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Ports, plagues and politics: explaining Italian city growth 1300–1861

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The evolution of city growth is usually studied for relatively short time periods. The rise and decline of cities is, however, typically a process that takes many decades or even centuries. In this article we study the evolution of Italian cities over the period 1300–1861. Using an existing data set, we perform panel estimations where the development of city size and urban patterns can be explained by various geographical, institutional and other determinants of city size for the period under consideration. Although large shocks such as the plague epidemics are clearly visible in the data, our baseline estimation results show that the main determinants of Italian city growth are physical geography and the predominance of capital cities. With respect to geography, being a seaport or having access to navigable waterways increases city size whereas a city's relative location, measured by its urban potential, is not significant. Being a capital city also increases city size. The estimation results reveal strong century-specific effects on city growth and these effects differ markedly between the North and South of Italy. Additional estimations show that these time effects can be linked to the political and institutional developmental changes over time in Italy. Our findings that the capital city bonus increases and non-capital cities suffer when the political power and the institutions of the state are more centralised corroborate the idea that institutions are a key factor in explaining Italian city growth.

1. Introduction

Two key questions in urban economics are why cities differ and how they develop over time. In a nutshell, the answer is the inter-city variation in the mix of agglomeration and spreading forces and the fact that these forces change over time (Gordon *et al.* 2000; Fujita and Thisse 2002). Shifting patterns of urbanisation caused by the relative rise and decline of cities are processes that take many years. By applying a long-term perspective, these changes and their causal factors become visible (de Vries 1984, pp. 141, 242-3). In general, economic factors can explain the process of urbanisation in Europe. Most medieval European cities were small according to modern standards. In pre-modern times cities faced high relative costs of trade due to technological and institutional constraints. For their basic food consumption cities were dependent on nearby intensive agriculture, as described in the well-known Von Thünen model. European cities engaging in long-distance trade and finance were able to broaden their scope. From the sixteenth century onwards port cities became dominant with the development of colonies outside Europe and the increase of overseas trade, especially those with direct access to the Atlantic, leading to the relative downturn of Mediterranean harbours (Braudel 1972; Acemoglu *et al.* 2005). After 1750, early European industrialisation relied on water power and later also on coal. The access to these energy sources became an important factor in determining the location and pace of industrial activity and for that matter of urbanisation. More institutional approaches with regard to city growth stress the importance of state formation and centralistic political regimes – sometimes in the form of growing absolutism – in explaining urban activity within Europe and its regions in the early modern period (DeLong and Shleifer 1993, p. 689; Epstein 2000, pp. 69–70; Chor 2004, pp. 560–1).

It is easy to produce many more examples like these. They serve to illustrate that over the long haul the balance between agglomerating and spreading forces changes. One might thus expect that the city-size distribution and also the ranking of individual cities in the distribution would change over time, influenced by economic and political-institutional forces. Growing cities that were once only of local importance overtake former important centres. This is, however, not the general conclusion from the literature. As illustrated in, for example, de Vries (1984) and Hohenberg (2004), the European system of cities seems to have been remarkably stable: 'Taking both the resistance and the resilience of cities together, it is perhaps not surprising that the European system should rest so heavily on places many centuries old, despite the enormous increase in the urban population and the transformation in urban economies' (Hohenberg 2004, p. 3051).[1] Lock-in effects and self-reinforcing agglomeration forces seem to play a big role here.

[1] De Vries (1984) supplied the following account of the European pattern of urbanisation: 'Between 1500-1750 urban growth was concentrated in the larger cities, and in those whose growth persisted long enough for them to become large... Urbanization was not characterized by the "birth" of numerous new cities... Between 1750 and 1850 an "interlude" of new urbanization from below created many new urban settlements, caused by rapid population growth, technical innovation, and changed relative prices that brought a new prosperity to the agricultural sector...But with the coming of the railways large-city growth reasserted itself.' (De Vries 1984, pp. 101–2, 258). See also the example of the ten largest port cities of the USA in 1920 that still remain large although their initial advantage of cheap water access has ceased to play an important role anymore: Fujita and Mori 1996, p. 94.

Theories regarding the existence and development of cities recently experienced a revival.[2] All of these theories contain important elements to explain the actual development of cities. The starting point for this article is that whatever the relevance of each of these theoretical approaches, a prerequisite for any testing of these modern urban theories is, however, the availability of well-documented, historical analyses of urban development. The main contribution of this article is twofold. First, and building on Malanima (1998b, 2005), we use a large historical data set on more than 500 Italian towns for the period 1300–1861. Italy is one of the first urbanised areas in early modern history with abundant quantitative evidence on city development.[3] In sketching the development of urban hierarchies in Europe around 1250, Russell (1972) labelled Italy as 'the most advanced and urbanized country in Europe and probably even in the world'. Moreover, Italian cities experienced many exogenous shocks with different characteristics. The resulting variation in the data allows for an empirical analysis. We supply a short survey of descriptive statistics on individual city size and the city-size distribution as a whole to highlight the main characteristics of Italy's urban system. The second, and more important, contribution of this article is the presentation of panel data estimates to provide a deeper understanding of the development of Italian cities for the period 1300–1861. Our data allow for panel estimation where city size is regressed on various geographical, political/institutional and economic determinants of city size. We show that, besides the Black Death in the fourteenth century and the demographic crises brought on by the plague epidemics of the seventeenth century, the main determinants of city growth in Italy are invariably physical geography and the role played by capital cities. With respect to geography, being a seaport or having access to navigable waterways increases city size whereas a city's relative location, as measured by urban potential, is not significant. Being a capital city also increases city size. The estimation results also reveal strong century-specific effects on city growth and these effects differ markedly between the North and the South of Italy. Additional estimations show that these time effects can be linked to changes in the political and institutional development in Italy over time. We find that the capital city bonus increases and that non-capital cities decline in a relative sense when political enforcement is more centralised.

