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Origins of Impersonal Markets in Commercial and Communication Revolutions of Europe

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**Origins of Impersonal Markets in Commercial and
Communication Revolutions of Europe**

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Origins of Impersonal Markets in Commercial and Communication Revolutions of Europe*

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Abstract

Business in medieval ages relied on networks like guilds in Europe and clans in China. In the paper, I construct a dataset of medieval and early modern Europe, to understand how impersonal markets, where unfamiliar traders conducted business, emerged in sixteenth century Europe, and why restrictions on merchants for participation in trade reduced. I argue that in the fifteenth and sixteenth century Europe, closeness to sea ports, especially Atlantic ports, motivated traders to pursue partnerships with unfamiliar traders beyond their familiar networks. Also, during the same period, the mass availability of trade related printed books, and development of the within Europe postal system, helped in mass and peer-to-peer diffusion (horizontal communication revolution) of trade related information and business practices. Informative books like merchant manuals improved information access, and adoption of standardized practices like double-entry bookkeeping increased reliability in business exchange. Impersonal markets emerged in regions like Low countries and England, that benefited from both trade at the Atlantic coast and revolution in horizontal communication.

Keywords: Europe, printing, Atlantic sea, history

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I Introduction

Late fifteenth century and sixteenth century was a period of great changes in Europe. The Iberian Peninsula pioneered the discovery of new sea routes to Asia and Americas; the Germanic regions developed a printing culture that influenced knowledge production and culture; and renaissance ideas of Italy diffused elsewhere promoting rationalism and scientific enquiry. But of all places, it was Northwest European region of England and Low Countries that underwent transformational change. In the region a bourgeois culture emerged (McCloskey (2015), Chapter 54), which respected both profit and innovation (Mokyr (2016), p. 17) and cities like Antwerp, Amsterdam and London, became centres of institutional and business innovation that have influenced the modern world. For example, one of the first permanent commodity bourses was established in Antwerp in 1531, the first stock exchange emerged in Amsterdam in 1602, and joint stock companies became a promising form of organizing business in London in late sixteenth century. The sixteenth century transformation was followed by the seventeenth century Dutch Golden Age, and the eighteenth century English Industrial Revolution. What made the Northwestern Region of Europe so different, remains a central question in social sciences, with scholars from diverse fields (Weber, 1905; North, 1990; Padgett and Powell, 2012; McCloskey, 2015) researching the subject.

Several institutional and cultural factors made the Northwest European region unique. *Inclusive political institutions* of the region limited coercive powers of rulers (North (1990), p. 130; Acemoglu, Johnson and Robinson (2005)), and *impartial market based institutions* of its cities began to serve the interests of all businessmen rather than a particular few (Ogilvie (2011), p. 33; Gelderblom (2013)). The *bourgeois intellectual culture* of the region promoted discovery, entrepreneurship and innovation (McCloskey (2015), Chapter 58; Mokyr (2016), p. 17), and due to its cosmopolitan *business friendly popular culture* profit making ceased to be a taboo (McCloskey (2015), Chapter 58).

In this paper I explore what led to the rise of the unique institutional and cultural characteristics of the Northwestern region? Until the end of fifteenth century, impartial institutions like courts and police that serve all parties generally, so ubiquitous today in the developed world, weren't well developed in Europe (Ogilvie (2011), p. 187). In such a world without impartial institutions, trade often was (is) relationship based and conducted through networks like guilds (Greif, Milgrom and Weingast, 1994). Relationship based trade through networks of high closure (Burt, 2001) reduced concerns of information access and reliability. Guilds were non-kinship based networks that dominated European trade, like the kinship-based networks of caste in India, clan in China and tribes

in Arabia. But, in the sixteenth century Northwestern Europe, the guild system began to lose its significance as more impersonal markets began to emerge (see Region 1 of Figure I). The traders began to rely less on networked and collective institutions like guilds, and directly initiated partnerships with traders who they didn't know too well. For example, in Antwerp the domination of intermediaries (called hostellers) who would connect foreign traders declined. Instead, the foreign traders began to conduct such trades directly with each other in facilities like bourses (Gelderblom (2013), p. 58). Ogilvie (2011) noting the change in nature of economic exchange wrote (p. 433):

the guild-dominated societies of Italy, Iberia and German-speaking central Europe were unable to adjust to rapid institutional, commercial and demographic changes of the sixteenth century. They lost out to the market-oriented civic culture of the Low Countries and England with their increasingly impersonal markets and impartial states, which encouraged forms of generalized trust that favoured adaptation and growth. The weakening of the particularized trust generated by associative institutions such as merchant guilds created interstices in English and Dutch society within which people could experiment with generalized trust in strangers mediated by impersonal markets and impartial states. This cannot be regarded as an accident.

[Figure 1 about here.]

In the paper, I study the emergence of impersonal markets of Europe during the sixteenth century. I survey the 50 largest European cities during fourteenth to sixteenth century (Figure I) and codify the nature of sixteenth century economic institutions in each of the cities. In the survey I find that guilds were declining in the Northwestern region of Europe, while elsewhere in Europe they continued to dominate commerce until much later¹, although there were some reforms underway in the Milanese and Viennese regions of Italy.

What explains the observed pattern of emergence of impersonal markets in sixteenth century Europe? I focus on the interaction between *commercial and communication revolutions* of the late fifteenth century Europe. In the paper I argue that Northwest European region uniquely benefited from both the revolutions, because of its unique geography.

What motivated traders to seek risky opportunities beyond close networks? If traders found partnerships with unfamiliar traders beyond their business networks to be highly

¹Outside of Europe, business in India, East Asia and Arabian Peninsula continue to be based around kinship based networks of *Jati* (caste), clans and tribes respectively.

beneficial, that would provide good incentives for rise of impersonal markets. The North-western Region was close to the sea, and especially the Atlantic coast, which was undergoing a commercial revolution with discovery of new sea routes to Asia and Americas. So, the region became a hub for long distance trade, attracting unfamiliar traders who would come to its coast looking for business opportunity. I find that all cities where guild privileges declined were at the sea and along the Atlantic and North Sea coast. Moreover, all cities where guilds underwent reform (but didn't decline) were within 150km from the sea port, with their average distance being 67km. The average sea port distance of cities that didn't undergo reform was almost double at 125km.

What made traders feel confident about reliability of such risky impersonal partnerships? If availability of trade related information and business practices improved, it could increase confidence traders had in such unfamiliar partnerships. In the sixteenth century, the postal system improved across Europe (Figure XII). The postal system made communication between distant traders easier, helping in long distance trade across Europe. While the Northwest European region didn't have a particular advantage over other regions in postal communication, it had an advantage in early diffusion of printed books. The Northwest European region was close to Mainz, the city where Johannes Gutenberg invented the movable type printing press in mid fifteenth century. Dittmar (2011) showed how cities close to Mainz, adopted printing sooner than many other regions of Europe in the first few decades of its introduction. So, trade related books and new (or unknown) business practices like double-entry bookkeeping diffused early and rapidly in the region (Puttevils, 2015; Chatfield and Vangermeersch, 2014). Such a high penetration of printed material reduced information barriers and improved business practices. I find that all cities where guild privileges declined or guilds underwent reform in the sixteenth century, enjoyed high penetration of printed material in the fifteenth century. Among cities within a 150km distance from sea, cities where guilds declined or reformed had more than twice more number of diffused books per capita than cities where guilds continued to dominate. A city at the Atlantic coast with four times more per capita printing penetration in the fifteenth century was one degree higher in level of impersonalization² in the sixteenth century. As a comparison, there were four impersonalizing cities- Hamburg, London, Antwerp and Amsterdam, while there were four relationship based cities- Lisbon, Seville, Rouen and Bordeaux as major Atlantic ports in the sixteenth century. The fifteenth century per capita printing penetration of the cities would stack as- Lisbon (0.81 books per 1000 population (bptp)), Bordeaux (1.44 bptp), *Hamburg* (3.69 bptp), Seville (4.57 bptp), Rouen (8.11 bptp), *London* (9.33 bptp), *Amsterdam* (14.29 bptp) and *Antwerp*

²Levels of impersonalization: 0 = Relationship based, 1 = Undergoing Reform, 2 = Impersonalizing

(24.92 bptp)

The combination of both the commercial revolution along the sea coast, especially Atlantic coast, and the communication revolution, especially near Mainz, uniquely benefited the Northwestern Europe. Regions like Spain and Portugal that benefited only from the commercial revolution of trade through the sea to Asia and Americas; or regions like Germany, Italy and France that benefited only from the the communication and print revolution, didn't enjoy the unique combination of both benefits.

II A brief survey of commercial history of Europe

Beginning around the twelfth century, craft and merchant guild system emerged in Europe. Guilds were dense non kinship based networks of organized and specialized artisans and traders. Craft guilds engaged in secondary activities, while merchant guilds engaged in tertiary retail and wholesale trade.

Merchant guilds were effective ways of organizing trade in regions lacking in formal legal institutions. Guild networks were valuable conduits of information, and merchants would use their "guild mysteries" to maintain competitive advantage (Ogilvie (2011), Chapter 9). Guilds also helped in close monitoring and repeated interaction between traders (Greif, Milgrom and Weingast, 1994; Gelderblom and Grafe, 2010). Such repetition and monitoring helped European merchants expand their circle of trade beyond ties of kinship, which were the predominant networks tapped for trade in most societies. The contrast between kinship based organization of trade in China and guild based organization of trade in Europe has been richly described by Greif and Tabellini (2015).

A wide range of relationship based mechanisms (private³, third party⁴ and community based⁵) could be applied by guilds to reduce cheating by traders. Guilds also helped in development of public goods such as warehousing and protective convoys that helped in trade (Gelderblom and Grafe, 2010).

Not surprisingly, because the guild system functioned efficiently in absence of strong formal institutions, it sustained in Europe for several centuries. In developing countries

³Merchant guilds in Europe and kinship networks elsewhere (and Europe) were sustainable economic institutions as they provided an effective mechanism for monitoring and punishing opportunism (Greif, Milgrom and Weingast, 1994). The monitoring and punishing methods are considered *private mechanisms* that individuals can privately use to constrain a partner from cheating.

⁴A *third party* (like ruler) can identify and punish cheaters by improving contract enforcement (or law and order) (North, 1990; Milgrom, North and Weingast, 1990).

⁵A *community mechanism* of community responsibility system (Greif, 2006) enables impersonal exchange between traders as long as their community identities are known. In the community responsibility system cheating behavior by one member of a community follows sanctions on the entire community by the members of the community of the cheated partner.

like India lacking in developed formal institutions networked institutions like caste still play an important role in business. Before the fourteenth century merchant guild networks were probably non-hierarchical, voluntary and inclusive. But, with time merchant guilds started to become exclusive monopolies, placing high barriers of entry for outsiders (Ogilvie (2011), Chapter 5). There are two reasons for the high barriers to entry. Firstly, as repeated committed interaction was the key to effectiveness of guilds, uncommitted newcomers could behave opportunistically and undermine the system. So, newcomers faced restrictions. Secondly, the newcomers also threatened the position of existing businessmen by increasing competition. So, even genuinely committed newcomers could be restricted to enter as they threatened the domination of existing members. For example, Gelderblom and Grafe (2010) classified merchant guilds (in Amsterdam, Antwerp, Bilbao and Bruges) on the basis of control they could extend over individual merchants, and their classification showed that up to and especially in the fifteenth century merchant guilds were no longer voluntary institutions and began to resemble almost like cartels (their analysis shows a clear reduction in control of guilds over individual merchants after (not during) sixteenth century). Given, the influence of guilds, authors such as Ogilvie (2011) have looked at the redistributive role of merchant guilds, and provided an account of close relationship (nexus) that developed between merchant guilds and rulers. Gelderblom and Grafe (2010) in their analysis argued that potential to obtain rents through monopoly was one reason why individual members were interested in delegating more control to guilds.

Given the dominance of guilds in the market, merchant guilds were also a favored channel for local rulers to raise taxes (Dessí and Ogilvie, 2004). But, such exclusionary guild monopolies meant that large fraction of potential traders was left out. European cities overtime got divided into prosperous merchant guild members and non-members (Ogilvie (2011), Chapter 3, 4).

The merchant guild system started to decline from sixteenth century in Low Countries and England. The direct reason for the decline was the change in preferences of rulers. The rulers in sixteenth century would no longer approve requests for monopolies by local or overseas merchant guilds (Ogilvie (2011), p. 187). As monopolies of guilds were removed, trade opened up for other individuals interested in trading. What motivated rulers to stop favoring merchant guilds still remains a puzzle (Ogilvie (2011), p. 187). Moreover, why did the shift happen only in the sixteenth century and especially in Low Countries and England?

In the sixteenth century, Low Countries and England started to move towards impersonal and impartial institutions. Traders conducted trade in impersonal markets which

were supported by institutions like courts that served all parties. So, the period around sixteenth century saw two systems of economic organization. First was the prevailing relationship based system dominated by merchant guilds where business interactions were limited to dense networks. Even when guilds interacted with outsiders, they did so with members of other guilds, such that if there was any conflict it was resolved between guilds collectively. The second form of economic organization was the emerging impersonal system where traders sought partnerships with unfamiliar traders beyond their existing networks. *How did impersonal exchanges occur reliably? Could a ruler by establishing impersonal and impartial institutions like courts unilaterally develop impersonal markets?* In other words, were the two systems of economic organization just a matter of choice for the ruler?

Even if a ruler could provide for impersonal and impartial institutions, it would not eliminate the risks and temptations of cheating in impersonal business transactions, and the costs associated with resolution of conflicts. Given the risks in partnership with unfamiliar traders, the partnerships would need to be highly beneficial to motivate traders to go beyond their familiar and reliable networks. Also, regardless of the potential benefit of partnership, traders would also need to have confidence in entering in exchange with unfamiliar traders⁶.

Given the challenges associated with emergence of an impersonal system of trade, I propose the following potential trading systems:

1. *Relationship Based System*: When impersonal exchange is not highly beneficial compared to exchange with familiar contacts, impersonal exchange doesn't occur because of poor incentives. Similarly if reliable trade related information is not available or business practices that make trade more reliable don't get adopted, impersonal exchange doesn't occur because of lack of confidence in partnership. In absence of an incentive and confidence, a ruler does not provide for impersonal and impartial institutions, as relationship based system is more efficient.

⁶Ogilvie (2005) pointed at the challenges and argued that markets in regions like Low countries were supported by a "market oriented civic culture" , where traders could trade with each other reliably. McCloskey (2015) looked at cultural attitudes of early modern English texts (although after 1600s) and discussed how the meaning of the word "honest" changed from being a noble to being truthful (Chapter 25). She wrote "In English our bourgeois word "honest" once meant not mainly "committed to telling the truth" or "paying one's debts" or even "upright in dealing," but mainly "noble, aristocratic," or sometimes "dignified," in a society in which only the noble were truly dignified.". Similarly, Sahle (2015) looked at merchant advice manuals and argued that ethics were an important part of both Quaker and non Quaker merchant advice manuals (Quakers are a religious group that were credited to have high standards of ethics in business dealings) and emphasized "virtues of honesty, reliability and risk adversity and warn of the same vices, particularly covetousness."

2. *Undergoing Reform*: When impersonal exchange is beneficial compared to exchange with familiar contacts, there are good incentives for impersonal exchange. If reliable trade related information is also available or business practices that make trade more reliable also get adopted, impersonal exchange can occur. If the benefit from such impersonal exchange is not disruptively large, then existing relationship based institutions like guilds may reform and make themselves more competitive and efficient.
3. *Impersonalizing System*: If the impersonal opportunities are disruptively beneficial and there is availability of trade related information and adoption of standardized business practices, relationship based system becomes less efficient. So, the ruler could be motivated to invest in impersonal institutions.

Did the commercial and communication revolutions of Europe create the conditions in sixteenth century that motivated rulers in Northwestern Europe to disband the merchant guilds and establish impersonal institutions?

III Emergence of Bourgeois Culture in Low Countries and England

Medieval European merchant guilds traded in temporary fairs, of which the Champagne fairs of Northern France were the most prominent. In the thirteenth century, the Champagne fairs declined as a trading place, when its rulers began to exploit the visiting traders. After the decline, the neighboring local rulers of Low Countries began to attract the international merchants who traded at Champagne (Gelderblom (2013), p. 14). The international merchants eventually began to cluster in emerging cities of Low Countries in cities like Bruges and Antwerp. The visiting traders began trade with the help of local hostellers and brokers, who acted as intermediaries between unfamiliar traders (Gelderblom (2013), p. 43).

III.1 The changing Atlantic coast

In late fifteenth century, discovery of the new sea routes to Asia and Americas during commercial age opened up Atlantic shores for beneficial long distance trade (Davis (1973), Chapter 2). As Low Countries shared a coastline with the Atlantic, the already booming inland trade of Low Countries, grew even more with long distance sea trade, bolstering the region's (including England) position as the leading cluster of international trade in

Europe. Many footloose international merchants, who would previously visit the cities for short durations, began to settle in the cities (Gelderblom (2013), p. 58). This led to a large increase in city populations as reflected in historical population estimates. The new population would like to enjoy greater freedom and not rely on local and increasingly influential brokers and hostellers as intermediaries for networking and trade (Gelderblom (2013), p. 58). Also, observing the newly found opportunities in long distance trade, middle-class non-merchants in Low Countries and England also began to aspire to enter the profession. They also found guild monopolies to be restrictive for their aspirations to build new business networks (Ogilvie (2011), p. 188). If the non-guild members wanted to trade with long distance traders they needed alternative impersonal channels other than guilds.

But, participation in impersonal markets was not only limited by monopolized guild networks but also by frictions like information access and moral hazard. Fifteenth century was a period with underdeveloped impartial legal systems and contract enforcement (Ogilvie (2011), p. 33). Economic information available to aspirational traders was opaquely available which was tightly controlled by merchant guilds (Ogilvie (2011), Chapter 9). Moreover, there was an uncertainty regarding reliability of other traders, which was the prime reason why hostellers and other intermediaries were so dominant⁷. The frictions of information and transparency made making a large shift to impersonal interaction not feasible. So, the economy remained punctuated in a relationship based equilibrium where although a larger section would like to trade in impersonal markets with unfamiliar traders, but traders lacked confidence in unfamiliar partners as markets were of unknown reliability.

