A) or market establishments *and* city incorporations per year per 1,000 cities (Panel B).

Table 7: Careers of Graduates in Law

Career	Abs. number	% of sample
<i>Panel A: Tübingen graduates 1477–1534</i>		
Church (clergy)	1095	67.3
Academia	133	8.17
Public Administration	327	20.1
Other career	72	4.43
<i>Panel B: Tübingen and Bologna graduates 1477–1534</i>		
Church (clergy)	21	30.43
Academia	8	11.59
Public Administration	21	30.43
Other career	19	27.54
<i>Panel C: Bologna graduates 1070–1619</i>		
Church (clergy)	478	39.44
Church Administration	381	31.44
Academia	91	7.51
Public Administration	262	21.62

Source: Kuhn (1971); own tabulations based on Alidosi (1623).