[2] This is best illustrated by J. V. Henderson and J-F. Thisse (eds.) (2004), *Handbook of Regional and Urban Economics*, vol. 4: *Cities and Geography*, and Davis and Weinstein (2002). The contributions in this handbook illustrate that in the past 15 years or so, new location theories have come to the fore. In this respect, Krugman (1991) deserves to be mentioned. This paper initiated the New Economic Geography (NEG) literature that formalises in a general equilibrium framework the agglomerating and spreading forces that determine the spatial distribution of economic activity.

[3] Karl-Julius Beloch was the first to make a systematic study of population development for the whole peninsula (Beloch 1937, 1961, 1965).

2. The data set

Before starting our empirical analysis, we briefly discuss the data that we use in this article. Throughout, we use centennial data on city size by number of inhabitants collected by Malanima, who compiled a data set comprising over 500 Italian towns between 1300 and 1861.[4] The final year of the database is 1861, the year of Italy's unification and also the year of the first Italian national census. Unless indicated otherwise, the main unit of analysis used in this article is cities with at least 10,000 inhabitants, although we will also frequently show results when using all cities with at least 5,000 inhabitants. By using this urban threshold of 10,000 inhabitants, we aim to exclude large villages and – this is especially relevant for the southern part of Italy – so-called agro-towns, which were mainly agricultural centres.[5] By looking mainly at cities with at least 10,000 inhabitants we aim to capture 'true' cities, i.e. centres of commercial exchange, having links with other cities and having influence over the broader region through their juridical, ecclesiastical, administrative and educational functions (de Vries 1984; Cowan 1998; Epstein 2001). Given the importance of the North–South divide in Italy, we will not only present results for Italy as a whole but we will also frequently look at North and South separately and look for differences in urban development between the two. Invariably we use the present regional southern borders of Tuscany, Umbria and Marche as the dividing line (Malanima 1998a, p. 95).[6]

Complementing these city-size data, we have collected additional data that we will use in our empirical analysis in Section 4 as well as for our calculation of the size of the markets that a city has access to – the so-called urban potential – in Section 3.2. For each individual city we have collected information on the nature of its geographical location: its longitude and latitude to calculate distances between any two cities; its elevation above sea level; whether it is a major seaport or located at a navigable river (the river Po and its subsidiary rivers Adige, Adda, Mincio and Ticino and the river Arno in Tuscany);[7] and whether it is directly connected to a major Roman road (see Appendix A for a map of these Roman roads), or a crossing of at least two Roman roads (hub). As our final city-specific variable, we have collected information on which cities served as (regional)

4 www.issm.cnr.it/asp/cv/malanima/dati/urban.pdf, and Malanima (1998a).

5 See Malanima (1998a). Recently this view has been attacked by scholars who point to the important role played by many towns in southern Italy that had jurisdictional rights over surrounding communities and thus can be seen as fitting the functional approach with regard to cities (Marin 2001, pp. 318–19, 326).

6 See Appendix A for a map illustrating this division as well as showing the boundaries of Italy's present-day provinces; this map will be used in Section 3.

7 Outside the Arno Valley (with cities like Pisa and Florence) and Po Plain there was no canal construction and many rivers dried up completely during the summer, which limited the economic role of these waterways.

capital cities in each of the centuries of our sample (see Appendix A for an overview).

Along with these city-specific variables, we will use city-*in*variant variables in our empirical analysis in Section 4.3 as well. These variables measure (the evolution of) the quality of institutions. From Acemoglu *et al.* (2005) we took the 'protection for capital' variable; from DeLong and Shleifer (1993) we took a classification of western European regimes; and from Tilly (1990) we included a variable measuring the relative development of coercion versus capital. The last two variables distinguish explicitly between the North and the South.

3. City size and city-size distribution in Italy from 1300 to 1861

3.1. Italian urbanisation in historical perspective

Around the year AD 1000 the largest Italian cities were to be found in the south of the peninsula and on Sicily. But between 1000 and 1300 the northern towns witnessed a large expansion and increasingly dominated economic life in Europe. In the centre and the north of Italy three major economic regions developed: Tuscany with the centre Florence, the upper Po Valley with Milan and the territory of Venice. These cities with over 100,000 inhabitants were surrounded by about 100 medium-sized towns with more than 5,000 inhabitants. The average number of inhabitants per square km was 38.0 for the region of Venice, 34.5 for Milan and 40.0 for the Florence region (Russell 1972, p. 239). Urbanisation rates – together with the size of urban population widely seen as an indicator of economic prosperity – in Italy were high compared with the rest of Europe. Bairoch calculated an average European urbanisation rate of 9.5 for 1300 (Bairoch 1988, p. 258), whereas urbanisation rates in Italy were almost 20 per cent (Malanima 2005, p. 101). Only regions like Flanders, Brabant and Holland came close to the Italian urbanisation ratios in this period.