III.2 The development of postal network

During the end of fifteenth century, just as Europe was undergoing commercial revolution, it was also undergoing a communication revolution. The postal system was connecting the major trading cities of Europe, including the Northwestern region by the end of the fifteenth and the start of the sixteenth century. The development of postal networks in

⁷Some of the long distance relationships could be repeated which resolved moral hazard problems by creating ample incentives for partners to trade with each other again. A repeated exchange was the classic way in which long distance trade has been described to have been organized by “individualist” Genoese merchants in contrast to “collectivist” Maghrib merchants (Greif, 1994). But, several transactions did not involve such long sustained interactions. For example, new unestablished traders did not have well developed long term relationships they could leverage on to enter in long distance exchange. So, many traders would have liked to build new networks which was difficult in absence of confidence in other unknown traders.

the end of fifteenth and sixteenth century was useful in expanding the circle of contacts, as it helped establish lines of long distance communication⁸. A look at the map of early modern postal network in Europe, based on Giovanni da L'Herba's 1563 travelogue (see Appendix Figure XII), shows that the postal system was already well developed by the middle of the sixteenth century in Western Europe, extending between Italy, Low Countries and Iberian Peninsula and crisscrossing France and Germany. The map does not include important centers like London, where there were private arrangements for letter communication⁹. So, while individual post offices may not have been established in every major city of Europe, because of a strong backbone of within Europe postal network (thanks to the Taxis), the already existing postal network ensured that the service could be arranged for traders and cities in need for long distance communication. In previous centuries a developed within Europe postal network did not exist and it made communication difficult¹⁰. So, the development of within Europe (and international) postal network enabled traders across Europe to seek and communicate with long distance partners.

III.3 The diffusion of printed material

At the end of fifteenth century, another important breakthrough in communication was the invention of movable type printing press. High levels of diffusion of books in London, Antwerp, and other Low countries cities, that got triggered in the fifteenth century, made best practices like double-entry bookkeeping and new information regarding trade available with the availability of printed books (Puttevils, 2015; Chatfield and Vangermeersch, 2014). The unique aspect about diffusion of information in post-printing era was that information mass diffused horizontally among peers, and not just vertically by parents, teachers and other authorities.

Why did London, Antwerp, and other Low countries cities adopt printing early? These cities were some of the closest non-German cities geographically to Mainz, the city where the movable type printing press was invented by Gutenberg (Dittmar, 2011). Dittmar (2011) argued that the movable type printing press was heavy to transport and difficult to build without the small group of apprentices who knew how it was built. So, the cities closer to Mainz got the printing press earlier than others in first few decades of introduction of printing (1450s to 1500s), and such cities were early to print books that

⁸Thanks to Prof. Joel Mokyr for pointing out the significance of postal networks.

⁹In 1496 Henry VII granted the liberty to establish private postal service in London (Daybell (2012), p. 137).

¹⁰See Schobesberger et al. (2016) for a more detailed look at European postal networks in the early modern period.

appealed to merchants.

A look at the Universal Short Title Catalogue (USTC) curated at University of St. Andrews, for Economics related books, shows the Mainz centric diffusion pattern in early decades of printing:

- The first book related to Economics according to USTC, *De contractibus mercatorum* or “On the contracts of Merchants” was printed in Cologne in 1468 by Johannes Nider. For the next 10 years, all the economics related books were printed in German speaking regions of Cologne, Strasbourg (1493), Basel (1475) and Esslingen (1475) (each of which were close to Mainz), with Rome (1473) being the only exception.
- In the subsequent decades, cities in Low Countries also began printing books related to Economics in Bruges (1477), Brussels (1485), Louvain (1485), Antwerp (1487), Zwolle (1488) and Gouda (1489).
- French cities of Lyon (1488), Paris (1493) and Provins (1496) also began to print such books eventually. In the early sixteenth century London (1504) emerged as a printing center for economics related books.
- Economics related books in Italian cities began getting printed in Venice (1503), Pavia (1505) and Bologna (1507) in early sixteenth century according to USTC catalogue. But, even if economics as a special category emerged late in Italy, the volume of printing of books in related categories like mathematics was large in the region, with notably the book on double-entry bookkeeping by Luca Pacioli being printed in 1494 in Venice.
- While Polish and Czech cities eventually began to print economics related books from 1522 in Wroclaw and 1525 in Prague, but Spanish cities don't find a mention in the catalogue.

Of all European cities Antwerp (105 books till 1550) and London (72 books till 1550) emerged as two of the major cities in printing of Economics related books (Paris being third with 52 books till 1550). The Northwestern Region had other important centers for printing of economics related books other than Antwerp and London, including Cologne (50 books till 1550), Ghent (41 books till 1550) and Amsterdam (10 books till 1550). German, French and Italian cities like Strasbourg, Augsburg, Lyon and Venice continued being other important cities for production of Economics related books. In Antwerp, adapted works of Luca Pacioli by Jan Ympyn Christoffels where he illustrated bookkeeping, were printed in Dutch (*Nieuwe instructie*) and French in 1543 (*Nouvelle instructie*), and in English (*A notable and very excellent woorke*) in London in 1547.

Summarizing the effect of printed books on business culture of Antwerp, Puttevils (2015) wrote:

Sixteenth-century Antwerp served as a training ground and test site for commercial techniques and know-how as a result of the concentration of representatives of all European traders in one city. Low Countries merchants showed themselves eager students: they were trained by foreign merchants in Antwerp and abroad (either Low Countries expats or citizens of particular cities) and Antwerp's printing presses. Antwerp was one of the most important book production centres in sixteenth-century Europe produced so-called *Ars Mercatoria* guides or 'Doing business for dummies'. So, Low Countries merchants could easily pick up information on Italian-style accounting, letter writing, mathematics, business techniques such as the bill of exchange and languages. This training allowed them to catch up with the most recent techniques but it did not give them an advantage over their competitors who were familiar with the same techniques.

Similarly Van der Wee (2013) described how double-entry bookkeeping was popularized and taught in Antwerp and elsewhere (p. 331):

...the printing press made the considerable distribution of commercial manuals possible. Even amongst ordinary merchants, training in Italy or elsewhere abroad became an established practice. So far double-entry bookkeeping had been limited to Italian firms. During the sixteenth century mainly under the influence of Antwerp, this technique was popularized and conquered commercial circles in Germany, the Low Countries, France, England and even in the Hansa centres. P. Savonne, Fr. Flory and J. Ympyn were famous Antwerp teachers of the practice of double-entry bookkeeping and published important manuals on the subject there.

So, because of printing of books and manuals in Economics and other related subjects, mysteries of guilds on techniques of trade were no longer secrets, and there was a greater education on the art of trade, including the teaching of standard skills like double-entry bookkeeping. With better availability of information, and with adoption of practices like bookkeeping, the reliability of traders increased. More transparency in information and business practices motivated a new class of traders to join trading in an impersonal setting.

Increasing pressure from footloose merchants and the rising influence of a middle class not part of guilds, bolstered by (i) large benefits of trade at the Atlantic coast, (ii) learning of trade related information and new business practices and (iii) more frequent long distance postal contacts, provided good conditions for impersonal interaction to emerge and be sustained. Rulers began to disfavour privileged monopolies when they realized the feasibility of impersonal exchange and that they could have superior sources of revenue from impersonal markets. Good fiscal health in some regions (England and Netherlands) further (through confiscation of church land in newly Protestant areas (Ogilvie (2011), p. 188) ensured that they had enough coffers to risk the shift. To build proper institutions for supporting impersonal exchange, rulers also improved impartial legal institutions that significantly reduced the risks of such a trade. So, an agglomeration of footloose migrants and aspirational locals in England and Low Countries, accelerated by the presence of horizontal communication and long distance trade, motivated rulers to prefer impersonal markets and associated impartial legal institutions over the medieval relationship based arrangement.

III.4 Iberian Peninsula: Trade by Elites

Other regions of Europe did not have conditions as favorable as Low Countries and England. Spain and Portugal had a long Atlantic coast and commercially advanced cities with postal networks. Cities like Seville grew rapidly in the sixteenth century due their position near the Atlantic coast. But, printing did not penetrate deep in the region early on. Being distant from Mainz the region wasn't an early adopter of printing. So, the diffusion of printed books was low with limited availability of trade related information (guild mysteries) and of business practices. For example, the first book on double-entry bookkeeping in Spanish only was published in Madrid in 1590 by Seville based Bartolom Salvador (Edwards (2013), p. 68), when such accounting books in Dutch, French and English were written much earlier by 1540s by Ympyn, and the original book by Pacioli in Latin in 1494.

Given the traditional information barriers and reliability issues, guilds continued to be an effective system. So, rulers continued to favor merchant guilds that held onto their privileged positions in the economy, as impersonal exchange couldn't emerge as a credible alternative to challenge the guild based system of the region. In fact many Spanish cities competed to receive guild privileges in late medieval period (Smith, 1940), and cities like Sevilla further tightened their requirements (20 years residence) on who could undertake trade in the city (Ogilvie (2011), p. 54).

Figure I shows the geographic advantage cities in Northwestern Europe (Region 1) had over other cities because of their proximity to the Atlantic coast, as well as from the city of Mainz. Spanish and Portuguese cities, on the other hand, were close to the Atlantic coast but were distant from Mainz (Region 3).

III.5 Northern Italy and Germany: Absence of Incentives

Northern Italy, provided another relevant case in contrast to Spain and Portugal. The region had well developed postal network (Schobesberger et al., 2016). The region also had a high penetration of printed books by late fifteenth century, with several commercial books being printed in several cities. There was a higher awareness regarding standardized business practices, which were being popularized by printing and shared by merchant letters. In fact, revolutionary financial innovations like double-entry bookkeeping were developed in the region and diffused to rest of Europe from there, like Luca Pacioli's 1494 book on bookkeeping in Venice being adapted by Jan Ympyn Christoffels in Antwerp. But, opportunity from impersonal exchange in Northern Italy was not disruptive enough, as the region was already at the center of Mediterranean and Land trade to Asia (so, having powerful guilds), while not at the geographic forefront of trade to Americas and Asia through the Atlantic route. So, while in the region trade related information and standardized business practices were popular, but, impersonal trading opportunities were not disruptive enough (Region 2 of Figure I). So, merchant guild elites could initiate reform that made opportunities from relationship based guild system more beneficial and avert the potential challenge of emergence of impersonal exchange. In the North Italian region, especially in Venetian and Milanese clusters, there were reforms going on during the sixteenth century (Epstein (2004), pp. 301, 308). Merchant guilds held onto their power in the regions (Ogilvie (2011), p. 53), but traders and producers from the countryside like the silk producers of village areas of Milanese Lombardy, got more concessions from urban elites (Epstein (2004), p. 308).

In North Germany, the relevance of sea coast on institutional outcomes is even starker. Lubeck and Hamburg were the two prominent cities of North Germany. The two cities are situated close to each other, both of which were part of the Hanseatic league of prominent German trading cities. One key geographic difference between the two closely situated cities was, while Lubeck was on the Baltic coast, Hamburg was on the Atlantic coast. Both the cities had established printing presses, although it was Lubeck which emerged as the larger trading and printing hub. Baltic facing Lubeck in the sixteenth century not only continued with the merchant guild privileges, it further made them more entrenched. In

contrast, Atlantic-facing Hamburg (located in Region 1 of Figure I) became more impersonal, and dismantled the monopoly privileges merchant guilds enjoyed (Ogilvie (2011), p. 87). Rest of German cities as well as major towns in French inland also continued to have dominant merchant guilds despite high levels of printing penetration, as they were distant to the beneficial long-distance sea trade, especially the Atlantic coast.

Considering Figure I, in sixteenth century; Northwestern Europe with high printing penetration and an Atlantic coast fell in Region 1, which was favorable for emergence impersonal markets; Northern Italy with high printing penetration but no Atlantic coast fell in Region 2 which was favorable for relationship based systems undergoing reform; and Spain and Portugal and most of the Europe, because of having either low rates of printing penetration or poor opportunities for long distance trade, fell in Region 3, which had persistent relationship based systems. So, considering different regions of Europe, historical evidence suggests, different intensities of trade opportunity (which affected incentive to trade) and printing penetration (which affected frictions in conducting trade) led to different outcomes in different regions of Europe.

Can we observe such patterns in the data collected from medieval and early modern Europe?

IV Empirical Study: Why impersonal markets emerged?

IV.1 General Theory

In sixteenth century different regions of Europe developed different types of economic institutions. The theory suggests that an area was better placed to have impersonal markets or to undergo reform in sixteenth century if the area enjoyed both, large benefits from impersonal exchange, and high information access and diffusion of new business practices. Otherwise the area had relationship based institutions.

So, the basic hypothesis can be expressed as an OLS model:

$$Inst_a^{1600} = \alpha + \beta_1 Opp_a + \beta_2 Communication_a + \beta_3 Opp_a X Communication_a + \epsilon_a \quad (1)$$

where $Inst_a^{1600}$ is the nature of economic institutions in sixteenth century in a given area a , Opp_a is the size of benefit from impersonal exchange, $Communication_a$ is the size of diffusion of trade related information and business practices. I expect only coefficient β_3 (the interaction) to be sizable and significantly positive. If in an area impersonal exchange

was disruptively beneficial (code it as a dummy $dDisrupt_a = 1$), then we expect that area had a higher probability of having impersonal markets. So, we expect to observe a larger effect of $Communication_a$ on $Inst_a^{1600}$ in areas with $dDisrupt = 1$.

To understand the puzzle of transition, we first need to identify the nature of business interactions in different parts of Europe in sixteenth century. Secondly we need to find good proxies that can measure size of benefit of impersonal exchange and level of adoption of standardized practices. We can then explore the relationship between the proxies and nature of business interactions.

IV.2 Data: Nature of economic institutions, impersonal or not?

To explore the nature of business interaction in Europe, European cities provide a good testing ground. Merchant guilds in Europe were associated with particular cities. The German Hansa, was an example of a regional association between merchants, but even the Hansa was a federation of different cities. What was the nature of economic institutions in sixteenth century in the largest cities that dominated Europe between fourteenth and sixteenth century? Did they allow for impersonal marketplaces?¹¹ The largest cities of Europe provide a good snapshot of commercial life of Europe, as the largest cities would also be the business or political centers. Tables VII, VIII and IX in Appendix A.1 list down the largest cities of Europe in fourteenth, fifteenth and sixteenth century respectively as listed in Bairoch, Batou and Chevre (1988), a historical data source on city level population of European cities.

Looking at secondary historical information on each of the 81 cities, I coded the nature of economic institutions of the cities, with cities coded as Relationship based (R), Undergoing Reform (U) and Impersonal (I) depending upon whether a city restricted trade to particular groups. The coding criteria is detailed in Table I. Based on the coding criteria, Table X in Appendix A.2 details the nature of economic institutions in each city based on historical sources. Figure II maps the cities based on their coded type.

[Table 1 about here.]

[Figure 2 about here.]

Genoa (coded as I1) was an exceptional city¹², as through out history the city allowed all citizens to trade freely, with liberal requirements for citizenship (Ogilvie (2011), p.

¹¹See Gelderblom and Grafe (2010) for a detailed discussion of guild institutions in cities of Amsterdam, Antwerp, Bilbao and Bruges.

¹²Greif (1994) modeled the impersonal nature of trade in Genoa as a repeated one sided prisoner's dilemma game.

53). All other cities restricted who could trade in the city, and just a handful of cities in Northwestern Europe were impersonalizing during sixteenth century period (coded as I2). Genoa being always an impersonal city, I do not include it in the dataset. The cities undergoing reform were found in North Italy and Low Countries (coded as U1, U2 or U3), where guilds eased restrictions of trade for locals without losing their monopolies. In rest of the cities (coded as R1, R2 and R3) either guilds enjoyed monopoly privileges or else the system of trade was feudal. Variable $Inst_a^{1600}$ measures the level of impersonalization of economic institutions in sixteenth century in a given city. I code $Inst_a^{1600} = 2$ for all impersonalizing cities with coding I2, and cities undergoing reform with code U1, U2 and U3 have $Inst_a^{1600} = 1$. Other cities coded as relationship based (R1, R2 and R3) have $Inst_a^{1600} = 0$.

IV.3 Data: Sea distance as a proxy for impersonal opportunity

Closeness to sea is a geographical characteristic, where cities closer to the sea have natural advantages for long distance trade. Being a long distance trader in the relationship based system required extensive networks, which was especially difficult for immigrants, small and aspirational traders. In such a scenario, if impersonal exchange could be developed i.e. if unfamiliar partners could be generally trusted and relied upon, the benefits from such an impersonal exchange was large as immigrants, small and non traders (traders in the model) could enter in partnerships with each other and engage in long distance trade. So, European cities that were close to sea were suitable for long distance trade and can be expected to find partnership with unfamiliar traders more beneficial.

Acemoglu, Johnson and Robinson (2005) listed down 166 cities that acted as Atlantic and Mediterranean ports of Europe. I calculate the distance of each city a in my database to the nearest Atlantic or Mediterranean port ($PortDist_a$) (see Figure III). I also calculate the closest distance from sea ($SeaDist_a$), and for cities which were closer to Baltic Sea (Plovdiv, Poznan, Prague and Wroclaw) or were Baltic Ports (Leubeck, Gdansk and Copenhagen) I use the distance from sea as a measure instead of distance from Atlantic Port. I square root transform the combined variable $SeaPortDist_a$ and invert to make it an increasing positive variable ($SeaPortCloseness_a = constant - \sqrt{SeaPortDist_a} \geq 0$) representing closeness to Atlantic or Mediterranean port or Baltic sea, to be used as a proxy for Opp_a .

Mediterranean sea acted at the centre of European long distance trade until the discovery of new Atlantic routes to the Americas and Asia, during fifteenth century. For early modern Europe, the discovery was disruptive as it opened trade in newer lands

and of newer commodities (Acemoglu, Johnson and Robinson, 2005). Cities that were Atlantic ports, can thus be expected to enjoy a disruptive opportunity for long distance trade. If a city was an Atlantic port or it was close to an Atlantic Port ($PortDist_a < 50km$), I label a city close to Atlantic port as a city enjoying disruptive opportunity and code $dNearAtlantic_a = dDisrupt_a = 1$.

IV.4 Data: Printing penetration as a proxy for diffusion of new information

Impersonal exchange was not just limited by lack of beneficial opportunities. Information was opaquely available and there existed a general doubt about reliability of unfamiliar traders. Better communication technologies could have helped.

Printing was a disruptive technology (Dittmar, 2011) as it reduced cost of acquiring information and triggered the rise of horizontal communication. Unlike the postal system that could easily diffuse (thanks to the extensive network) and be served by formal (the Taxis of Europe) and informal (like the arrangement in London) arrangements, the printing technology was not as easily diffusable. Commissioning of a movable type printing press required experts that were not abundantly available (Dittmar, 2011). So, cities that got an early head start in availability of printed books could affect the access traders had to trade related information and new business practices. So, a city that had higher printing penetration in fifteenth century, can be expected to have been better availability of information regarding trading practices among its residents. To estimate penetration of printed material in the 81 cities in the database, I use database on early printing in Europe. There are several printing databases, with minor differences. I rely on *Gesamtkatalog der wiegendrucke* (GW) database to build my database of early printing cities and the penetration of printing material.