Table 1 reveals large fluctuations in total city population as well as in urbanisation rates between 1300 and 1861. Between the North and the South we find clear differences in long-term urban development. The North starts out in 1300 as having a much more developed urban system than the South, with a larger urban population and a higher urbanisation rate. However, during our sample period the South slowly overtakes the North both in terms of total urban population as well as in urbanisation rate (the North even becomes slightly less urbanised over the centuries).

As to the major shocks that hit the Italian cities during our sample period the plague epidemics clearly stand out. The death toll of the Black Death between 1348 and 1351 is estimated at about 40 per cent of the total population of the peninsula. Recent calculations by Malanima (2005)

Table 1. *Italian city size (North and South) for cities >= 10,000*

	1300	1400	1500	1600	1700	1800	1861
	TOTAL CITY POPULATION (x 1,000)						
Italy	1840	692	1339	2148	1916	3105	5011
% North	76 %	84 %	65 %	53 %	54 %	47 %	43 %
% South	24 %	16 %	35 %	47 %	46 %	53 %	57 %
	URBANISATION (% total population living in cities >= 10,000)						
Italy	0.15	0.09	0.15	0.16	0.14	0.17	0.19
North	0.18	0.12	0.16	0.14	0.13	0.14	0.13
South	0.09	0.03	0.13	0.19	0.16	0.21	0.26
	NUMBER OF CITIES						
Italy	79	26	51	75	66	126	201
% North	67 %	81 %	61 %	49 %	52 %	40 %	33 %
% South	33 %	19 %	39 %	51 %	48 %	60 %	67 %
	CITY RANK CORRELATION RELATIVE TO 1861						
Italy	0.473	0.460	0.711	0.686	0.785	0.744	1.000
North	0.658	0.533	0.808	0.751	0.819	0.858	1.000
South	0.280	0.833	0.576	0.551	0.724	0.606	1.000
	CITY SIZE CORRELATION RELATIVE TO 1861						
Italy	0.519	0.444	0.907	0.914	0.926	0.963	1.000
North	0.917	0.896	0.908	0.737	0.792	0.876	1.000
South	0.627	0.842	0.987	0.978	0.980	0.995	1.000

Source: Malanima (1998a, b).

indicate that the population in central and northern Italy declined from an estimated 7.75 million to 4.72 million between 1300 and 1400. The urbanisation rate fell from 15 per cent to 9 per cent for Italy as a whole (see Table 1), which confirms the notion that urban population suffered a great deal more from the epidemic than the rural population. 'There is no doubt that in Italy the consequences of the plagues were always heavier for the urban than for the rural populations' (Malanima 1998a, p. 99; see also Belfanti 2001, pp. 303, 308). By 1500 the overall population had increased again to 5.31 million and the urbanisation rate had regained its 1300 level (Malanima 2005). But between 1600 and 1700 a second big wave of plague epidemics swept across Italy, resulting in a loss of more than one million people. Particularly the plagues of 1629–31 and 1656–7 had detrimental effects on the population level, with an average death rate of at least 20 per cent (Cipolla 1981, p. 102). Urban recovery from these shocks was slow. In 1700 both the total city population and the urbanisation rates were well below the levels of 1600 (see Table 1). Figure 1 gives the death toll for the seventeenth-century plague epidemic for a number of cities. It not only illustrates the large losses in urban population but also the large variation in death rates across the cities. Several authors have noted however that these demographic crises had more effect on rates of urbanisation than on urban

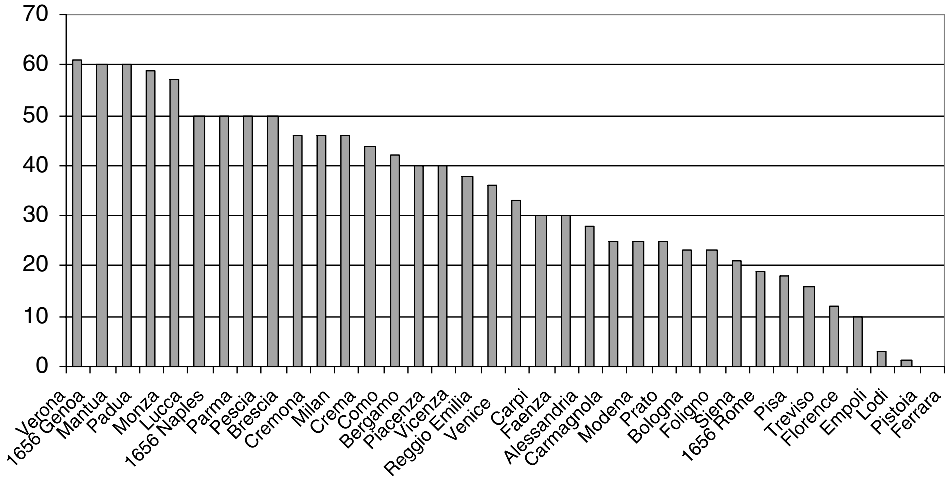

Figure 1. *Deaths as percentage of the population during the plague epidemic of 1629–31*

Source: Own survey of the literature (various sources, available upon request).

hierarchies (Belfanti 2001, pp. 304-5). We will refer back to Figure 1 when discussing our estimation results in Section 4.

The most important demographic crises can be ascribed to the plague epidemics, but slow urban growth was also an effect of politics, wars and economic change. From the fourteenth century onwards the existing system of independent city-states in northern Italy transformed into one in which cities claimed their rights over larger territorial states. Urban rivalry within these states intensified, which resulted in shifts in the functions of cities and in the establishment of clearly defined hierarchies among towns. According to Epstein, metropolitan growth was not dependent anymore on being an international node of trade and finance. Instead, establishing the domination over a regional economy became a crucial aim of city oligarchies (Epstein 2000, p. 92). These changes produced very different outcomes depending on the way in which hegemony was enforced and some authors claim that this has changed patterns of urbanisation across the regions. For example, the urban rank-size distributions reveal that towns in Lombardy were back to their pre-Black Death size much earlier than in Tuscany (Epstein 2000, pp. 89–105; Belfanti 2001, pp. 292–314).

Military agony came with the Italian Wars in the first half of the sixteenth century. Cities fought against French and Spanish troops but also against each other. Towns were sacked, such as Ravenna, Rapallo, Prato and Rome, or besieged for lengthy periods, such as Pisa, Verona, Florence and Siena. These hostilities coincided not incidentally with plagues, bad harvests and famines. Initially most cities were able to recover from the resulting demographical shocks. Halfway through the sixteenth century northern Italy was still the largest industrial area in Europe. A definitive reversal of fortune came with the severe food crises 50 years later in the 1590s.

Recent analyses, however, paint a subtler picture, i.e. one characterised by only *relative* economic decline, due to the loss of economic primacy in Europe and to shifts in economic activity between town and countryside.[8] According to this approach structural forces and shifting patterns of trade are stressed. For example, Venetian leadership in the Mediterranean economy witnessed a downturn when it lost its spice trade to the Atlantic ports. The loss of the northern markets for textiles and luxuries coincided with supply-side problems in urban areas. Italian cities lost their competitive edge to northwestern Europe (Broadberry and Gupta 2006, p. 10). High production costs and high urban taxation rates together with monopolistic practices of guilds moved industrial producers to smaller cities and to the countryside (e.g. textile production and raw silk production), where wages and rates of taxation were lower. Despite these relative drawbacks, however, Italy remained the country with the largest urban population in Europe (DeLong and Shleifer 1993, p. 678).[9]

The above-described incidental shocks like the plague, wars or famines and also the more enduring structural changes in e.g. trade patterns and institutional developments can in principle affect the position of individual cities in the total distribution of cities. This makes the general consensus on the stability of the European urban system(s) alluded to in the introduction (see de Vries 1984 and Hohenberg 2004) indeed quite remarkable, as it would imply that all these potential effects leave the urban system and also individual cities largely unaffected. To see if the Italian data support this notion of stability, the bottom part of Table 1 provides, as a first pass, both the rank and the size correlation of the Italian cities in our data set with their respective rank and size in 1861. The rank correlations reveal the comparability of the ranking of individual cities in the overall city-size distribution in a particular century with the ranking in 1861. The size correlations lead to similar observations but this time in terms of actual population size. The two statistics complement each other as a change in a city's size need not result in a change in the city's rankings and vice versa.

[8] For a discussion see Malanima (2006, pp. 108–11).

[9] If we count the number of cities with more than 10,000 inhabitants, in both 1300 and 1861 Italy was still the leading European country with respectively 79 and 201 cities with more than 10,000 inhabitants (see Table 1), which was ahead of countries like France and England.

For Italy as a whole the rank correlation with 1861 shows more variation than the size correlation. This indicates that, on average, individual cities' sizes do not drastically change over the centuries, however they do change enough to let them switch ranks in the overall distribution. Again the North–South division shows large differences between the urban developments in these two parts of the peninsula. City-size correlations in the South are even higher than for Italy as a whole, whereas the rank correlation is considerably lower. In the North cities' ranks are more stable, whereas the size correlations are lower. South Italy had only a few large urban centres and many relatively small cities. These small cities change little in size over time but frequently switch rank with other small cities, inducing the high size correlation in combination with the lower rank correlation. In the North the urban hierarchy is much more stable, with more cities of different sizes. These cities do change in size, but given the larger differences in size between cities they do not switch rank frequently. The additional summary statistics provided in Appendix B confirm this story. To illustrate the existence and evolution of the Italian urban system(s) even more accurately we will look at the so-called urban potential of cities.

3.2. Urban potential

As already stated by de Vries (1984), in the period under consideration Italy consisted of several relatively autonomous urban subsystems that were headed by large cities, most notably Naples, Venice, Milan, Palermo, Genoa, Rome and Florence. Some of the large cities, such as Venice and Genoa, even headed urban systems that stretched beyond the Italian territory. To illustrate the existence of subsystems on the peninsula we calculated for each city its *urban potential*. The urban potential serves as our proxy for the size of the markets a city has access to. It explicitly takes account of a city's location in the urban system by incorporating its distance to other cities and as such introduces a spatial dimension to the analysis. More specifically, it measures the sum of distance-weighted population of all cities surrounding the city under consideration. When using distance in terms of kilometres only, this might give a distorted view because some cities are landlocked and others are interconnected by navigable waterways (see de Vries 1984). In order to deal with these differences we use distance weights that highlight special transportation characteristics of certain cities.