I characterize a city in the GW database as a printing city if it printed more than 10 books until 1500 (see Figure IV). As books were not geographically bounded, books printed in one city b were being read in another¹³. For example the book called *Summa de arithmetica* by Luca Pacioli that gave the first printed description of double-entry book-keeping was printed in Venice in 1494, but it quickly became popular across Europe. But, one can assume that more populous cities and closer cities would have better availability of books from a city b than others.

Could it be that some printing hubs were printing books with a target audience in a geographically distant region? Like German books being printed in Venice? USTC cata-

¹³Thanks to Prof. Joel Mokyr for pointing out that books were being traded between cities.

logue lists language of printed books. I find that a negligent proportion of books printed until 1500 were being printed in a language that was neither local nor Latin. For example out of 3692 books printed in Paris until 1500 (according to USTC) only 6 were printed in Dutch, the maximum for a non local language. Similarly out of 3570 books printed in Venice until 1500 (according to USTC), 5 were printed in German, the maximum for a non local language.

I use a gravity model to estimate printing penetration in the 81 cities of interest. If one of the 81 cities a with population $Pop1500_a$ and one of the 121 printing cities b printing B_b books, were having a distance d_{ab} , then per capita printing penetration in the city a by books from city b , $PrintIndex_{ab} = \frac{B_b}{d_{ab}^2 (\sum_{i=1}^{81} \frac{Pop1500_i}{d_{ib}^2})}$, where $\frac{Pop1500_c}{d_{cb}^2} / \sum_{i=1}^{81} \frac{Pop1500_i}{d_{ib}^2}$ represents the relative influence (mass) of a city a relative to b . When the printing city was the city itself ($b=a$), I normalise $d_{ab} = 1$. So, the total printing penetration in the city a because of all printing cities (121 in total) was $PrintIndex_a = \sum_{j=1}^{121} \frac{B_j}{d_{aj}^2 (\sum_{i=1}^{81} \frac{Pop1500_i}{d_{ij}^2})}$ books per 10000 population (bptp). I log transform the variable to $PrintPentr_a = const + \ln(PrintIndex_a) \geq 0$, to use it as a proxy for trade related information access and diffusion of business practices ($Communication_a$) (see Figure V). I also count number of print cities in a 50km radius $PrintCity50km_a$, for a city a , and use it as an alternative measure of printing penetration.

[Figure 3 about here.]

IV.5 Data: Preliminary Observation

[Figure 4 about here.]

A two way plot in Figure VII between printing penetration ($PrintPentr_a$) and closeness to sea ($SeaPortCloseness_a$), supports the basic hypothesis described in Figure I. All impersonalizing cities (green squares in Figure VII), except Bruges were Atlantic port cities, and Bruges is only 20km away from the Atlantic Port of Vlissingen (in previous centuries Bruges itself was a port but the port silted). Moreover the cities had high printing penetration appearing in the upper right corner of the logarithmic scale in Figure VII, as expected in Region 1 of Figure I. Moreover, all impersonalizing cities also enjoyed disruptive opportunity of trade at the Atlantic coast with $dDisrupt_a = 1$, and no city was an impersonalizing city which did not enjoy benefit of an Atlantic coast. As all impersonalizing cities were Atlantic cities, it gives strength to the claim that disruptive opportunity of trade at the Atlantic coast was a necessary condition for a city transitioning to impersonal equilibrium and removing merchant guild monopolies.

All cities undergoing reform (orange triangles in Figure VII), also belong to the upper right corner of the graph. So, reforms were observed only in cities that were close to the sea port and had high printing penetration, which confirms to the expectation that cities undergoing reform should be found in Region 2 of Figure I. The reforming cities included cities in Low Countries and North Italy (Venetian Republic and Milanese Lombardy), and most cities undergoing reform in Low countries did not enjoy disruptive opportunity of trade at the Atlantic coast as they were more than 50km away from an Atlantic port.

In regions of the graph where either distance from sea port is large or printing penetration is low, only relationship based cities are found, which confirms to the expectation that relationship based cities should be found in Region 3 of Figure I. The relationship based cities include inland cities, and cities around the sea with low levels of printing in fifteenth century.

Also, I code the cities based on whether they had a postal service as per Giovanni da L'Herba's travelogue in 1563 (the earliest compilation of such a data), and find a small correlation of 0.0099 between the postal dummy and the type of institution, which is expected given that the postal network (formal and informal) had already developed quiet extensively across Europe (not all of them listed in Giovanni's travelogue) by the middle of the sixteenth century and had especially reached most of the large cities (especially Western cities) that have been considered in my database. From the Map XII itself the evidence is clear that the network for postal communication in Europe existed already, so now I would focus on the printing penetration as my city specific heterogeneous variable for horizontal communication.

V Alternate Factors and Hypothesis Tests

V.1 Urban Agglomeration and Population

North Italy, Belgium and Netherlands enjoyed high levels of urban agglomeration. Gelderblom (2013) has argued that Low countries were able to evolve institutionally because of competition between close competing cities. Is high level of urban agglomeration a mediating factor that attracted higher rates of printing in regions close to sea?

To measure level of urban agglomeration, from Bairoch, Batou and Chevre (1988) population dataset I consider 335 cities that had a population greater than or equal to 10,000 in fourteenth, fifteenth and sixteenth century (including the 81 largest cities, see Figure VI). I cluster the cities using hierarchical clustering method based on average city distance

(UPGMA)¹⁴. The process produces a dendrogram (given in Figure XI in Appendix A.3) which can be cut off at a given threshold. For a given threshold, if a city a is part of a cluster made up of n cities, then the city has clustering index $Clust_a = \log(n)$. I cut the dendrogram at different thresholds for robustness and use the clustering in Table XI in Appendix A.3 for my standard regressions.

I consider log of population in fifteenth century ($\text{Log}(\text{Pop1500}_a)$), and growth in population between fourteenth and fifteenth century ($\text{Growth1500}_a = \log(\frac{\text{Pop1500}_a}{\text{Pop1400}_a})$), as basic controls, that may affect nature of economic institutions. Data related to population (total and growth) not only estimates demographic characteristics but also economic characteristics at city level, where historically the largest cities were also the most prosperous ones. Large cities being economically dominant could attract more traders. Similarly growing cities were attracting traders because of greater availability of opportunities. I also consider the square root of elevation ($\sqrt{\text{Elevation}_a}$ for each city a), as cities at higher altitude may be more difficult to reach in medieval and early modern period, thus unsuitable as commercial towns, and more suitable as political and administrative centers. The three factors could effect impersonal nature of cities.

V.2 Medieval Fairs

Medieval cities that hosted temporary fairs, where European traders (affiliated to guilds) would gather, could be good precursors for emerging impersonal markets. One of the most prominent medieval fairs in Europe were the Champagne fairs in Northern France. Gelderblom (2013) wrote how the decline of medieval fairs gave rise to markets in Low Countries, as footloose merchants trading in Champagne moved away to North. But, it is noteworthy that cities in the Champagne region did not themselves generalize. So, while it is possible that fair cities could themselves evolve into impersonal cities, it is also alternatively possible that the traditional institutions in established medieval fair cities, resisted evolution of impersonal economic institutions.

Regardless of direction of causality if any, medieval fairs reflect an important aspect of medieval commercial system of Europe. I borrow data on location of fairs during 1450-1500 in Europe, from University of Iowa Library's Atlas of Printing¹⁵ which builds its data from a variety of sources. I label a city a as a fair city if the city is listed to host fairs in

¹⁴The UPGMA algorithm constructs a rooted tree (dendrogram) that reflects the structure present in a pairwise similarity matrix (or a dissimilarity matrix). At each step, the nearest two clusters are combined into a higher-level cluster. The distance between any two clusters A and B , each of size (i.e., cardinality) $|A|$ and $|B|$, is taken to be the average of all distances $d(x,y)$ between pairs of objects x in A and y in B , that is, the mean distance between elements of each cluster: $\frac{1}{|A||B|} \sum_{x \in A} \sum_{y \in B} d(x, y)$

¹⁵<http://atlas.lib.uiowa.edu>

the Atlas of Printing and I code $dFair_a = 1$. The following large cities were fair cities in Europe according to Atlas of Printing:

- Angers, Bordeaux, Caen, Lille, Lyon, Orleans, Paris, Rennes, Rouen, Toulouse and Tours in France,
- Antwerp, Bruges and Ghent in Belgium,
- Bologna, Ferrara, Florence, Milan, Rome and Venice in Italy,
- Cordoba, Plasencia, Sevilla and Valladolid in Spain, and
- London (Westminster) in England.

V.3 Result: Interaction between Printing and Closeness to Sea

Table II provides descriptive statistics of the data, part of which has already been described in Figure VII where non relationship based cities have higher levels of printing and are closer to the sea. But, note that aggregate population growth in 1500 of impersonalizing and reforming cities in fifteenth century was higher than relationship based cities. Such high levels of population growth in medieval and early modern period highlights how these cities were attracting people because of the economic opportunities. Also, impersonalizing and reforming cities were more clustered and at a lower altitude from sea on average than an average relationship based city. Population level in fourteenth and fifteenth century does not show any distinct pattern where reforming cities were more populated than the general sample in fifteenth century while impersonalizing cities were less populated. More impersonal cities on an average were holding medieval fairs than relationship based city. But, fewer cities undergoing reform on an average were holding medieval fairs.

[Table 2 about here.]

Table III reports OLS regression of the dependent variable $Inst_a^{1600}$ with covariates for the whole sample.

$$Inst_a^{1600} = \alpha + \beta_1 SeaPortCloseness_a + \beta_2 PrintPentr_a + \beta_3 SeaPortCloseness_a X PrintPentr_a + \gamma X_a + \epsilon_a \quad (2)$$

where $Inst_a^{1600}$ measures the level of impersonalization of economic institutions in sixteenth century of a city and X_a is a vector of control variables.

[Table 3 about here.]

Columns 3 and 4 of Table III show that an interaction between transformed variables Printing Penetration and Closeness to Port had a sizable and significant positive effect on sixteenth century level of impersonalization of economic institutions ($Inst_a^{1600}$). The individual effects of Printing Penetration and Closeness to Port (Columns 1-3) lose significance when controls on clustering ($Clust_a$), population growth ($Growth1500_a$), population in 1500 ($\log(Population1500)$), medieval fair and elevation are added (Column 4). As printing penetration and opportunities independently do not directly affect impersonalization of economic institutions, the hypothesis passes a key test that it is the interaction of the two factors that really mattered for impersonalization.

Many cities had little or no printing, so any establishment of printing in and around the city increased the per capita printing penetration of the region several times. For example London (with $PrintIndex_a = 9.33$ bptp) which with Westminster printed several hundred books in the fifteenth century, had ten times more printing penetration per capita than Lisbon (with $PrintIndex_a = 0.81$ bptp) where according to GW database 28 books were printed in the fifteenth century. If a relationship based city was at the sea ($Opp_a = 21.29\sqrt{km}$), and its per capita printing penetration in fifteenth century doubled, it was about 1 out of 5 or 6 steps (0.18) closer to undergo reform in sixteenth century. So, a ten fold increase in fifteenth century per capita printing penetration (less that between London and Lisbon), increased the sixteenth century impersonalization level of a city by 1 unit.

The fact that high printing penetration doesn't independently affect impersonalization shows that a large shock in printed books alone even in large commercial European cities did not make it easier for traders to trade in an impersonal manner in absence of clear incentives to initiate trade beyond familiar networks. If interaction between printing and closeness to port is not considered (Columns 1, 2 & 2a), then both the factors appear individually significant, which further strengthens the argument that an interaction between the two sizable and significant factors was important. Clustering appears to have a large positive effect (Column 4) but only at a 10% significance level and it would have been attributed a larger and more significant positive effect (Columns 2a) had interaction between printing and closeness to port not been considered.

The regression results suggest that more cities close to a port and enjoying higher levels of printing activity in fifteenth century, were reforming and turning impersonal in sixteenth century, and cities that enjoyed none or only one of the two factors stayed relationship based.

V.4 Result: Instrumental Variable- Distance from Mainz

Is it reasonable to assume that Printing was exogenous? Maybe, cities like Antwerp that were already more commercially oriented attracted more printing. Such endogeneity may upward bias the results. But, many cities that were adopting printing, like Paris or Rome were traditional economic and political centres that might have been resistant to institutional change, which may downward bias the results. To allay endogeneity concerns, I use a geographic instrumental variable. One of the geographic reasons that determined level of early printing adoption in Europe was its distance from Mainz, Germany. Printing press was invented in Mainz by Johannes Gutenberg, and most know-how regarding printing press technology was based in the city (held by Gutenberg and his apprentices) during fifteenth century Europe. The printing press diffused slowly, with cities closer to Mainz getting the technology sooner (Dittmar, 2011), and distance from Mainz has been used as an instrument by Dittmar (2011) for level of print adoption. Mainz wasn't a distinct city in fifteenth century, such that the distance from Mainz would affect cities in ways other than print adoption.

Columns 2 and 4 of Panel A of Table IV report results of the second stage of 2SLS regressions and comparing to their OLS counterparts, the results seem to hold with interaction between printing and closeness to port having a sizable and significant positive effect. Distance from Mainz and its interaction to distance from port, is a strong instrument with large and highly significant relation to printing as shown in Panel B, with a large F statistic greater than 10. The 2SLS estimate of effect of interaction between printing and closeness to port (Column 4), is around double the size of OLS estimate (Column 3). While in the OLS specification, a ten fold increase in fifteenth century per capita printing penetration led to 1 unit increase in sixteenth century impersonalization level; in the 2SLS specification, a five times increase in fifteenth century per capita printing penetration led to 1 unit increase in sixteenth century level of impersonalization.

As distance from Mainz is a strong instrument, and it is argued that it is reasonable to assume that it followed the exclusivity restriction, the larger estimate can be interpreted as the effect of higher printing and its interaction for cities that adopted printing primarily because of closeness to Mainz. Clearly there were other factors that affected printing adoption, one of which is medieval fair in the city (Column 4a) which had a significant and positive effect on printing adoption, and the 2SLS estimate would exclude the impact of other covariates. Medieval fair in a city seems to negatively affect impersonalization (Column 4), which hints towards the possibility that medieval traditional trade institutions, that must be more established in medieval fair cities, impeded reform and impersonalization.

[Table 4 about here.]

V.5 Result: Studying cities nearer to sea

As Figure VII showed and OLS and 2SLS regressions in Tables III and IV confirmed, there is evidence for a strong relationship between sixteenth century level of impersonalization of economic institutions ($Inst_a^{1600}$) and interaction between printing and closeness to sea. I now turn my focus on cities close to sea. The most distant non relationship based city from port (Brescia, Italy) had a distance of 143km from port (Table II). I thus now focus on cities that were within a distance of 150km from sea.

Table V reports the regression results for the limited sample. Among cities close to sea, $PrintPentr_a$ continues to have a large and significant positive effect on impersonalization in economic institutions. When the dummy variable $dNearAtlantic_a = dDisrupt_a$ is added to regression, to specifically account for cities that were closer than 50km from an Atlantic Port, the variable also has a large and significant effect (Column 3). The addition also increases the R square of the regression. When an interaction between printing and nearness to Atlantic Port is considered (Column 4), the interaction has a sizable and significant positive effect. Among cities close to city and on the Atlantic coast about 6 times increase in fifteenth century per capita print penetration, increases sixteenth century level of impersonalization by 1 unit.

The isolated effect of printing continues to be sizable and significantly positive in the limited sample, but cities near Atlantic Port did not individually have higher levels of impersonalization if not enjoying higher print penetration. Note that the effect of interacted printing term is greater than isolated printing term, which supports the argument that cities close to a sea port that enjoyed the disruptive opportunity of Atlantic sea trade reformed or impersonalized more in sixteenth century than cities that did not enjoy such disruptive opportunity, and such transition only happened when printing penetration was high.

Also it is noteworthy that in the restricted sample of cities close to sea, the effect of urban clustering is insignificant. But, medieval fair in a city continue to have a significant negative effect (Column 4), further hinting that established trading institutions in cities with medieval fairs probably impeded emergence of impersonal economic institutions.

[Table 5 about here.]

Columns 2 and 4 of Panel A of Table VI report result of 2SLS regressions with distance from Mainz acting as an instrument for printing penetration. The estimates for the limited sample like in case of whole sample (Table IV) show a large and significant effect of

printing. The interaction between closeness to Atlantic Port and printing is large, but is significant only at 10% level. In the 2SLS specification a 4 fold increase in fifteenth century per capita printing penetration among cities close to sea and at the Atlantic coast led to a unit increase in sixteenth century level of impersonalization (unlike the 6 fold needed in OLS specification).

The instrument is strong (Panel B) and has high F statistic. Once again like in Table IV, the higher 2SLS in Table VI estimates can be interpreted as estimating the isolated effect of printing in cities that had high printing penetration primarily because of closeness to Mainz, excluding the effect of covariates like medieval fairs. Like in previous regressions, medieval fairs seem to have a large negative effect on sixteenth century impersonalization of economic institutions (Column 4).

[Table 6 about here.]

VI Robustness

VI.1 Alternate variables and specifications

As impersonal and reforming cities may be driven by different factors, I also run a multinomial logit regression and the results are reported in Appendix Table XII. There are two prominent observations to be made. Firstly Columns 2a and 2b show that an interaction between printing penetration and closeness to port is significant in predicting whether a city reforms or turned impersonal when considering the entire sample. If cities close to sea within 150km are considered (Column 4a), printing increased the chances of a city reforming, while nearness to an Atlantic Port had no significant effect. The observation is in line with the expectation as North Italian cities reformed, and enjoyed high printing penetration, but were not close to Atlantic. In contrast, closeness to Atlantic exponentially increased the chances that a city impersonalized (Column 4b) (because there are no non Atlantic cities that impersonal in sixteenth century), and the effect of printing on impersonalization of a city was large and positive but not statistically significant at 10% level, in cities that were close to an Atlantic Port, which is consistent with the expectation. The loss of significance may be attributed to the small sample of impersonalizing ($Inst_a^{1600} = 2$) cities. Secondly, urban clustering had a large and significant effect on increasing the chances of reform in a city (Column 2a and 4a), which is not surprising given that all reforming cities were parts of dense urban clusters of Belgium, Netherlands and North Italy. But, noteworthily urban clustering had no significant effect on chances

of a city impersonalizing (Column 2b and 4b). The observation is in line with expectation, as cities like London or Hamburg were not parts of urban clusters and impersonal nonetheless. The Medieval fair dummy holds large negative effect (statistically significant in column 2a and 4a, and not significant in column 2b) in all cases (as has been the trend in previous regressions) except Column 2b, where in Column 2b presence of medieval fairs increase the probability of a city impersonalizing, which reflects the trends in the summary statistics where impersonalizing cities were on an average more likely to hold medieval fairs. Given the mixed effects of medieval fairs in the results, I conclude it is better not to provide a definitive conjecture on effect of medieval fairs on economic institutions.