Following de Vries, we calculated the urban potential for each city i as follows:

$$U_i = \sum_{j=1}^{n} \frac{Pop_j}{w_{ij} D_{ij}} \qquad (1)$$

where Pop_j is the population of city j, D_{ij} is the great-circle distance between city i and city j and w_{ij} is a distance weight defined as follows:

$$w_{ij} = \begin{cases} 0.5 & \text{if} \quad \textit{city i and city j both major seaports} \\ 0.75 & \text{if} \quad \textit{city i and city j connected by a navigable waterway} \\ 0.8 & \text{if} \quad \textit{city i and city j both located on a Roman road} \\ 0.95 & \text{if} \quad \textit{city i a major seaport and city j on the coast but no major seaport} \\ 0.975 & \text{if} \quad \textit{city i and city j both on the coast but no major seaports} \\ 1 & \text{if} \quad \textit{none of the above or } i = j \end{cases} \qquad (2)$$

Note that we do not weight own city population when calculating the urban potential by taking $D_{ij} = 1$ if $i = j$, which is different from de Vries who applies $D_{ij} = 20$ if $i = j$. We see no reason to weight own city population, because we argue that own city population constitutes the most relevant accessible pool of potential workers/consumers to a specific city.

Using the calculated urban potential per city we are able to sketch the development of urban subsystems in Italy over time very accurately. The maps in Appendix C show contour shades of the urban potential over the centuries, with the darker (lighter) regions indicating highly (less) urbanised areas respectively. They show how in the North a pronounced, dense urban system existed, with major cities such as Florence, Milan, Venice and Bologna surrounded by medium-sized cities like e.g. Siena, Genoa, Cremona and Brescia. From 1600 onwards, the rapid rise of Turin is clearly visible. In the South three large subsystems appear around Rome, Naples and Palermo. In contrast to the North, these systems are heavily concentrated around the main cities with hardly any other medium-sized cities in the immediate surroundings. From 1800, more cities appear, such as the subsystem of Bari.[10] A comparison between the maps of 1300 and 1400 clearly reveals the devastating impact of the bubonic plague around 1350 on the urban systems in Italy. During the sixteenth century the demographical recovery after the Italian Wars shows up, and this contrasts with the seventeenth century which saw new wars and subsequent plague episodes. When comparing 1600 with 1700 one can see a decline in the extent of the urban system in the North, whereas e.g. the system around Rome increases in size.

De Vries (1984) noted earlier that own city population represents a significant part of a city's urban potential. In our case where we do not down-weight own population, this may be even more so. Figure 2 provides clear evidence on the relationship between a city's calculated urban potential and its own population size.

Figure 2A shows that the urban potential is almost fully captured by its own city population only for the very large cities, e.g. Naples, Rome and

[10] This is consistent with the discussion of the rank and size correlation in the previous section.

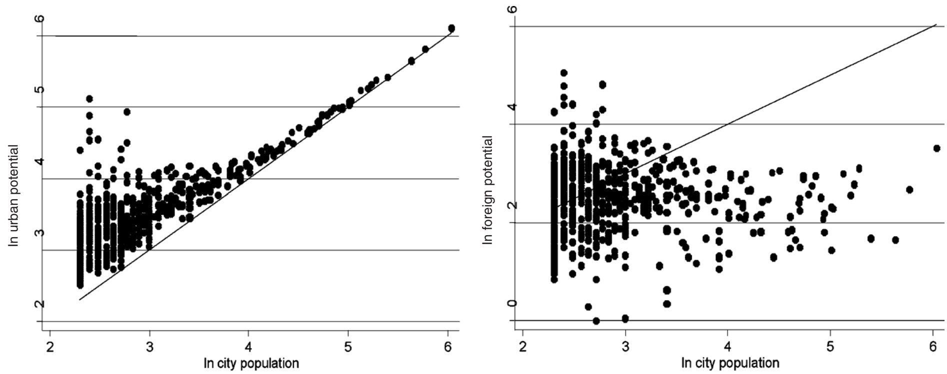

Figure 2. (A) *City population vs urban potential* (B) *City population vs foreign potential*

Notes: The bold line in each figure is the 45°-degree line. The correlation between urban potential and foreign potential and own city population is 0.69 and 0.06 respectively (the correlation with foreign potential is also not significant even at the 10 per cent level, whereas the correlation with urban potential is very significant).

Milan (see also Table C1 in Appendix C). It is only for smaller cities that the urban potential clearly exceeds the own city size.[11] To abstract from the part of urban potential due to own city population, we also calculate the urban potential *excluding* the own city size, what we call here the *foreign* urban potential. It measures the density of the urban system in the area surrounding a city. Although foreign potential exceeds own city population only for the smaller cities, this indicator is not significantly correlated with own city size as shown in Figure 2B. Two large cities in close proximity seem to be the exception; usually the larger city is surrounded by several smaller cities.