Appendix Tables XIII (considering number of printing cities within 50km from a city ($PrintCity50km_a$) as a proxy for printing), XIV (considering different thresholds for distance from port and level of clustering), XV and XVI (considering a limited sample of 50 largest cities in fifteenth century), XVII and XVIII (considering a limited sample of cities without code R3 or U3) report robustness checks, and the results remain principally unchanged.

When considering number of printing cities within 50km from a city a ($PrintCity50km_a$) as a proxy for printing, its interaction with Nearness to Sea (Appendix Table XIII Columns 7 and 8) has no significant effect. The observation can be attributed to the fact that the maximum number printing cities within 50km of a relationship based city was 3, and for a restricted sample of only disruptive cities ($dNearAtlantic = 1$) the maximum number was 2. So, it may be the lack of observation of relationship based cities that is driving the result. The fact that, all cities enjoying disruptive trade at the Atlantic coast and also having large number of printing cities around them were non relationship based cities, gives strength to the claim that there was indeed an interaction between the two factors.

VI.2 Study of print content

Measuring the aggregate number of books being printing around a city, provides an estimate of the fifteenth century printing penetration in the city, which was found to significantly predict institutional reforms in cities closer to sea, especially Atlantic coast. But, printing included all kinds of topics, from religion, to art to economy. The soundness of my empirical strategy hinges upon the assumption that printing towns did indeed print books that wrote about new trading practices that helped in reliable impersonal exchange¹⁶. To test the hypothesis, I collect data on books printed until fifteenth century

¹⁶Thanks to Economic History Lunch Seminar at Northwestern University for the suggestion.

from USTC catalogue, which classifies early printed books on 37 categories. I consider 9 categories of books that can be expected to include books with new ideas and techniques or help individuals in impersonal exchange. The categories are: Academic dissertations, science and mathematics, philosophy and morals, economics (treatises, regulation of guilds) and news books (sensational literature, events, wars) that can be expected to print material with new ideas; and educational books (ABCs, how to write letters, grammars), dictionaries (vocabularies, foreign language instruction), etiquette and courtesy (civil conversation and sumptuary) and travels (topography, maps and navigational manuals) that can be expected to print material teaching about other other cultures and traditions. I call the categories, trade friendly categories. Other categories either are related to religion, arts, politics or are industry specific. All the major cities, except Caen, producing books in the trade friendly categories of USTC database were already included in the GW database. I focus on the 121 printing cities of the GW database and develop a new Printing Index for each of large city a and printing city b ($PrintIndex_{ab}^{U9}$) considering number of books printed in the 9 trade oriented USTC categories (B_b^{U9}), instead of all books printed in the GW database (B_b).

[Figure 5 about here.]

There is a strong correlation (Figure VIII) between $PrintPentr_a$ and $PrintPentr_a^{U9}$, i.e. cities which were having a higher printing penetration were also having a high printing penetration for book printing in the 9 trade oriented categories. Also considering the ratio ($TradeCatShare_a$) between the two variables $PrintIndex_a$ and $PrintIndex_a^{U9}$, that measure the proportion of books in the 9 trade oriented categories, there seems to be no correlation between $PrintPentr_a$ and $TradeCatShare_a$ (Figure IX), showing no systematic bias for or against the 9 USTC categories in minor or major printing towns. The observation implies more printing in fifteenth century was associated with more printing in all categories, and that $PrintPentr_a$ is a reasonable variable to measure production of ideas (in general) in a given city, which is exogenously affected by Distance from Mainz.

[Figure 6 about here.]

In contrast, cities that were close to Atlantic Coast ($dNearAtlantic_a = 1$), had higher share of printing in the 9 USTC categories, which is reasonable as closeness to the Atlantic Coast increased interest in long distance trade in fifteenth century Europe and books that helped in such long distance trade and travel. Also, there is a correlation between fifteenth century share of modernising books ($TradeCatShare_a$) and sixteenth century levels of impersonalization of cities ($Inst_a^{1600}$) which is not surprising given that $Inst_a^{1600}$ correlates with $dNearAtlantic_a$ (see Figure X).

So, the USTC data suggests that cities with higher printing penetration had more availability of books and ideas promoting new practices of trade. But, the ideas were only significant in promoting impersonal exchange if there were beneficial opportunities in long distance trade. Presence of beneficial opportunity for long distance trade made people more interested in books related to new practices of trade. When the two factors combined it made impersonal exchange feasible, that lead to institutional changes.

VII Conclusion: Persistence and Change

In the paper, I used city level data of historical Europe to answer the following questions. Firstly, why did transition from relationship based to impersonal system happen in low countries and England? I argued that while postal network of Europe expanded radius of private communication for all potential traders in major European cities, the opportunity of Atlantic long distance trade provided the necessary incentive to trade to enable such transition at the Atlantic coast. Moreover higher availability of printed books in Low Countries and England, especially of trade related books, increased information access and popularized new business practices like double-entry bookkeeping, which increased confidence in such impersonal exchange.

Secondly, why did the transition happen only during the sixteenth century? As trade at the Atlantic coast, the inter European Postal Network and Movable Type Printing were innovations of late fifteenth century, the transition happened only began during the late fifteenth and early sixteenth century.

Thirdly, why didn't other regions transition, even if they faced similar initial conditions? I argued that no other region won the double lottery of high printing penetration and trade at the Atlantic coast like Low countries and England, and winning of both the lotteries was necessary for transition to happen.

The paper by looking at early modern Europe, studies the challenges associated with emergence of impersonal markets in traditional societies where economic exchange is embedded in social relations (Polanyi, 1944; Granovetter, 1973; Coleman, 1988; Greif, 1994; Burt, 1995, 2001; Padgett and Powell, 2012). Societies that are embedded in social relations exhibit considerable institutional (Michalopoulos and Papaioannou, 2013, 2014) and cultural persistence (Putnam, Leonardi and Nanetti, 1994; Guiso, Sapienza and Zingales, 2008b; Nunn and Wantchekon, 2011), and two notable explanations of persistence have been proposed in the literature. The *cultural approach* that considers intellectual (McCloskey, 2015; Mokyr, 2016) and popular culture (Weber, 1905; Putnam, Leonardi and Nanetti, 1994; Tabellini, 2008; Greif and Tabellini, 2015; Guiso, Sapienza and Zingales,

2008a) points at differences in people's initial attitudes, that lead to divergent equilibria where people either stick to or go beyond exchange with familiar contacts. The paper sheds light on one of the factors, horizontal communication, that may increase confidence in impersonal exchange through availability of better information (Dittmar, 2011) and adoption of business practices (Puttevils, 2015) and norms that increase reliability. The *institutional approach* that considers political (North, 1990; Acemoglu, Johnson and Robinson, 2005; Greif, 2006) and economic (Ogilvie, 2011; Gelderblom, 2013) institutions has considered the role of quality of institutions on long term development. The paper explores the interaction of social and economic factors that may impersonalize economic exchange in absence of formal legal institutions and promote development of impartial institutions that serve generally all parties, without favoring a particular few¹⁷.

The paper highlighted that dominant network based institutions like guilds were quiet dominant in a world without formal and impartial legal institutions. Good incentive to go beyond networks, and ample information and reliability enhancing business practices that reduced frictions was necessary for emergence of impersonal markets. If better data were available for the business organizations of this period, a more granular study of European guilds can be undertaken. If we had a better knowledge of which trade related and business books were popular during this period, it would have given further insights into the role to printing even further. Given the limitations of data, I attempted to make the best out of the city level data I could gather of largest cities of Europe. More granular future studies could further enlighten us about this exciting period of European history, which not only is interesting in itself, but also of great significance for understanding how traditional societies transition into modernity.

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¹⁷Related paper, Raj (2017) undertakes a theoretical treatment of the argument, exploring the conditions under which impersonal exchange can evolve in absence of formal legal institutions. A relevant paper considering nexus between economic elites and and politicians is Rajan and Zingales (2003) that discussed the political economy of financial development, and provided a mechanism for opening of financial markets where financial and business elites resisted such development as they would lose their dominance.

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A Appendix: Data

A.1 Appendix: 50 largest European (excluding Russian) cities in fourteenth-sixteenth century

[Table 7 about here.]

[Table 8 about here.]

[Table 9 about here.]

A.2 Appendix: Type of Institution by city

[Table 10 about here.]

A.3 Appendix: Urban Agglomeration

[Table 11 about here.]

[Figure 7 about here.]

A.4 Appendix: Postal Map of Europe in 1563

[Figure 8 about here.]

B Robustness Tests: Tables

Appendix Tables (multinomial regression), XIII (considering number of printing cities within 50km from a city ($PrintCity_{50km_a}$) as a proxy for printing), XIV (considering different thresholds for distance from port and level of clustering), XV and XVI (considering a limited sample of 50 largest cities in fifteenth century), XVII and XVIII (considering a limited sample of cities without code R3 or U3) report robustness checks from Section VI

[Table 12 about here.]

[Table 13 about here.]

[Table 14 about here.]

[Table 15 about here.]

[Table 16 about here.]

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[Table 18 about here.]

List of Figures

I	Map of 50 largest cities of Europe during fourteenth to sixteenth century (Bairoch, Batou and Chevre, 1988) based on the type of institutions. The figure describes the different conditions in different regions in Europe. Region 1 in Northwestern Europe is the area that is closer to Mainz and also close to Atlantic Ports. So, it was uniquely situated at the heart of Commercial and Communication revolution. In Region 1 area, all cities with emerging impersonal markets were found. No other region won the double lottery of high printing penetration and trade at the Atlantic coast like Low countries and England, and winning of both the lotteries, I argue, was necessary for transition to happen. Region 2 in North Italy is the area that is closer to Mainz and also close to the sea. In Region 2 area cities undergoing reform were found where elites reformed to ensure impersonal markets would not develop. Rest of the region (Region 3) is made up of Relationship based cities. The Label- Green: I1 & I2 (impersonalizing), Yellow: U1, U2 & U3 (undergoing reforming), Red: R1, R2 & R3 (relationship based). Table X in Appendix A.2 details the nature of economic institutions in each city based on historical sources. See Section IV.2 for more details.	36
II	Map of 50 largest cities of Europe during fourteenth to sixteenth century (Bairoch, Batou and Chevre, 1988) based on type of institutions. Label-Green: I1 & I2 (impersonalizing), Yellow: U1, U2 & U3 (undergoing reform), Red: R1, R2 & R3 (relationship based).	37
III	Map of 166 Atlantic and Mediterranean Ports of Early Modern Europe (Acemoglu, Johnson and Robinson, 2005).	38
IV	Map of 121 cities that printed more than 10 books in 15th century in GW catalogue. Size of the circle represents the number of books being printed.	38
V	The $PrintPentr_a$ measure of the 81 largest cities in the sample. Size of the circle represents the degree of printing penetration.	38
VI	Map of 335 largest cities of Europe during fourteenth to sixteenth century (Bairoch, Batou and Chevre, 1988) with population greater than or equal to 10,000.	38
VII	The two way plot of cities between variables $PrintPentr_a$ and $SeaPortCloseness_a$ for different types of institutions.	39
VIII	The two way plot of cities between variables $PrintPentr_a$ and $PrintPentr_a^{U9}$ for different types of institutions.	40
IX	The two way plot of cities between variables $PrintPentr_a$ and $TradeCatShare_a$ for different types of institutions.	41
X	The two way plot of cities between variables $Inst_a^{1600}$ and $TradeCatShare_a$ for Atlantic and Non Atlantic cities.	41
XI	The figure presents a hierarchal dendrogram of 335 largest cities in fourteenth, fifteenth and sixteenth century Europe.	42
XII	European postal routes in 1563 according to the travelogue of Giovanni da L'Herba. Sketch in: Joseph Rbsam (1854-1927)'s L'Union postale, revue de l'Union Postale Universelle, Bern 1900, image source: Wikimedia.	43

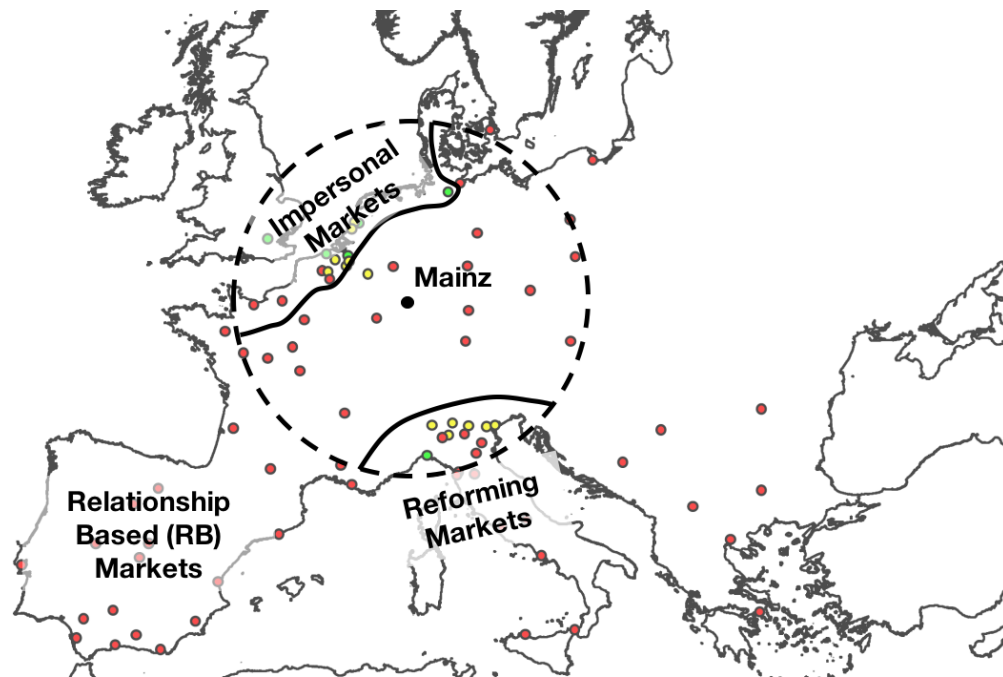


Figure I: Map of 50 largest cities of Europe during fourteenth to sixteenth century (Bairoch, Batou and Chevre, 1988) based on the type of institutions. The figure describes the different conditions in different regions in Europe. Region 1 in Northwestern Europe is the area that is closer to Mainz and also close to Atlantic Ports. So, it was uniquely situated at the heart of Commercial and Communication revolution. In Region 1 area, all cities with emerging impersonal markets were found. No other region won the double lottery of high printing penetration and trade at the Atlantic coast like Low countries and England, and winning of both the lotteries, I argue, was necessary for transition to happen. Region 2 in North Italy is the area that is closer to Mainz and also close to the sea. In Region 2 area cities undergoing reform were found where elites reformed to ensure impersonal markets would not develop. Rest of the region (Region 3) is made up of Relationship based cities. The Label- Green: I1 & I2 (impersonalizing), Yellow: U1, U2 & U3 (undergoing reforming), Red: R1, R2 & R3 (relationship based). Table X in Appendix A.2 details the nature of economic institutions in each city based on historical sources. See Section IV.2 for more details.

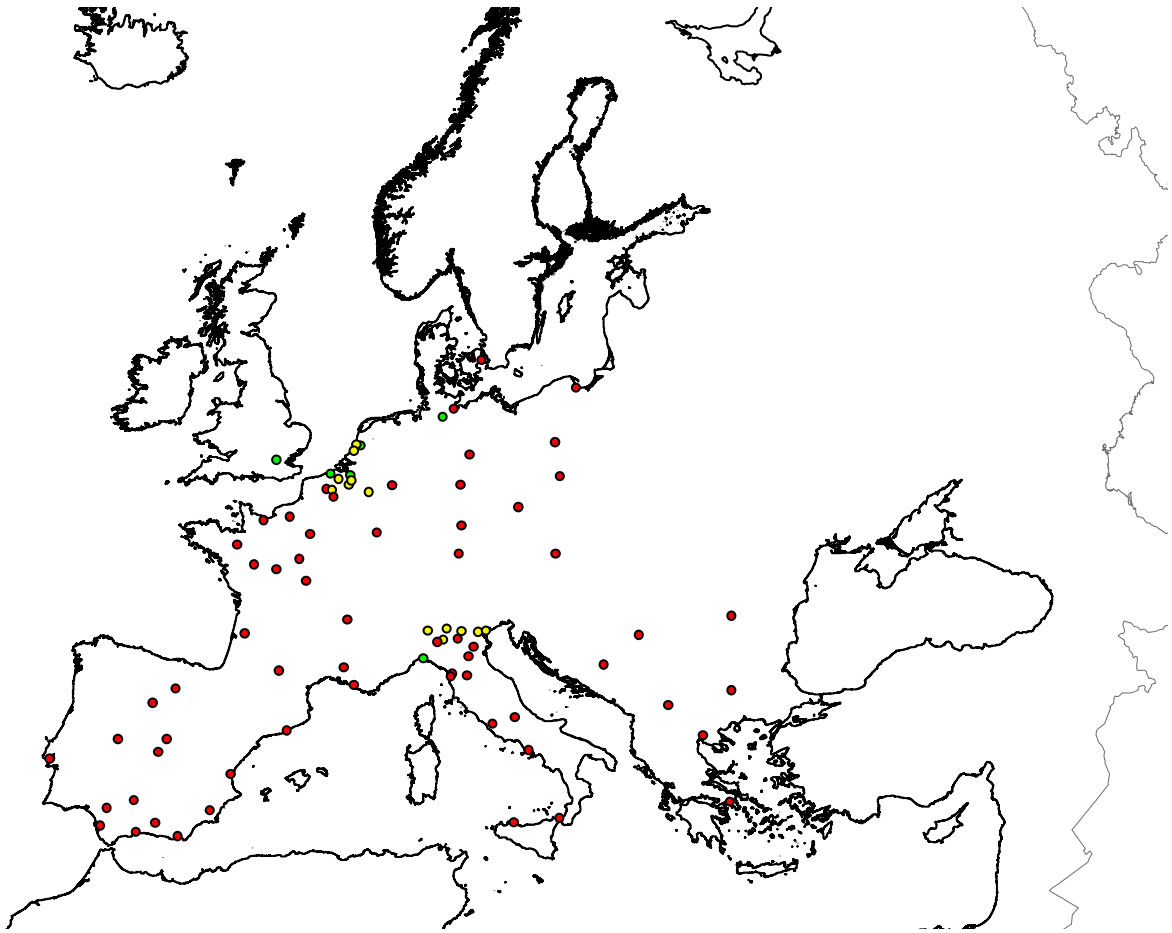


Figure II: Map of 50 largest cities of Europe during fourteenth to sixteenth century (Bairoch, Batou and Chevre, 1988) based on type of institutions. Label- Green: I1 & I2 (impersonalizing), Yellow: U1, U2 & U3 (undergoing reform), Red: R1, R2 & R3 (relationship based).



Figure III: Map of 166 Atlantic and Mediterranean Ports of Early Modern Europe (Acemoglu, Johnson and Robinson, 2005).



Figure IV: Map of 121 cities that printed more than 10 books in 15th century in GW catalogue. Size of the circle represents the number of books being printed.

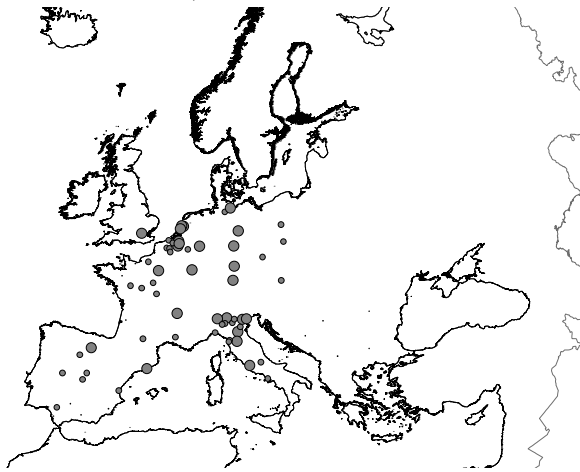


Figure V: The $PrintPentra$ measure of the 81 largest cities in the sample. Size of the circle represents the degree of printing penetration.

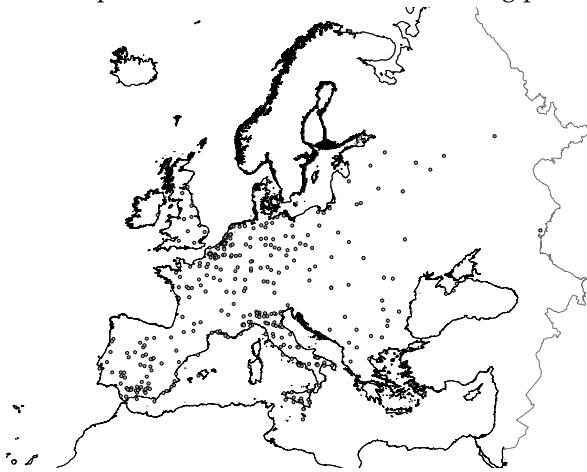


Figure VI: Map of 335 largest cities of Europe during the fourteenth to sixteenth century (Bairoch, Batou and Chevre, 1988) with population greater than or equal to 10,000.



Figure VII: The two way plot of cities between variables $PrintPentra_a$ and $SeaPortCloseness_a$ for different types of institutions.

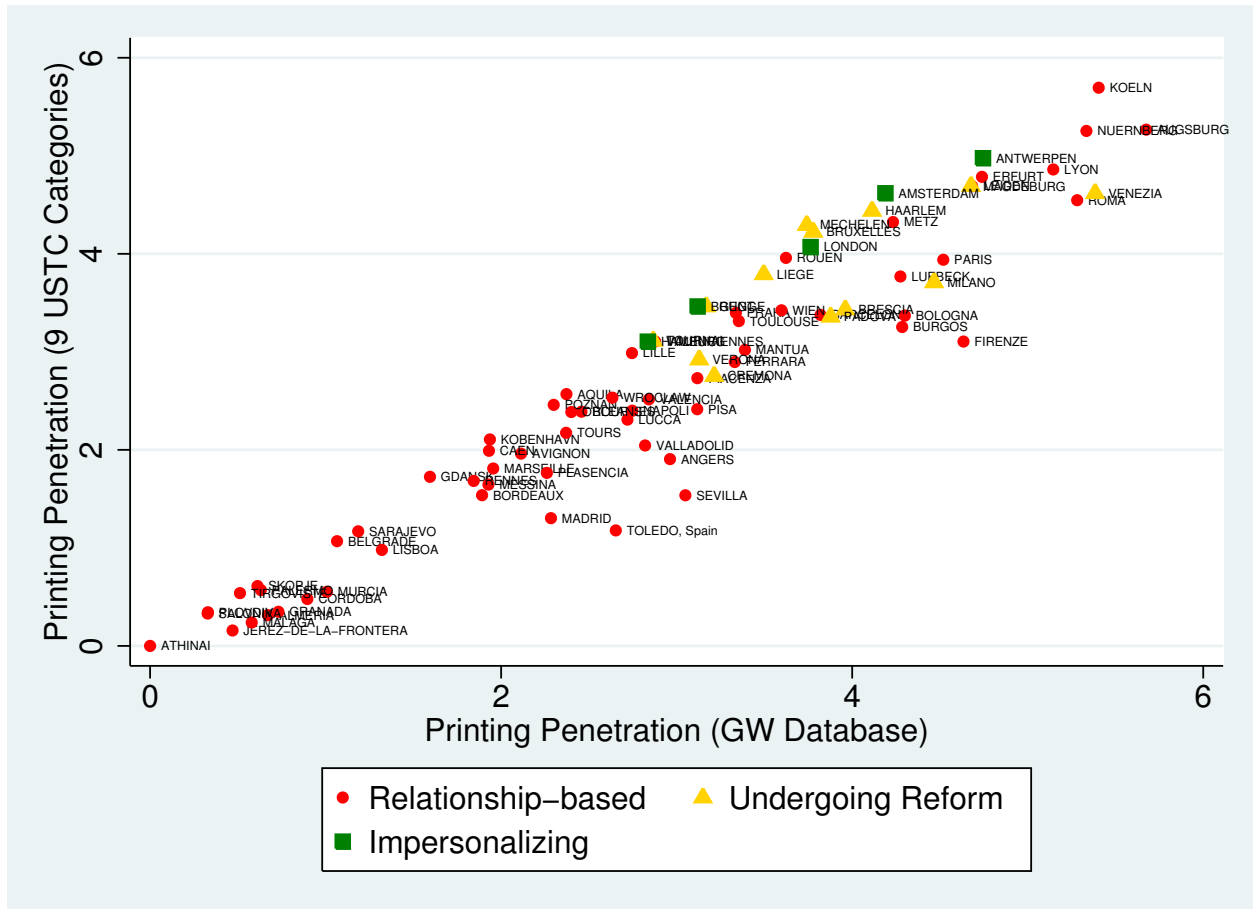


Figure VIII: The two way plot of cities between variables $PrintPentra$ and $PrintPentra^{U9}$ for different types of institutions.

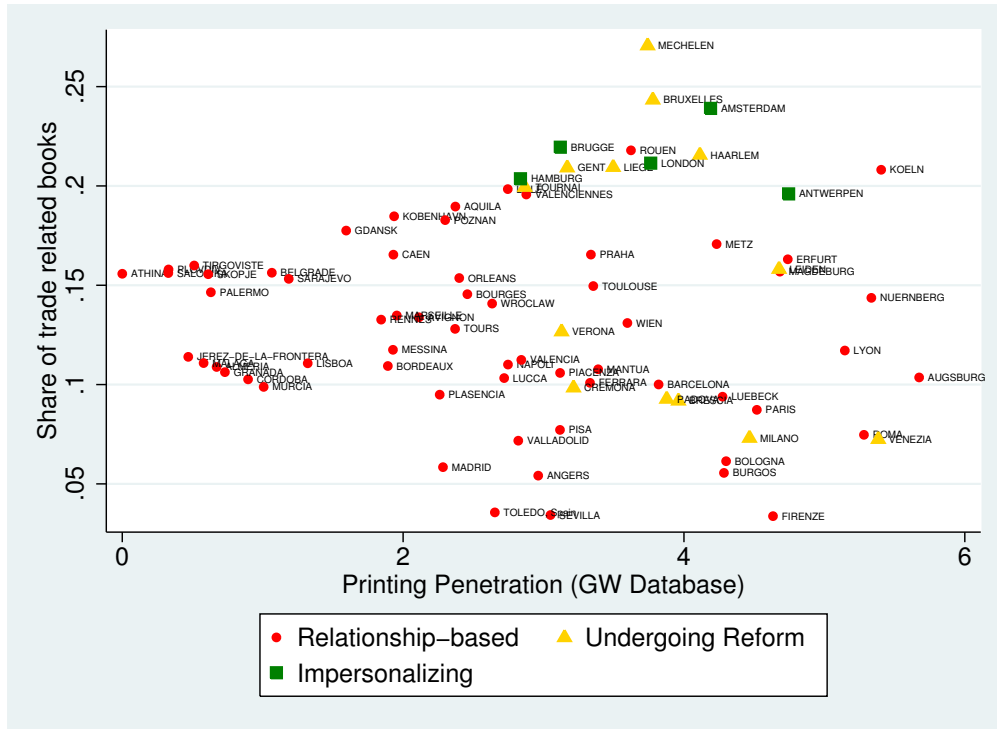


Figure IX: The two way plot of cities between variables $PrintPentr_a$ and $TradeCatShare_a$ for different types of institutions.

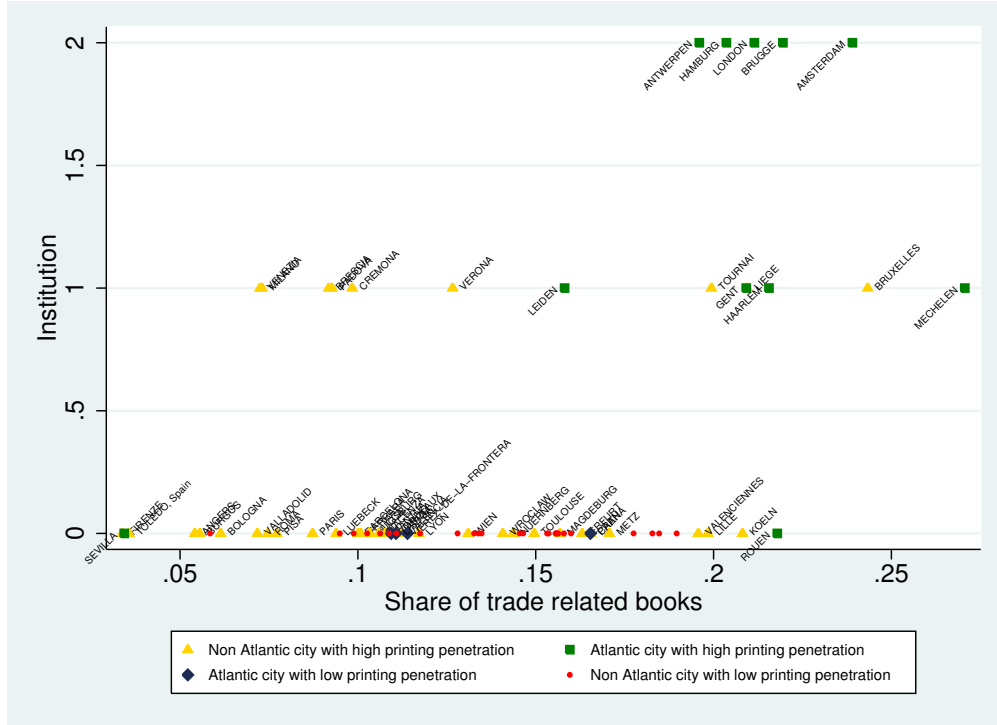


Figure X: The two way plot of cities between variables $Inst_a^{1600}$ and $TradeCatShare_a$ for Atlantic and Non Atlantic cities.

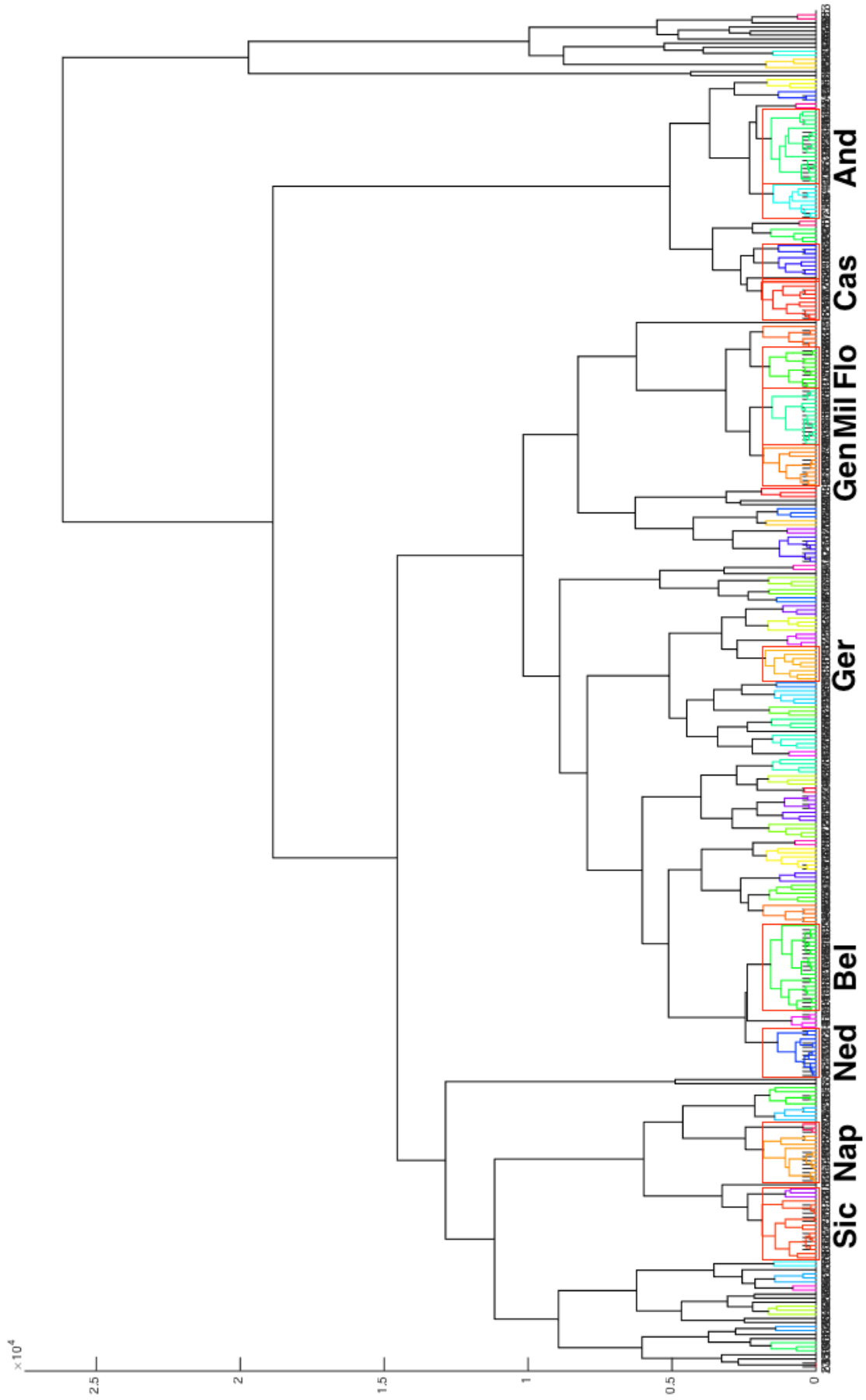


Figure XI: The figure presents a hierarchical dendrogram of 335 largest cities in fourteenth, fifteenth and sixteenth century Europe.

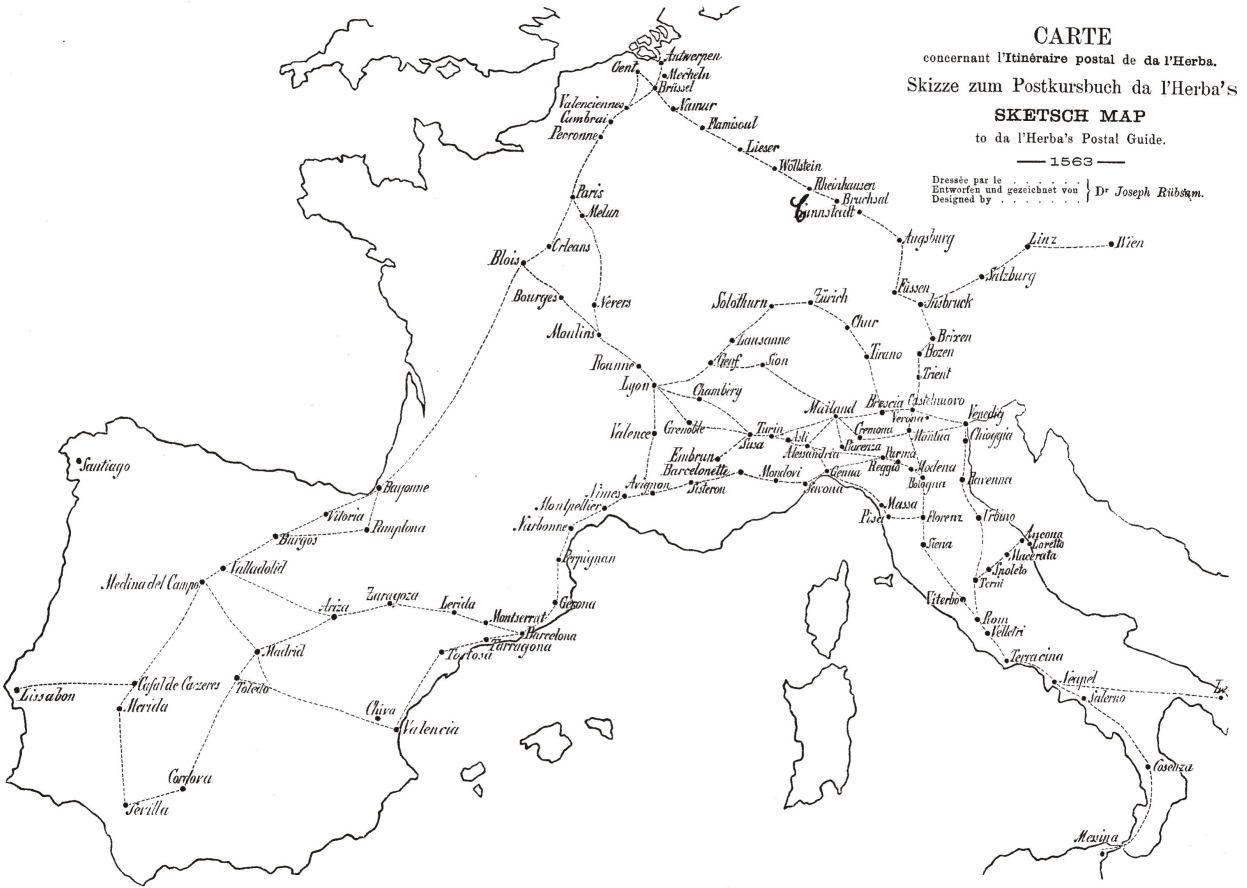


Figure XII: European postal routes in 1563 according to the travelogue of Giovanni da L'Herba. Sketch in: Joseph Rbsam (1854|1927)'s *L'Union postale, revue de l'Union Postale Universelle*, Bern 1900, image source: Wikimedia.