Table C1 and Figure C1 in Appendix C give additional information on the actual movement of the largest individual cities within the city distribution, supplementing the information given by the rank and size correlation shown in Table 1 and the urban potential maps of Appendix C. It shows that at the beginning of the sample period the northern Italian cities dominate their southern counterparts in terms of size. From the fifteenth century onwards, however, the southern cities quickly gain importance. In 1800 Naples, Rome and Palermo are the three largest urban centres of the peninsula. The rankings also show that in the North the dynamics of the largest cities in terms of their rank are more pronounced. Although the large northern cities in the years around 1300 are generally also among the largest northern cities in 1861, notable changes in rank take place, in contrast to the much more stable South. Florence, for example, was second amongst the northern

[11] Note that by construction a city's urban potential is never smaller than its own population.

cities in 1300, but occupied only fifth place in 1500, and ended up as the fourth largest northern city in 1861. At the end of the sample period, Siena, Piacenza, Cremona, Brescia and also Venice are additional examples of cities moving down the urban hierarchy in the North. Cities like Genoa and Turin took their place instead. Being one of the smaller cities in the earlier centuries, Turin became a capital city in 1568 and quickly moved upwards in the city-size ranking, ending up as the second largest northern city in 1861.[12]

Overall the statistics presented in Section 3 lead to the following observations. The impact of large shocks (for example, the Black Death in the fourteenth century, the plagues and the political and economic turmoil in the seventeenth century) is clearly visible in the data and we show that the position of individual cities is far from constant through time. There is, however, a remarkable degree of continuity in the urban system as a whole, both in the North and the South. *Stability amidst change* seems to sum up the material presented in this section. This qualification is different from the description by Hohenberg (2004) who found the system of cities in Europe 'remarkably stable'. Our conclusion immediately raises a new and more fundamental question. What are the determinants of Italian city growth between 1300 and 1861 that help to explain the city trends discussed above? The rest of our article aims to provide some answers to this question.

4. The determinants of Italian city growth 1300–1861

4.1. Methodology

As we have data on individual cities over a long period of time, the use of multivariate panel data regression analysis is an obvious choice to look for evidence on possible determinants of the development of Italy's cities. This enables us to distinguish between factors that are constant over time and those that are not. Our method is as follows. The dependent variable is always the log of city size. This implies that the coefficients on the included variables can be interpreted as relative changes, e.g. the coefficient on our capital city dummy indicates how much per cent larger the average capital city is relative to the average non-capital city. We use centennial data on the population size of settlements in Italy that had at least 10,000 inhabitants in the period 1300–1861 as our *baseline* sample. For completeness we also present estimation results for the 5,000 inhabitants' cut-off. All estimation results are obtained using a random effects GLS panel estimator, which

[12] When looking at the foreign urban potential rankings instead, one also observes a shift from a top 10 dominated by northern cities at the beginning of the sample period to one dominated by southern cities (mostly those around Rome and Naples) in 1861 (results are available upon request).

allows for unobserved heterogeneity over the cities in our sample that is uncorrelated with the regressors. In all cases the Breusch–Pagan statistic indicates that this specification is preferred over a standard pooled panel regression (see p-value BP in corresponding tables).

We distinguish between three sets of explanatory variables: (i) geographical variables; (ii) political/institutional variables and (iii) city-invariant century-specific variables. The last set of variables will be captured *eithe*r by a set of time (i.e. century) dummies *or* by a time trend and two dummy variables capturing the effect of the plague epidemics in the fourteenth and seventeenth centuries respectively.[13] We split the first set of explanatory variables further into variables related to a city's physical geography, i.e. being a major seaport, being located at sea, on a navigable river, at more than 800m above sea level, on a Roman road or a crossroad of two Roman roads, and its relative geography, i.e. a city's access to markets other than its own measured by foreign urban potential. As for the second set of variables, the political/institutional variables, we include a capital city dummy in our baseline estimations. Being a (regional) capital is expected to contribute positively to city size, since government is able to draw 'resources from the territory as a whole to the political and administrative capital, whose regional hegemony therefore tends to increase' (Epstein 1993, p. 457; see also Ades and Glaeser 1995). Also, we explicitly allow for differences between the North and the South of Italy, and for the fact that these differences may evolve over time. Finally, when extending the baseline estimates in Section 4.3, we will make use of those variables already mentioned in Section 2 as introduced by Acemoglu *et al.* (2005), De Long and Shleifer (1993) and Tilly (1990) that aim to capture the evolution of institutions in Italy (the latter two do so by explicitly making a distinction between North and South Italy).

4.2. Baseline estimation results

The baseline results are presented in Table 2. In this table, as well as in Table 4 in the next subsection, below each coefficient the p-value corresponding to the robust standard error is given. This value indicates the maximum confidence level at which the parameter estimate is significant, i.e. if it indicates [0.023] the parameter is significant at a 2.3 per cent level or higher, and not at e.g. the 2 per cent level. It is likely that the error terms for each specific city display a substantial degree of autocorrelation over time, given the fact that we cannot control for some city-specific time-varying unobserved characteristics. The unobserved city-specific heterogeneity that

[13] We will explicitly mention when and why we use either of these two options when discussing the results.