List of Tables

I	The table explains the scheme adopted for classifying cities as impersonalizing (I), undergoing reform (U), or relationship based (R) in the 16th century.	47
II	The table presents the summary statistics of key variables for the whole sample of 81 cities, and further decomposes the statistics based on the type of 16th century economic institution (see Section IV.2).	48
III	The table reports results of regression between 16th century economic institutions and 15th century diffusion of printing with additional variables especially closeness to sea. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Closeness Port is the square root of <i>constant</i> - Distance of the city from a sea port (see Section IV.3). The independent variables of interest are Print Penetration, Closeness to Port and their interaction. Columns 4 has additional controls described in Section V. Column 2a additionally reports the results without the interaction effect between Print Penetration and Closeness to Port.	49
IV	Columns 2 and 4 of Panel A report results of second stage IV regression between 16th century economic institutions and 15th century diffusion of printing of cities at a given distance from sea. The coefficients are contrasted with results of OLS regressions reported in Columns 1 and 3. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Closeness Port is the square root of <i>constant</i> - Distance of the city from a sea port (see Section IV.3). Additional controls are described in Section V. Panel B reports the coefficients of the first stage regression between endogenous variable Printing Penetration and IV which is log (<i>constant</i> - Distance from Mainz). Columns 2a (4a) and 2b (4b) of Panel B, are the first stage of Column 2 (4) regression of Panel A.	50
V	The table reports results of regression between 16th century economic institutions and 15th century diffusion of printing for cities within 150km of sea port. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Additional controls are described in Section V and Near Atlantic is a dummy variable whether the closest port to the observed city was an Atlantic Port.	51

VI	Columns 2 and 4 of Panel A report results of second stage IV regression between 16th century economic institutions and 15th century diffusion of printing for cities within 150 km of sea port. The coefficients are contrasted with results of OLS regressions reported in Columns 1 and 3. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Additional controls are described in Section V and Near Atlantic is a dummy variable whether the closest port to the observed city was an Atlantic Port. Panel B reports the coefficients of the first stage regression between endogenous variable Printing Penetration and IV which is $\log(\text{constant} - \text{Distance from Mainz})$. Columns 2 (4a and 4b) of Panel B, is the first stage of Column 2 (4) regression of Panel A.	52
VII	Largest European cities in 1400. Source: Bairoch, Batou and Chevre (1988). .	53
VIII	Largest European cities in 1500. Source: Bairoch, Batou and Chevre (1988). .	55
IX	Largest European cities in 1600. Source: Bairoch, Batou and Chevre (1988). .	57
X	Economic Institutions in European cities	59
XI	City Clusters based on Hierarchical Clustering based on average distance (UPGMA)	68
XII	Columns 2a and 2b report the relative risk ratio coefficients for multinomial logit regression between 16th century economic institutions and 15th century diffusion of printing with additional variables. Column 1 reports the OLS regression for reference. Column 4a and 4b report the relative risk ratio coefficients for multinomial logit regression for cities within 150 km. Column 4 reports the OLS regression for the limited sample for reference. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Closeness Port is the square root of $\text{constant} - \text{Distance}$ of the city from a sea port (see Section IV.3). Additional controls are described in Section V.	70
XIII	The table replicates Table V with an alternate 15th century printing variable: Number of 15th century printing cities within 50 km distance from the observed city. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.	71
XIV	The table replicates Column 4 of V considering a limited sample of cities within x km of sea port. Columns 2 and 3 (in contrast to Column 1) have alternate measurement of city clustering (see Section V). Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.	72
XV	The table replicates Table III considering a limited sample of only the largest cities of fifteenth century Europe (see Table VIII). Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.	73

XVI	The table replicates Table V considering a limited sample of only the largest cities of fifteenth century Europe (see Table VIII) within 150km of sea port. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.	74
XVII	The table replicates Table III considering a limited sample excluding those cities that are coded as R3 or U3 (see Table I). Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.	75
XVIII	The table replicates Table V considering a limited sample excluding those cities within 150km of sea port, that are coded as R3 or U3 (see Table I). Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.	76

Table I: The table explains the scheme adopted for classifying cities as impersonalizing (I), undergoing reform (U), or relationship based (R) in the 16th century.

Code	Description
I1	A city that never gave monopoly privilege to particular traders/groups.
I2	Sixteenth century impersonalizing city where monopolies over trade were removed at least partially.
U1	Sixteenth century city undergoing reform where while urban elites enjoyed monopoly privileges, but they gave concessions to rural or non guild producers/traders.
U2	Sixteenth century auxilliary city close to an impersonalizing city, where rural or non guild producers/traders were not coerced to trade through the auxilliary city.
U3	Sixteenth century city undergoing reform where specific details regarding guild reforms is not documented at city level, but region has been identified as undergoing reform.
R1	Sixteenth century relationship based city where merchant guilds have been documented to enjoy monopoly privileges.
R2	Sixteenth century relationship based city where merchant guilds were non existent as social institution in the region was documented to be was feudal.
R3	Sixteenth century relationship based city where specific details regarding guild privileges is not documented at city level, but their monopolistic nature can be inferred based on other descriptions.

Table II: The table presents the summary statistics of key variables for the whole sample of 81 cities, and further decomposes the statistics based on the type of 16th century economic institution (see Section IV.2).

	(1)	(2)	(3)	(4)
VARIABLES	N	Whole Sample mean	min	max
# cities in cluster	81	7.852	1	22
Print Index	81	9.250	0.217	63.14
# Print Cities in 50km	81	1.309	0	6
Population 1400	75	36.99	3	275
Population 1500	81	37.37	5	225
Population 1600	81	52.94	7	300
Population 1850	81	122.1	4	2,236
Distance from Port	81	106.4	0	453.4
Growth 1500	75	0.114	-1.273	2.079
Medieval Fair	81	0.309	0	1
Elevation from sea	81	127.1	1	862

	(1)	(2)	(3)	(4)
VARIABLES	N	Inst = 0 mean	min	max
# cities in cluster	62	6.258	1	22
Print Index	62	8.381	0.217	63.14
# Print Cities in 50km	62	0.758	0	3
Population 1400	56	35.25	4	275
Population 1500	62	36.48	5	225
Population 1600	62	51.79	7	300
Population 1850	62	97.97	4	1,053
Distance from Port	62	124.5	0	453.4
Growth 1500	56	0.0828	-1.253	2.079
Medieval Fair	62	0.306	0	1
Elevation from sea	62	156.0	5	862

	(1)	(2)	(3)	(4)
VARIABLES	N	Inst = 1 mean	min	max
# cities in cluster	13	13.54	4	22
Print Index	13	13.04	3.807	47.20
# Print Cities in 50km	13	3.462	0	6
Population 1400	13	38.46	6	100
Population 1500	13	43.23	12	100
Population 1600	13	49.69	11	151
Population 1850	13	72.62	26	209
Distance from Port	13	67.57	0	143.6
Growth 1500	13	0.202	-0.405	0.847
Medieval Fair	13	0.231	0	1
Elevation from sea	13	43.46	1	150

	(1)	(2)	(3)	(4)
VARIABLES	N	Inst = 2 mean	min	max
# cities in cluster	5	12.40	2	22
Print Index	5	11.43	3.692	24.92
# Print Cities in 50km	5	2.800	0	5
Population 1400	5	40	3	125
Population 1500	5	29	15	50
Population 1600	5	73.60	27	200
Population 1850	5	549.6	50	2,236
Distance from Port	5	4.114	0	20.57
Growth 1500	5	0.370	-1.273	1.792
Medieval Fair	5	0.600	0	1
Elevation from sea	5	11	3	21

Table III: The table reports results of regression between 16th century economic institutions and 15th century diffusion of printing with additional variables especially closeness to sea. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Closeness Port is the square root of *constant* - Distance of the city from a sea port (see Section IV.3). The independent variables of interest are Print Penetration, Closeness to Port and their interaction. Columns 4 has additional controls described in Section V. Column 2a additionally reports the results without the interaction effect between Print Penetration and Closeness to Port.

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(2a) OLS
Print Penetration	0.127*** (0.0369)	0.153*** (0.0356)	-0.0762* (0.0407)	-0.0617 (0.0427)	0.123*** (0.0357)
Closeness Port		0.0336*** (0.0102)	-0.0208** (0.00967)	-0.0119 (0.0123)	0.0342** (0.0130)
Print Pentr X Closeness Port			0.0179*** (0.00439)	0.0151*** (0.00469)	
log(# cities in cluster)				0.161* (0.0825)	0.195** (0.0801)
Growth 1500				0.0651 (0.132)	0.0991 (0.139)
log(Population 1500)				-0.0552 (0.0838)	-0.0651 (0.0898)
$\sqrt{Elevation}$				0.00140 (0.00898)	0.00160 (0.00942)
Medieval Fair				-0.0975 (0.139)	-0.0478 (0.142)
Constant	-0.0799 (0.0749)	-0.593*** (0.171)	0.133 (0.108)	0.0127 (0.352)	-0.630* (0.354)
Observations	80	80	80	74	74
R-squared	0.099	0.228	0.312	0.360	0.307

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table IV: Columns 2 and 4 of Panel A report results of second stage IV regression between 16th century economic institutions and 15th century diffusion of printing of cities at a given distance from sea. The coefficients are contrasted with results of OLS regressions reported in Columns 1 and 3. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Closeness Port is the square root of *constant* - Distance of the city from a sea port (see Section IV.3). Additional controls are described in Section V. Panel B reports the coefficients of the first stage regression between endogenous variable Printing Penetration and IV which is log (*constant* - Distance from Mainz). Columns 2a (4a) and 2b (4b) of Panel B, are the first stage of Column 2 (4) regression of Panel A.

Panel A: Dependent Variable: Institution				
VARIABLES	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS
Print Penetration	-0.0762* (0.0407)	-0.0933 (0.0748)	-0.0617 (0.0427)	-0.111 (0.0770)
Closeness Port	-0.0208** (0.00967)	-0.0539** (0.0232)	-0.0119 (0.0123)	-0.0522** (0.0261)
Print Pentr X Closeness Port	0.0179*** (0.00439)	0.0308*** (0.00797)	0.0151*** (0.00469)	0.0317*** (0.00971)
log(# cities in cluster)			0.161* (0.0825)	0.0717 (0.0906)
Growth 1500			0.0651 (0.132)	0.00859 (0.132)
log(Population 1500)			-0.0552 (0.0838)	-0.0294 (0.0940)
$\sqrt{Elevation}$			0.00140 (0.00898)	0.00491 (0.0112)
Medieval Fair			-0.0975 (0.139)	-0.251* (0.150)
Constant	0.133 (0.108)	0.149 (0.240)	0.0127 (0.352)	0.157 (0.455)
Observations	80	80	74	74
R-squared	0.312	0.138	0.360	0.175
Panel B: First Stage Regression				
Dependent Variable: VARIABLES	(2a) Print Penetration	(2b) Print Penetration X Closeness Port	(4a) Print Penetration	(4b) Print Penetration X Closeness Port
Distance from Mainz	1.544*** (0.373)	-2.114 (5.389)	1.971*** (0.418)	1.065 (6.206)
Mainz Dist X Closeness Port	0.00481 (0.0271)	1.814*** (0.391)	-0.0101 (0.0306)	1.739*** (0.455)
Closeness Port	-0.00941 (0.0332)	1.118** (0.478)	0.0516 (0.0436)	1.597** (0.648)
log(# cities in cluster)			0.0191 (0.152)	0.298 (2.261)
Growth 1500			-0.0415 (0.207)	-1.229 (3.075)
log(Population 1500)			0.241 (0.217)	5.177 (3.221)
$\sqrt{Elevation}$			0.0583* (0.0292)	0.541 (0.434)
Medieval Fair			0.572** (0.281)	6.331 (4.176)
Constant	1.402*** (0.501)	1.468 (7.225)	-1.191 (1.127)	-31.87* (16.72)
Observations	80	80	74	74
R-squared	0.523	0.693	0.591	0.723
F stat	39.02	39.29	34.51	27.67

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table V: The table reports results of regression between 16th century economic institutions and 15th century diffusion of printing for cities within 150km of sea port. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Additional controls are described in Section V and Near Atlantic is a dummy variable whether the closest port to the observed city was an Atlantic Port.

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Print Penetration	0.209*** (0.0473)	0.182*** (0.0450)	0.181*** (0.0438)	0.123*** (0.0417)
log(# cities in cluster)		0.132 (0.105)	0.118 (0.0870)	0.0731 (0.0825)
Growth 1500		0.105 (0.213)	0.0153 (0.174)	-0.0873 (0.165)
log(Population 1500)		-0.104 (0.109)	0.0270 (0.113)	0.110 (0.110)
$\sqrt{Elevation}$		-0.0139 (0.0121)	-0.00187 (0.00858)	-0.00267 (0.00845)
Near Atlantic			0.688*** (0.227)	-0.235 (0.318)
Near Atlantic X Print Penetration				0.318** (0.131)
Medieval Fair		-0.106 (0.178)	-0.292* (0.150)	-0.289** (0.139)
Constant	-0.191** (0.0919)	0.121 (0.368)	-0.490 (0.372)	-0.531 (0.343)
Observations	59	56	56	56
R-squared	0.201	0.268	0.444	0.503

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table VI: Columns 2 and 4 of Panel A report results of second stage IV regression between 16th century economic institutions and 15th century diffusion of printing for cities within 150 km of sea port. The coefficients are contrasted with results of OLS regressions reported in Columns 1 and 3. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Additional controls are described in Section V and Near Atlantic is a dummy variable whether the closest port to the observed city was an Atlantic Port. Panel B reports the coefficients of the first stage regression between endogenous variable Printing Penetration and IV which is $\log(\text{constant} - \text{Distance from Mainz})$. Columns 2 (4a and 4b) of Panel B, is the first stage of Column 2 (4) regression of Panel A.

Panel A: Dependent Variable: Institutions in cities within 150km of port				
VARIABLES	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS
Print Penetration	0.209*** (0.0473)	0.424*** (0.0848)	0.123*** (0.0417)	0.289*** (0.0879)
Near Atlantic			-0.235 (0.318)	-0.494 (0.648)
Print Penetration X Near Atlantic			0.318** (0.131)	0.407* (0.222)
log(# cities in cluster)			0.0731 (0.0825)	-0.00538 (0.0972)
Growth 1500			-0.0873 (0.165)	-0.153 (0.173)
log(Population 1500)			0.110 (0.110)	0.136 (0.124)
$\sqrt{Elevation}$			-0.00267 (0.00845)	-0.00198 (0.0119)
Medieval Fair			-0.289** (0.139)	-0.415** (0.167)
Constant	-0.191** (0.0919)	-0.790*** (0.237)	-0.531 (0.343)	-0.905** (0.439)
Observations	59	59	56	56
R-squared	0.201		0.503	0.376
Panel B: First Stage Regression				
Dependent Variable: VARIABLES	(2) Print Penetration	(4a) Print Penetration	(4b) Print Penetration X Near Atlantic	
Distance from Mainz	1.583*** (0.230)	1.703*** (0.340)	-0.0721 (0.134)	
Distance from Mainz X Near Atlantic			-0.0762 (0.533)	1.344*** (0.210)
Near Atlantic			0.0353 (0.668)	1.454*** (0.264)
log(# cities in cluster)			-0.0975 (0.179)	0.0824 (0.0705)
growth1500			0.00502 (0.269)	0.161 (0.106)
Growth 1500			0.309 (0.254)	-0.0734 (0.100)
$\sqrt{Elevation}$			0.0286 (0.0281)	0.00197 (0.0111)
Medieval Fair			0.474 (0.337)	0.0618 (0.133)
Constant	1.271*** (0.258)		-0.0389 (0.930)	0.141 (0.367)
Observations	59	56	56	56
R-squared	0.453	0.510	0.510	0.938
F stat	47.17	16.39	16.39	25.39

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table VII: Largest European cities in 1400. Source: Bairoch, Batou and Chevre (1988).

City	Population (,000) 1400	Rank 1400
<i>PARIS</i>	275	1
<i>BRUGGE</i>	125	2
<i>GENOVA</i>	100	3
<i>GRANADA</i>	100	3
<i>VENEZIA</i>	100	3
<i>PRAHA</i>	95	6
<i>MILANO</i>	90	7
<i>SEVILLA</i>	70	8
<i>GENT</i>	56	9
<i>FIRENZE</i>	55	10
<i>LISBOA</i>	55	10
<i>BOLOGNA</i>	45	12
<i>LONDON</i>	45	12
<i>NAPOLI</i>	45	12
<i>TOLEDO</i>	45	12
<i>SALONIKA</i>	42	16
<i>CORDOBA</i>	40	17
<i>FERRARA</i>	40	17
<i>KOELN</i>	40	17
<i>MALAGA</i>	40	17
<i>TOURNAI</i>	40	17
<i>BARCELONA</i>	38	22
<i>VALENCIA</i>	36	23
<i>ATHINAI</i>	35	24
<i>CREMONA</i>	35	24
<i>ROUEN</i>	35	24
<i>VERONA</i>	35	24
<i>PADOVA</i>	34	28
<i>LYON</i>	33	29
<i>ROMA</i>	33	29
<i>AQUILA</i>	30	31
<i>AVIGNON</i>	30	31
<i>BELGRADE</i>	30	31
<i>BORDEAUX</i>	30	31
<i>LIEGE</i>	30	31
<i>ORLEANS</i>	30	31
<i>BRESCIA</i>	27	37
<i>BURGOS</i>	27	37
<i>PALERMO</i>	27	37

<i>BRUXELLES</i>	26	40
<i>ALMERIA</i>	25	41
<i>ANGERS</i>	25	41
<i>LUEBECK</i>	25	41
<i>MANTUA</i>	25	41
<i>METZ</i>	25	41
<i>PIACENZA</i>	25	41
<i>TIRGOVISTE</i>	25	41
<i>ERFURT</i>	24	48
<i>LUCCA</i>	23	49
<i>PISA</i>	23	49
<i>VALENCIENNES</i>	23	49

Table VIII: Largest European cities in 1500. Source: Bairoch, Batou and Chevre (1988).