Table 2. *Baseline estimates Italian city growth 1300–1861*

		Cities >=5	Cities >=10	North >=5	Cities >=5	Cities >=10
Geography						
Seaport		0.345	0.316	0.495	0.305	0.250
		[0.002]	[0.016]	[0.059]	[0.003]	[0.046]
Roman road		0.214	0.070	0.230	0.198	0.036
		[0.000]	[0.287]	[0.041]	[0.000]	[0.571]
Hub		0.278	0.339	0.126	0.218	0.277
		[0.196]	[0.063]	[0.697]	[0.224]	[0.047]
Navigable waterway		0.626	0.388	0.717	0.668	0.433
		[0.000]	[0.008]	[0.000]	[0.000]	[0.003]
Mountains		−0.109	−0.087	−0.032	−0.109	−0.091
		[0.005]	[0.116]	[0.752]	[0.004]	[0.098]
Foreign urban potential		0.069	0.015	0.003	0.017	−0.042
		[0.073]	[0.815]	[0.979]	[0.713]	[0.566]
Institutions						
Capital		0.909	0.702	0.604	–	–
		[0.000]	[0.000]	[0.000]	–	–
	North	–	–	–	0.741	0.535
		–	–	–	[0.000]	[0.000]
	South	–	–	–	1.729	1.575
		–	–	–	[0.001]	[0.001]
p-value North = South		–	–	–	[0.070]	[0.034]
Constant		1.833	2.643	2.041	2.065	2.871
North	1400	−0.367	−0.420	−0.465	−0.426	−0.400
	1500	−0.179	−0.097	−0.306	−0.277	−0.162
	1600	−0.021	0.071	−0.133	−0.118	−0.032
	1700	−0.026	0.051	−0.148	−0.125	−0.048
	1800	0.124	0.162	0.047	0.054	0.078
	1861	0.211	0.286	0.174	0.146	0.260
South	1300	–	–	–	−0.368*	−0.645
	1400	–	–	–	−0.840*	−1.708
	1500	–	–	–	−0.495	−0.710
	1600	–	–	–	−0.288	−0.417
	1700	–	–	–	−0.301	−0.436
	1800	–	–	–	−0.123	−0.286
	1861	–	–	–	−0.009	−0.157
p-value years		[0.000]	[0.000]	[0.001]	[0.000]	[0.002]
max p-value North = South		–	–	–	[0.140]	[0.039]
p-value regions		[0.027]	[0.446]	[0.200]	[0.003]	[0.196]
R^2		0.45	0.50	0.44	0.48	0.57
p-value BP		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Nr observations		1702	623	635	1702	623

Notes: p-values in brackets. p-value years/regions respectively denotes the p-value of the F-test for the joint significance of the time/region dummies. p-value North = South denotes the p-value for a test of equality of the North and South specific capital city coefficients. p-value BP denotes the p-value of the Breusch–Pagan test for random effects. In the first three columns, the time dummies are not separately estimated for North and South. max p-value North = South denotes the maximum p-value for a test of equality of the North and South dummy. *in column 4 denotes significantly different from the North in that year.

does not change over time is captured by allowing for random effects. When using standard or heteroscedasticity corrected standard errors instead, this can result in an over-rejection of the null-hypothesis and thus the possibility of finding a variable to be significant when it is in fact not. By allowing for an autocorrelation structure in the error terms this possibility of wrong inference is avoided. Also shown are the coefficient of determination R^2, the number of observations, and in some cases the p-value of a test (or tests) of equivalence when distinguishing between *North* and *South*, and the p-value of a test regarding the significance of the included year and/or region dummies. These region dummies are based on the present-day provincial division of Italy (see Appendix A) and are included to control for unobserved city-specific variables such as weather, soil quality, etc. that are likely to be to some extent captured by the fine geographical grid of these provinces. Also some of these present-day provincial boundaries correspond roughly with previous political borders (e.g. Liguria, Tuscany, etc.).

The baseline estimation results in Table 2 are shown for three different samples: [14]

(a) the total sample of cities with a population larger than 5,000 (columns 1 and 4)
(b) only cities with a population larger than 10,000 (columns 2 and 5)
(c) only cities in the North with a population larger than 5,000 (column 3).

Case (a) gives the largest sample; case (b) is our baseline sample for reasons discussed in Section 2; and case (c), leaving out all southern cities, is included as an additional robustness check.

Turning to the estimation results, we find that for physical geography, two geographical variables stand out: seaports and cities that have access to navigable waterways. In all specifications shown in Table 2 these indicators are significant. Transport over water is an important factor determining Italy's city growth. Having a seaport gave a city a big advantage as the bulk of international trade took place between the main seaports. In Italy this was reinforced by the fact that the long coastline was not very beneficial for the location of many ports, so every seaport had a potential advantage over cities without direct access to the sea. The two navigable river systems, the river Arno connecting cities such as Pisa and Florence and the river Po connecting cities such as Verona, Ferrara and Piacenza, provided the cities located on these riverbanks with a cheap means of transportation, opening up a much larger hinterland that allowed them to engage in international finance and commerce and to diversify their industries (Braudel 1972; Hanlon 2000, pp. 82–3; Black 2001, p. 21). The evidence on the additional

[14] Malanima (1998a, b) argues that the 5,000 cut-off is less problematic in the case of northern cities.

physical geography variables (Roman road, hub, mountains) turns out to be somewhat more mixed. In our baseline sample of cities larger than 10,000, being a hub has a significantly positive effect on a city's population size in line with predictions from Fujita and Mori (1996). However, in the samples including also the smaller cities (columns 1, 3 and 4) this variable is no longer significant, which is mainly due to the fact that these samples include some hub cities that are quite small (e.g. Trieste, Rimini, Capua and Brindisi), shedding some doubt on an unequivocal positive effect of being a hub city. Location on a Roman road or in the mountains, on the other hand, does have a significantly positive and negative effect respectively when including the smaller cities between 5,000 and 10,000 inhabitants, whereas they are both not significant in our baseline sample. This result is driven by the fact that by adding the smaller cities that are on the one hand more likely to be located in the mountains and on the other hand less likely to be on a major Roman road, a part of the difference in population can now be ascribed to these two variables.[15] It indicates that these two variables are very relevant for the possibility of the smaller cities becoming larger population centres, whereas they lose their importance once a certain level of population is reached (King 1985, p. 145).