City	Population (,000) 1500	Rank 1500
<i>PARIS</i>	225	1
<i>NAPOLI</i>	125	2
<i>MILANO</i>	100	3
<i>VENEZIA</i>	100	3
<i>GRANADA</i>	70	5
<i>PRAHA</i>	70	5
<i>LISBOA</i>	65	7
<i>TOURS</i>	60	8
<i>GENOVA</i>	58	9
<i>FIRENZE</i>	55	10
<i>GENT</i>	55	10
<i>PALERMO</i>	55	10
<i>ROMA</i>	55	10
<i>BOLOGNA</i>	50	14
<i>BORDEAUX</i>	50	14
<i>LONDON</i>	50	14
<i>LYON</i>	50	14
<i>ORLEANS</i>	50	14
<i>SKOPJE</i>	50	14
<i>TIRGOVISTE</i>	50	14
<i>VERONA</i>	50	14
<i>BRESCIA</i>	49	22
<i>KOELN</i>	45	23
<i>MARSEILLE</i>	45	23
<i>SEVILLA</i>	45	23
<i>FERRARA</i>	42	26
<i>MALAGA</i>	42	26
<i>VALENCIA</i>	42	26
<i>CREMONA</i>	40	29
<i>ROUEN</i>	40	29
<i>NUERNBERG</i>	38	31
<i>BRUGGE</i>	35	32
<i>CORDOBA</i>	35	32
<i>TOURNAI</i>	35	32
<i>BRUXELLES</i>	33	35
<i>BOURGES</i>	32	36
<i>POZNAN</i>	32	36
<i>TOLEDO</i>	32	36
<i>ALMERIA</i>	30	39

<i>ANTWERPEN</i>	30	39
<i>AUGSBURG</i>	30	39
<i>BELGRADE</i>	30	39
<i>GDANSK</i>	30	39
<i>LUCCA</i>	30	39
<i>PLOVDIV</i>	30	39
<i>TOULOUSE</i>	30	39
<i>VALLADOLID</i>	30	39
<i>PADOVA</i>	29	48
<i>LILLE</i>	26	49
<i>CAEN</i>	25	50
<i>LUEBECK</i>	25	50
<i>MANTUA</i>	25	50
<i>MECHELEN</i>	25	50
<i>MESSINA</i>	25	50
<i>MURCIA</i>	25	50
<i>PIACENZA</i>	25	50
<i>PLASENCIA</i>	25	50
<i>WROCLAW</i>	25	50

Table IX: Largest European cities in 1600. Source: Bairoch, Batou and Chevre (1988).

City	Population (,000) 1600	Rank 1600
<i>PARIS</i>	300	1
<i>NAPOLI</i>	275	2
<i>LONDON</i>	200	3
<i>VENEZIA</i>	151	4
<i>SEVILLA</i>	135	5
<i>LISBOA</i>	130	6
<i>MILANO</i>	120	7
<i>PALERMO</i>	105	8
<i>PRAHA</i>	100	9
<i>ROMA</i>	100	9
<i>GDANSK</i>	80	11
<i>TOLEDO</i>	80	11
<i>FIRENZE</i>	76	13
<i>ROUEN</i>	70	14
<i>GRANADA</i>	69	15
<i>MADRID</i>	65	16
<i>TOURS</i>	65	16
<i>VALENCIA</i>	65	16
<i>BOLOGNA</i>	63	19
<i>GENOVA</i>	63	19
<i>BELGRADE</i>	55	21
<i>SKOPJE</i>	55	21
<i>AMSTERDAM</i>	54	23
<i>BRUXELLES</i>	50	24
<i>MESSINA</i>	50	24
<i>SALONIKA</i>	50	24
<i>WIEN</i>	50	24
<i>ANTWERPEN</i>	47	28
<i>AUGSBURG</i>	45	29
<i>MARSEILLE</i>	45	29
<i>SARAJEVO</i>	45	29
<i>VERONA</i>	45	29
<i>LEIDEN</i>	44	33
<i>VALLADOLID</i>	41	34
<i>BORDEAUX</i>	40	35
<i>HAMBURG</i>	40	35
<i>KOBENHAVN</i>	40	35
<i>KOELN</i>	40	35
<i>MAGDEBURG</i>	40	35

<i>NUERNBERG</i>	40	35
<i>ORLEANS</i>	40	35
<i>TOULOUSE</i>	40	35
<i>WROCLAW</i>	40	35
<i>HAARLEM</i>	39	44
<i>BRESCIA</i>	36	45
<i>CREMONA</i>	36	45
<i>LYON</i>	35	47
<i>ATHINAI</i>	33	48
<i>FERRARA</i>	33	48
<i>JEREZ</i> – <i>DE – LA –</i> <i>FRONTERA</i>	33	48
<i>LILLE</i>	33	48
<i>PADOVA</i>	33	48
<i>PIACENZA</i>	33	48
<i>RENNES</i>	33	48

Table X: Economic Institutions in European cities

City	Note	Code
<i>ALMERIA</i>	Spanish cities were feudal in character and cities began receiving merchant guild permissions only in late medieval period. Almeria was not granted a Consulado (merchant guild) and thus lost out in patronage to other Spanish cities (Smith (1940), p. 15).	R2
<i>AMSTERDAM</i>	Amsterdam rose during sixteenth century and did not have a major local merchant guild barring some areas of commerce, and prohibited alien merchant guilds from gaining monopoly privileges (Ogilvie (2011), p. 32).	I2
<i>ANGERS</i>	No specific information on the city. French cities resisted any guild reform until at least eighteenth century. Rouen, Nancy, Metz, Roussillon and Paris had some partial reform during eighteenth century (Horn (2015), p. 224).	R3
<i>ANTWERPEN</i>	In Antwerp, merchant guilds began to decline around 1500, with a shift away from dominance by the merchant guild towards one in which individual merchants could conduct trade without the restrictions often imposed by guilds. (Ogilvie (2011), p. 32)	I2
<i>AQUILA</i>	Feudal rights were being enjoyed by elites at least until eighteenth century in Aquila (Epstein (2004), p. 328).	R2
<i>ATHINAI</i>	No specific information on nature of institutions in Athens, but given that ruling Ottoman empire had a system of granting privileges (Ogilvie, 2011), it is assumed economic organization in Ottoman influenced Athens was similar.	R3
<i>AUGSBURG</i>	Augsburg was dominated by Fuggers who continued their influence throughout fifteenth century albeit some anti monopoly dissent caused by Martin Luther inspired writings. In an edict in 1525 Charles V weighed in on monopoly issue in favor of the merchant companies, arguing that private interest and the common good were compatible (Häberlein, 2012).	R1
<i>AVIGNON</i>	No specific information on the city. French cities resisted any guild reform until at least eighteenth century. Rouen, Nancy, Metz, Roussillon and Paris had some partial reform during eighteenth century (Horn (2015), p. 224).	R3

<i>BARCELONA</i>	In Catalonia (Barcelona) merchant guilds enjoyed privileges in early modern period (Ogilvie (2011), pp. 33-34).	R1
<i>BELGRADE</i>	Belgrade had merchant guilds during sixteenth-seventeenth century. Merchant colonies of Bosnian merchants blocked the settlement of Ragusan merchant colonies in Belgrade and other Hungarian and Slavonian towns (Ogilvie (2011), p. 124).	R1
<i>BOLOGNA</i>	Silk and hemp merchant guilds continued to enjoy merchant guild monopolies in eighteenth century Bologna (Ogilvie (2011), p. 113).	R1
<i>BORDEAUX</i>	No specific information on the city. French cities resisted any guild reform until at least eighteenth century. Rouen, Nancy, Metz, Roussillon and Paris had some partial reform during eighteenth century (Horn (2015), p. 224).	R3
<i>BOURGES</i>	No specific information on the city. French cities resisted any guild reform until at least eighteenth century. Rouen, Nancy, Metz, Roussillon and Paris had some partial reform during eighteenth century (Horn (2015), p. 224).	R3
<i>BRESCIA</i>	In regions of Bergamo and Brescia, in sixteenth century, strategic considerations led Venice to make significant concessions of autonomy that freed such communities from direct dominion by the cities (Epstein (2004), p. 301).	U1
<i>BRUGGE</i>	In Bruges, merchant guilds continued their privileges only until mid sixteenth century (Ogilvie (2011), p. 12).	I2
<i>BRUXELLES</i>	Antwerp emerged as a major trading market for traders of the region Ogilvie (2011). No evidence exists such that individual merchant guilds successfully blocked locals from doing trade through Antwerp. The closeness of Belgian cities hindered them from enforcing exclusive privilege (Ogilvie (2011), pp. 31-32).	U2
<i>BURGOS</i>	In Spain, local merchant guilds such as those of Burgos and Bilbao used staple privileges to impose costs on foreign traders throughout the early modern period (Ogilvie (2011), p. 70-71).	R1

<i>CAEN</i>	Along with records of persistent guild system in Caen until at least eighteenth century Europe (Horn (2015), p. 224), there are accounts about Caen Butcher guilds, where workers complained that guild masters taxed them unfairly (Kwass (2006), pp. 136-137).	R1
<i>CORDOBA</i>	No specific information on the city. But, Andalusian merchant guilds used their privileges to guard their interests in eighteenth century (Stein and Stein (2014), p. 95-96).	R3
<i>CREMONA</i>	No specific account of the city. In 1593 Milanese Lombardy, representatives of the village areas managed to have the privileged allocation of raw silk suspended, even though cities maintained their monopoly over most of the activities (Epstein (2004), p. 308).	U3
<i>ERFURT</i>	No specific information on the city, but Erfurt was acquiring landed territories (Epstein (2004), p. 209) pointing towards a possibility of extending powers of urban elites which in line with the general trend of cities extending their commercial privileges (see Chapter 9 on Germany, Epstein (2004)).	R3
<i>FERRARA</i>	No specific information on Ferrara, but Papal states were unable or unwilling to grant rural communities autonomy at cost of weakening the Bolognese oligarchy (Epstein (2004), p. 315).	R3
<i>FIRENZE</i>	In sixteenth century, Florence had a high level of political centralism, which led to hollowing out of region's urban network (Epstein (2004), pp. 295-296) (Lucca and Pisa), and merchant guild privileges persisted (Ogilvie (2011), pp. 33-34).	R1
<i>GDANSK</i>	In sixteenth century, Gdansk excluded foreign merchants from trading without the agreement of existing burghers. (Ogilvie (2011), p. 55)	R1
<i>GENOVA</i>	Genoa allowed all citizens to trade freely, and had liberal requirements for earning citizenship (Ogilvie (2011), p. 53)	I1
<i>GENT</i>	Antwerp emerged as a major trading market for traders of the region Ogilvie (2011). No evidence exists such that individual merchant guilds successfully blocked locals from doing trade through Antwerp. The closeness of Belgian cities hindered them from enforcing exclusive privilege (Ogilvie (2011), pp. 31-32).	U2

<i>GRANADA</i>	No specific information on the city. But, Andalusian merchant guilds used their privileges to guard their interests in eighteenth century. (Stein and Stein (2014), pp. 95-96)	R3
<i>HAARLEM</i>	After 1581, new Dutch republic refused to grant privileges to merchants, and literature does not mention Haarlem and Leiden (unlike Dordrich and Middleberg) relying on staple rights (Ogilvie (2011), p. 183). No explicit mention of the city removing monopoly privileges.	U3
<i>HAMBURG</i>	Hamburg removed monopoly privileges of local merchant guilds while other cities of the German Hansa, continued with such privileges (Ogilvie (2011), p. 87).	I2
<i>JEREZ</i> – <i>DE – LA</i> – <i>FRONTERA</i>	No specific information on the city. But, Andalusian merchant guilds used their privileges to guard their interests in eighteenth century (Stein and Stein (2014), pp. 95-96).	R3
<i>KOBENHAVN</i>	There is a record of establishment of a merchant guild in Copenhagen in 1742 (Andersen (2011), p. 61).	R1
<i>KOELN</i>	Until early nineteenth century, Cologne merchant guilds maintained monopoly privileges, and used the privileges to block non-local merchants from trading in the hinterlands (Ogilvie (2011), p. 69).	R1
<i>LEIDEN</i>	After 1581, new Dutch republic refused to grant privileges to merchants, and literature does not mention Haarlem and Leiden (unlike Dordrich and Middleberg) relying on staple rights (Ogilvie (2011), p. 183). No explicit mention of the city removing monopoly privileges.	U3
<i>LIEGE</i>	Antwerp emerged as a major trading market for traders of the region Ogilvie (2011). No evidence exists such that individual merchant guilds successfully blocked locals from doing trade through Antwerp. The closeness of Belgian cities hindered them from enforcing exclusive privilege (Ogilvie (2011), pp. 31-32).	U2
<i>LILLE</i>	Merchant guild existed until eighteenth century in Lille; in eighteenth century, merchant guilds of Lille worked to restrict independence of rural brokers in the textile industry (Ogilvie (2011), p. 37).	R1
<i>LISBOA</i>	Portuguese merchants enjoyed monopolies over transatlantic and European trade, unlike English and Dutch merchants (Ogilvie (2011), p. 37).	R1

<i>LONDON</i>	The London livery companies (guilds of merchants and craftsmen) found it increasingly difficult to enforce their economic privileges as the sixteenth century progressed (Ogilvie (2011), pp. 32-33).	I2
<i>LUCCA</i>	In sixteenth century, Florence had a high level of political centralism, which led to hollowing out of region's urban network (Epstein (2004), pp. 295-296) (Lucca and Pisa), and merchant guild privileges persisted (Ogilvie (2011), pp. 33-34).	R1
<i>LUEBECK</i>	In sixteenth century, Lubeck, to tackle increasing Dutch and English competition, tightened the monopoly of its local merchant guild (Ogilvie (2011), p. 87).	R1
<i>LYON</i>	Weaving, finishing and marketing in silk industry of Lyon was controlled until 1789 (Ogilvie (2011), p. 415). French cities resisted any guild reform until at least eighteenth century. Rouen, Nancy, Metz, Roussillon and Paris had some partial reform during eighteenth century (Horn (2015), p. 224).	R1
<i>MADRID</i>	Merchant guilds enjoyed privileges in seventeenth century in Madrid (Herr (2015), p. 168). Epstein (2004) called it a "parasitic city".	R1
<i>MAGDEBURG</i>	Magdeburg law was an elaborate system of city privileges that emerged in Magdeburg, and spread across Germany and Eastern Europe. No evidence of Magdeburg laws changing in sixteenth century.	R3
<i>MALAGA</i>	In 1667, Malaga sought permission to trade with Atlantic (Smith (1940), p. 92). Andalusian merchant guilds used their privileges to guard their interests in eighteenth century (Stein and Stein (2014), pp. 95-96).	R1
<i>MANTUA</i>	In sixteenth century Mantua increased its centralization and control over countryside (Epstein (2004), p. 311).	R1
<i>MARSEILLE</i>	No specific information on the city. French cities resisted any guild reform until at least eighteenth century. Rouen, Nancy, Metz, Roussillon and Paris had some partial reform during eighteenth century (Horn (2015), p. 224).	R3

<i>MECHELEN</i>	Antwerp emerged as a major trading market for traders of the region Ogilvie (2011). No evidence exists such that individual merchant guilds successfully blocked locals from doing trade through Antwerp. The closeness of Belgian cities hindered them from enforcing exclusive privilege (Ogilvie (2011), pp. 31-32).	U2
<i>MESSINA</i>	Primarily an agrarian society, Sicilian cities began to grant guilds late, and their significance only increased in early modern period (Epstein, 2003). No specific mention of the city.	R3
<i>METZ</i>	Rouen, Nancy, Metz, Roussillon and Paris had some partial guild reform but only in 1762 (Horn (2015), p. 224).	R1
<i>MILANO</i>	In 1593 Milanese Lombardy, representatives of the village areas managed to have the privileged allocation of raw silk suspended, even though cities maintained their monopoly over most of the activities. (Epstein (2004), p. 308).	U1
<i>MURCIA</i>	Privileged guilds of Madrid set factories in the allied cities of Murcia (Herr (2015), p. 168).	R1
<i>NAPOLI</i>	Naples resembled a feudal state with significant privileges to nobles and elites (see Chapter 14 on <i>Kingdom of Naples</i> , Epstein (2004)).	R1
<i>NUERNBERG</i>	Nuremberg was called a “city without guilds” because the city councils dominated by powerful international dealers and merchant-entrepreneurs, regulated activities of craft guilds (Soly, 2008).	R1
<i>ORLEANS</i>	Orleans received new privileged guilds in seventeenth century (Horn (2015), p. 224).	R1
<i>PADOVA</i>	In Venetian republic while Padova continued to maintain its position in wool production (Epstein (2004), p. 315), but during the second half of sixteenth century rural representatives were able to negotiate concessions for tax allocation and collection (Epstein (2004), p. 301).	U1
<i>PALERMO</i>	Primarily an agrarian society, Sicilian cities began to grant guilds late, and their significance only increased in early modern period (Epstein, 2003). No specific mention of the city.	R3
<i>PARIS</i>	Paris expanded its guild system in seventeenth century, and partial reforms only happened in 1762 (Horn (2015), p. 224).	R1

<i>PIACENZA</i>	In sixteenth century, Farnese duchy increased its centralization and control over countryside which meant large part of the state territory lost to urban jurisdiction (Epstein (2004), p. 312).	R1
<i>PISA</i>	In sixteenth century, Florence had a high level of political centralism, which led to hollowing out of region's urban network (Epstein (2004), pp. 295-296) (Lucca and Pisa), and merchant guild privileges persisted (Ogilvie (2011), pp. 33-34).	R1
<i>PLASENCIA</i>	No specific information on the city. Spanish cities began receiving merchant guild permissions only in late medieval period (Smith, 1940) and cities without such charters lost out.	R3
<i>PLOVDIV</i>	Bribes and guild concessions were common in Bulgaria, (Lampe and Jackson (1982), p. 145) until 1878 emerged as an independent state.	R3
<i>POZNAN</i>	Merchant guilds enjoyed monopoly in seventeenth century Poznan, which they defended aggressively against local Jews and foreigners (Ogilvie (2011), p. 82).	R1
<i>PRAHA</i>	James (1893) records a 1856 celebration of merchant guilds of Prague.	R1
<i>RENNES</i>	Rennes received new privileged guilds in seventeenth century (Horn (2015), p. 224).	R1
<i>ROMA</i>	Early modern Rome had merchant guilds which charged admission fees that added to the wealth requirement of joining the guilds (Ogilvie (2011), p. 60).	R1
<i>ROUEN</i>	Rouen, Nancy, Metz, Roussillon and Paris had some partial guild reform but only in 1762 (Horn (2015), p. 224).	R1
<i>SALONIKA</i>	No specific information on nature of institutions in Salonika, but given that ruling Ottoman empire had a system of granting privileges (Ogilvie, 2011), it is assumed economic organization in Ottoman influenced Salonika was similar.	R3
<i>SARAJEVO</i>	Sarajevo had merchant guilds during sixteenth-seventeenth century. Merchant colonies of Bosnian merchants blocked the settlement of Ragusan merchant colonies in Sarajevo and other Hungarian and Slavonian towns (Ogilvie (2011), p. 124).	R1

<i>SEVILLA</i>	In the sixteenth century, Seville restricted naturalization, and thus permission to trade as a long distance merchant, to men who were subjects of the Holy Roman empire or one of its allies, or those who could prove twenty years residence in Castile and fulfil a property requirement (Ogilvie (2011), p. 54).	R1
<i>SKOPJE</i>	Skopje (Molnár, 2007) and other Ottoman Balkan cities have been documented to have merchant colonies in sixteenth century that held commercial privileges (Ogilvie (2011), p. 10).	R1
<i>TIRGOVISTE</i>	Targoviste was an important town of Wallachia which in sixteenth century enjoyed commercial privileges even when some new settlements in Wallachia did not enjoy the same generous privileges as older ones (Rădvan, 2009).	R1
<i>TOLEDO</i>	In Toledo, during sixteenth century craft guilds became even more powerful and autonomous extending control over previously unregulated manufacture. No information specific to merchant guilds (Epstein (2004), p. 288).	R1
<i>TOULOUSE</i>	In Languedoc (Toulouse) marketing and finishing of proto-industrial woollens were monopolized by the merchant guilds of Clermont-de-Lodeve and other towns into the later eighteenth century (Ogilvie (2006), p. 415).	R1
<i>TOURNAI</i>	Antwerp emerged as a major trading market for traders of the region Ogilvie (2011). No evidence exists such that individual merchant guilds successfully blocked locals from doing trade through Antwerp. The closeness of Belgian cities hindered them from enforcing exclusive privilege (Ogilvie (2011), p. 31-32).	U2
<i>TOURS</i>	Tours received new privileged guilds in seventeenth century (Horn (2015), p. 224).	R1
<i>VALENCIA</i>	In Valencia, merchant guilds were existent in eighteenth century, as a guild court was established in 1762 (Smith (1940), p. 13).	R1
<i>VALENCIENNES</i>	In Valenciennes and Cambresis cities retained control of the linen proto-industry until the late eighteenth century (Ogilvie (2006), p. 414).	R1
<i>VALLADOLID</i>	Starting late fifteenth century Burgos received exclusive rights to trade at the expense of cities like Valladolid (Smith (1940), p. 69).	R1

<i>VENEZIA</i>	In Venice while non citizens (a large majority) (Ogilvie (2011), p. 53) were excluded from trade in sixteenth century; during the second half of sixteenth century rural representatives were able to negotiate concessions for tax allocation and collection (Epstein (2004), p. 301).	U1
<i>VERONA</i>	No specific mention of merchant guilds of Verona, but during the second half of sixteenth century rural representatives of Venetian republic were able to negotiate concessions for tax allocation and collection (Epstein (2004), p. 301).	U3
<i>WIEN</i>	It was in the eighteenth century that <i>Congress of Vienna</i> decided to remove city staple rights privileges (ART XXV).	R1
<i>WROCLAW</i>	In early modern period, Silesia (Wroclaw) had merchant guilds/privileged merchant companies in proto-industrial sectors (Ogilvie (2011), pp. 33-34).	R1

Table XI: City Clusters based on Hierarchical Clustering based on average distance (UPGMA)

City	Cluster Name	Number of Cities
ALMERIA	East Andalusia	9
AMSTERDAM	Netherlands	12
ANGERS	Western France	6
ANTWERPEN	Belgium	22
AQUILA	Roman	5
ATHINAI		1
AUGSBURG		4
AVIGNON	Southern France	7
BARCELONA		1
BELGRADE		1
BOLOGNA	Florence	10
BORDEAUX		2
BOURGES	Central France	3
BRESCIA	Milan	14
BRUGGE	Belgium	22
BRUXELLES	Belgium	22
BURGOS		1
CAEN	Northern France	5
CORDOBA	West Andalusia	18
CREMONA	Milan	14
ERFURT	Western Germany	8
FERRARA	Florence	10
FIRENZE	Florence	10
GDANSK		3
GENOVA		10
GENT	Belgium	22
GRANADA	East Andalusia	9
HAARLEM	Netherlands	12
HAMBURG	Northern Germany	4
JEREZ-DE-LA-FRONTERA		2
KOBENHAVN		1
KOELN	Eastern Germany	4
LEIDEN	Netherlands	12
LIEGE	Eastern Germany	4
LILLE	Belgium	22
LISBOA		3
LONDON		2
LUCCA	Florence	10
LUEBECK	Northern Germany	4

LYON		2
MADRID	Spanish	10
MAGDEBURG	Western Germany	8
MALAGA	West Andalusia	18
MANTUA	Milan	14
MARSEILLE	Southern France	7
MECHELEN	Belgium	22
MESSINA		15
METZ		4
MILANO	Milan	14
MURCIA		2
NAPOLI		3
NUERNBERG		3
ORLEANS	Central France	3
PADOVA	Venice	6
PALERMO		3
PARIS		5
PIACENZA	Milan	14
PISA	Florence	10
PLASENCIA		3
PLOVDIV		3
POZNAN	Poland	4
PRAHA		4
RENNES		2
ROMA	Roman	5
ROUEN	Northern France	5
SALONIKA		1
SARAJEVO		1
SEVILLA	West Andalusia	18
SKOPJE		3
TIRGOVISTE		2
TOLEDO		5
TOULOUSE		3
TOURNAI	Belgium	22
TOURS	Western France	6
VALENCIA		4
VALENCIENNES	Belgium	22
VALLADOLID	Spanish	10
VENEZIA	Venice	6
VERONA	Venice	6
WIEN		3
WROCLAW	Poland	4

Table XII: Columns 2a and 2b report the relative risk ratio coefficients for multinomial logit regression between 16th century economic institutions and 15th century diffusion of printing with additional variables. Column 1 reports the OLS regression for reference. Column 4a and 4b report the relative risk ratio coefficients for multinomial logit regression for cities within 150 km. Column 4 reports the OLS regression for the limited sample for reference. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2. Printing Penetration is a measure of level of diffusion of printed books in 15th century in a given city, from the 121 printing cities in GW database (see Section IV.4). Closeness Port is the square root of *constant* - Distance of the city from a sea port (see Section IV.3). Additional controls are described in Section V.

VARIABLES	(1)	(2a)	(2b)	(3)	(4a)	(4b)
Dependent Variable:	OLS	Mlogit $I_{nst}^{1600} = 1$	Mlogit $I_{nst}^{1600} = 2$	OLS $< 150km$	Mlogit $I_{nst}^{1600} = 1$ $< 150km$	Mlogit $I_{nst}^{1600} = 2$ $< 150km$
Print Penetration	-0.0617 (0.0427)	-1.558 (1.054)	-7.180 (5.026)	0.123*** (0.0417)	4.657** (1.816)	-1.411 (2.302)
Closeness Port	-0.0119 (0.0123)	-0.792** (0.320)	-0.620 (0.707)			
Print Penetration X Closeness Port	0.0151*** (0.00469)	0.255** (0.105)	0.426* (0.253)			
log(# cities in cluster)	0.161* (0.0825)	2.846** (1.210)	0.554 (0.868)	0.0731 (0.0825)	3.172** (1.511)	0.832 (1.469)
Growth 1500	0.0651 (0.132)	-0.669 (0.834)	-0.481 (0.951)	-0.0873 (0.165)	-2.595 (1.873)	-1.046 (1.988)
log(Population 1500)	-0.0552 (0.0838)	2.569** (1.248)	-2.903** (1.427)	0.110 (0.110)	4.883** (2.332)	-2.161 (3.849)
$\sqrt{Elevation}$	0.00140 (0.00898)	-0.0614 (0.118)	-0.851* (0.444)	-0.00267 (0.00845)	0.172 (0.159)	0.711 (1.493)
Medieval Fair	-0.0975 (0.139)	-4.403*** (1.585)	4.088** (1.862)	-0.289** (0.139)	-12.85*** (4.468)	-4.313 (3.761)
Near Atlantic				-0.235 (0.318)	0.850 (10.62)	20.71 (27.36)
Near Atlantic X Print Penetration				0.318** (0.131)	2.325 (2.908)	6.065 (4.142)
Constant	0.0127 (0.352)	-10.65 (7.366)	16.39 (14.71)	-0.531 (0.343)	-40.25** (16.43)	-28.81 (33.26)
Observations	74	74	74	56	56	56
R-squared	0.360			0.503		

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table XIII: The table replicates Table V with an alternate 15th century printing variable: Number of 15th century printing cities within 50 km distance from the observed city. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) OLS	(8) OLS
# Print Cities in 50km	0.223*** (0.0386)		0.205*** (0.0484)		0.167*** (0.0515)		0.152*** (0.0463)	
1 Print City in 50km		-0.0649 (0.127)		-0.0914 (0.153)		-0.119 (0.171)		0.0528 (0.150)
2 Print Cities in 50km		0.364 (0.348)		0.293 (0.361)		0.356 (0.299)		0.163 (0.217)
3 Print Cities in 50km		0.489* (0.282)		0.447 (0.282)		0.474* (0.249)		0.322 (0.240)
4 Print Cities in 50km		1.114*** (0.253)		1.093*** (0.258)		0.897*** (0.255)		0.862*** (0.129)
5 Print Cities in 50km		1.114*** (0.253)		1.085*** (0.305)		0.769** (0.334)		0.796*** (0.160)
6 Print Cities in 50km		0.864*** (0.104)		0.869*** (0.252)		0.410 (0.336)		0.434 (0.372)
log(# cities in cluster)			0.0183 (0.0969)	0.00226 (0.0953)	0.0406 (0.0869)	0.0312 (0.0880)	0.0366 (0.0885)	0.0606 (0.0743)
Growth 1500			0.0512 (0.187)	-0.0200 (0.189)	-0.00243 (0.163)	-0.0252 (0.148)	-0.0187 (0.165)	0.0687 (0.142)
log(Population 1500)			-0.0386 (0.102)	0.0135 (0.0962)	0.0517 (0.108)	0.0681 (0.0945)	0.0653 (0.114)	0.0488 (0.0972)
$\sqrt{Elevation}$			-0.00858 (0.0117)	-0.00585 (0.0114)	-0.000316 (0.00816)	0.00343 (0.00847)	-0.000737 (0.00812)	0.00360 (0.00932)
Near Atlantic					0.540** (0.255)	0.582** (0.272)	0.471 (0.373)	0.412 (0.285)
# Prt. Cities in 50km X Near Atl.							0.0374 (0.108)	
0 Prt. City in 50km X Near Atl.								0.124 (0.566)
1 Prt. Cities in 50km X Near Atl.								-0.492 (0.316)
2 Prt. Cities in 50km X Near Atl.								1.511*** (0.354)
3 Prt. Cities in 50km X Near Atl.								1.323*** (0.398)
4 Prt. Cities in 50km X Near Atl.								0.0484 (0.572)
5 Prt. Cities in 50km X Near Atl.								0 (0)
6 Prt. Cities in 50km X Near Atl.								0 (0)
Medieval Fair			0.0682 (0.168)	0.106 (0.167)	-0.0868 (0.161)	-0.0778 (0.168)	-0.0865 (0.163)	-0.153 (0.161)
Constant	0.0421 (0.0815)	0.136 (0.104)	0.204 (0.391)	0.117 (0.388)	-0.225 (0.350)	-0.234 (0.332)	-0.242 (0.363)	-0.189 (0.311)
Observations	59	59	56	56	56	56	56	56
R-squared	0.345	0.401	0.347	0.400	0.449	0.506	0.451	0.655

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table XIV: The table replicates Column 4 of V considering a limited sample of cities within x km of sea port. Columns 2 and 3 (in contrast to Column 1) have alternate measurement of city clustering (see Section V). Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.

VARIABLES	(1) OLS $x = 150$	(2) OLS $x = 150$	(3) OLS $x = 150$	(4) OLS $x = 50$	(5) OLS $x = 75$	(6) OLS $x = 100$	(7) OLS $x = 125$	(8) OLS $x = 175$	(9) OLS $x = 200$
Print Penetration	0.123*** (0.0417)	0.121*** (0.0407)	0.111** (0.0430)	0.0717 (0.0737)	0.140* (0.0780)	0.124** (0.0552)	0.119*** (0.0423)	0.122*** (0.0419)	0.0898** (0.0382)
log(# cities in cluster)	0.0731 (0.0825)	-0.0847 (0.163)		-0.0613 (0.171)	0.0215 (0.143)	0.0586 (0.106)	0.0654 (0.0828)	0.0724 (0.0817)	0.0780 (0.0775)
Growth 1500	-0.0873 (0.165)	-0.0847 (0.163)	-0.103 (0.166)	-0.181 (0.292)	-0.144 (0.231)	-0.164 (0.213)	-0.136 (0.198)	-0.0847 (0.159)	-0.0867 (0.152)
log(Population 1500)	0.110 (0.110)	0.120 (0.104)	0.121 (0.108)	0.0876 (0.188)	0.0449 (0.145)	0.101 (0.138)	0.110 (0.111)	0.112 (0.110)	0.112 (0.106)
$\sqrt{Elevation}$	-0.00267 (0.00845)	-0.00188 (0.00854)	-0.00542 (0.00940)	-0.0552 (0.0834)	-0.00732 (0.0448)	-0.00888 (0.00979)	-0.00676 (0.00916)	-0.00236 (0.00781)	-0.00233 (0.00717)
Near Atlantic	-0.235 (0.318)	-0.166 (0.309)	-0.332 (0.271)	-0.308 (0.426)	-0.249 (0.344)	-0.264 (0.331)	-0.270 (0.318)	-0.238 (0.317)	-0.309 (0.312)
Near Atlantic X Print Penetration	0.318** (0.131)	0.292** (0.134)	0.341*** (0.119)	0.404** (0.164)	0.334** (0.152)	0.341** (0.143)	0.336** (0.133)	0.320** (0.131)	0.348*** (0.128)
Medieval Fair	-0.289** (0.139)	-0.279** (0.135)	-0.265* (0.135)	-0.115 (0.387)	-0.177 (0.203)	-0.306* (0.179)	-0.276* (0.148)	-0.290** (0.138)	-0.239* (0.123)
log(# cities in small cluster)		0.127 (0.0897)							
log(# cities in large cluster)			0.0960 (0.0818)						
Constant	-0.531 (0.343)	-0.566* (0.323)	-0.637* (0.360)	-0.0911 (0.463)	-0.323 (0.473)	-0.464 (0.414)	-0.504 (0.353)	-0.531 (0.343)	-0.490 (0.337)
Observations	56	56	56	29	35	44	53	57	61
R-squared	0.503	0.516	0.507	0.589	0.558	0.547	0.503	0.506	0.497

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table XV: The table replicates Table III considering a limited sample of only the largest cities of fifteenth century Europe (see Table VIII). Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
Print Penetration	0.123*** (0.0443)	0.137*** (0.0416)	-0.0785* (0.0466)	-0.0775* (0.0446)	0.111** (0.0468)
Closeness Port		0.0256** (0.0110)	-0.0289** (0.0109)	-0.0264** (0.0123)	0.0212 (0.0189)
Print Penetration X Closeness Port			0.0181*** (0.00540)	0.0171*** (0.00593)	
log(# cities in cluster)				0.212* (0.122)	0.226* (0.132)
Growth 1500				-0.000366 (0.191)	-0.00215 (0.210)
log(Population 1500)				-0.00634 (0.148)	-0.0168 (0.153)
$\sqrt{Elevation}$				0.00567 (0.0141)	0.00126 (0.0150)
Medieval Fair				-0.0689 (0.159)	0.00444 (0.167)
Constant	-0.0773 (0.0891)	-0.444** (0.179)	0.224* (0.112)	-0.147 (0.613)	-0.666 (0.605)
Observations	57	57	57	53	53
R-squared	0.101	0.185	0.280	0.352	0.274

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table XVI: The table replicates Table V considering a limited sample of only the largest cities of fifteenth century Europe (see Table VIII) within 150km of sea port. Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Print Penetration	0.198*** (0.0579)	0.178** (0.0724)	0.210*** (0.0639)	0.149** (0.0542)
log(# cities in cluster)		0.197 (0.206)	0.230 (0.174)	0.126 (0.174)
Growth 1500		0.00338 (0.323)	0.0279 (0.244)	-0.123 (0.231)
log(Population 1500)		-0.0435 (0.208)	0.0831 (0.185)	0.144 (0.179)
$\sqrt{Elevation}$		-0.00760 (0.0156)	0.00710 (0.0137)	0.00467 (0.0156)
Near Atlantic			0.685** (0.268)	-0.742 (0.540)
Near Atlantic X Print Penetration				0.471** (0.224)
Medieval Fair		-0.0401 (0.213)	-0.334** (0.161)	-0.338** (0.149)
Constant	-0.177 (0.115)	-0.299 (0.943)	-1.076 (0.804)	-0.857 (0.810)
Observations	41	39	39	39
R-squared	0.188	0.235	0.399	0.493

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table XVII: The table replicates Table III considering a limited sample excluding those cities that are coded as R3 or U3 (see Table I). Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
Print Penetration	0.123** (0.0486)	0.136*** (0.0431)	-0.0770 (0.0501)	-0.0747 (0.0498)	0.122** (0.0483)
Closeness Port		0.0378*** (0.0124)	-0.0228 (0.0163)	-0.0233 (0.0163)	0.0334** (0.0149)
Print Penetration X Closeness Port			0.0186*** (0.00587)	0.0176*** (0.00523)	
log(# cities in cluster)				0.192* (0.100)	0.201* (0.104)
Growth 1500				0.0864 (0.151)	0.100 (0.164)
log(Population 1500)				-0.0900 (0.0994)	-0.0946 (0.112)
$\sqrt{Elevation}$				0.00124 (0.0122)	0.000284 (0.0130)
Medieval Fair				-0.0293 (0.178)	0.0298 (0.181)
Constant	-0.0629 (0.120)	-0.580*** (0.193)	0.127 (0.144)	0.136 (0.512)	-0.526 (0.526)
Observations	59	59	59	55	55
R-squared	0.067	0.219	0.287	0.348	0.290

*** p<0.01, ** p<0.05, * p<0.1

Table XVIII: The table replicates Table V considering a limited sample excluding those cities within 150km of sea port, that are coded as R3 or U3 (see Table I). Dependent variable is 16th century nature of economic institutions in a given city as described in Section IV.2.

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Print Penetration	0.210*** (0.0690)	0.238*** (0.0700)	0.257*** (0.0670)	0.161** (0.0708)
log(# cities in cluster)		0.153 (0.130)	0.120 (0.107)	0.0740 (0.105)
Growth 1500		0.104 (0.245)	0.0537 (0.176)	-0.0852 (0.185)
log(Population 1500)		-0.202 (0.136)	-0.0670 (0.116)	0.0723 (0.128)
$\sqrt{Elevation}$		-0.0266 (0.0183)	-0.0107 (0.0127)	-0.00741 (0.0127)
Near Atlantic			0.862*** (0.277)	-0.557 (0.533)
Near Atlantic X Print Penetration				0.460** (0.201)
Medieval Fair		0.0157 (0.242)	-0.287 (0.207)	-0.326* (0.184)
Constant	-0.205 (0.175)	0.257 (0.539)	-0.417 (0.445)	-0.515 (0.437)
Observations	42	40	40	40
R-squared	0.129	0.236	0.474	0.529

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1