So far, the role of geography in determining Italian city size has been limited to physical geography. From modern location theories, like the new economic geography, we know that it might not be only the physical aspect of geography but also the relative aspect of geography that may be of importance for Italian city growth (Krugman 1991). To this end, we included foreign urban potential from Section 3.2 in the set of regressors as a measure of a city's access to other cities' markets.[16] In all five cases urban potential is not significant.[17] The most straightforward way to interpret this is that good access to other (large) cities does not significantly contribute to a city's growth; in the period under consideration the kind of spatial linkages that are captured by the urban potential variable were limited in Italy (de Vries, 1984). From new economic geography theory we know that when transportation costs are too high, or production is not yet characterised by

[15] 40% (28%) of cities with a population between 5,000 and 10,000 inhabitants are located in mountains (on a Roman road) compared to 18% (46%) of cities with more than 10,000 inhabitants.

[16] We chose foreign urban potential because urban potential (which includes own-city population) largely coincides with own-city population (compare Figures 2A and 2B), which immediately raises concerns regarding the endogeneity of this variable. We ran the same regressions with urban potential instead of foreign urban potential and the results are similar in the sense that urban potential is never significant.

[17] It is significant at the 10 per cent level when considering all cities larger than 5,000 inhabitants, however, significance is totally lost in this case when allowing for some differences between North and South Italy (see column 4). Also when distinguishing between North and South or over time, foreign urban potential is never significant (results available upon request).

Table 3. *Growth and size for cities gaining and losing capital status*

Cities losing capital status				Cities gaining capital status			
capital?	city growth	city size (5)	city size (10)	capital?	city growth	city size (5)	city size (10)
yes	0.070	24,623	13,135	yes	0.383	29,390	16,501
no	−0.092	17,828	6,989	no	0.066	4,165	−5,904

Source: Malanima (1998 a, b); Table A1.
Notes: City size (5) and city size (10) denote the difference between the average size of the indicated type of cities and the average size of all other cities with at least 5,000 or 10,000 inhabitants respectively.

increasing returns to scale, proximity to markets may not (yet) be important in determining the growth of cities. In our view, the insignificance of foreign urban potential could also be due to the fact that our measure only takes markets on the Italian peninsula into account. For some cities like Venice, Naples and Genoa access to foreign markets may have been much more relevant. Also, in the period under consideration the negative competition effect of having other large cities nearby may (in some cases even amounting to war between cities) undo any positive effects of the market size type we are looking for.

Turning to the political/institutional variables, our estimation results indicate a positive effect of being a capital city on city size. Capitals attract people as public expenditure or royal privileges are likely to be biased towards the capital city, creating jobs and business opportunities alike. Alternatively, the capital city may be seen as a so-called 'parasite' city attracting both capital (in the form of taxes and other supra-regional sources) and people. Being close to the one(s) in power can be argued to be beneficial. Columns 4 and 5 in Table 2 also show that the effect of being a capital city significantly differs between the North and the South (see p-value (capital North = capital South)). The impact of the capital city variable on city size is much stronger for the southern sample. We will look more closely into this particular North/South difference and its development over time in Section 4.3.

We are aware of the fact that there is a potential *endogeneity problem* because of a possible two-way relationship between being a capital and already being a relatively large, growing city due to other reasons, such as having economic power. Former economic sources of primacy (economies of scale, spillovers, etc.) may prove beneficial for strengthening political sources of primacy (protectionism, authority, etc.). Should this be the case, then our estimated coefficient will overstate the importance of being a capital city on (future) city size. Table 3 provides evidence on the importance of this issue. It shows the average growth and size (relative to all other cities) of cities that have either lost or gained capital status during our sample period (see Appendix A), distinguishing explicitly between the periods during which these cities did and did not enjoy capital status respectively.

The results in Table 3 clearly show that cities both losing and gaining capital status are growing fastest *when they are a capital*. Population growth increases (declines) rapidly in the period after gaining (losing) capital status. This is subsequently reflected in a higher than average city size when being a capital. There is no evidence that cities were already in a period of decline before losing their capital status, their population during that period being much larger than the average city (both compared to all other cities larger than 5,000 and larger than 10,000 inhabitants respectively). As for the argument that larger cities are the ones gaining capital status, this does not seem to be true either. Cities gaining capital status were on average somewhat smaller compared to other cities with at least 10,000 inhabitants. These results lead us to conclude that we can be confident that we have identified a causal effect of being a capital city on subsequent population growth.

There is thus no clear-cut evidence that there is a one-to-one relationship between having economic power first and then getting political power as a result. Not all large economic centres were to become capitals later. This depended very much on the strength of the territorial state the city belonged to and on the degree of political coordination (Epstein 2000, p. 95). Turin may serve as an example. Its rise to dominance in Piedmont was the result of the strictly political project to turn the city into the centre of a strongly centralised state, and subsequent mercantilist policies made it also the economic centre (Belfanti 2000, pp. 299–300). Similarly, Naples established its lead after 1450 through a series of privileges granted by the Aragonese sovereigns, including the full exemption of residents from direct taxation, which was later confirmed by the Spanish monarchy (Marin 2000, p. 321). As a final example we mention Palermo. This town together with Messina dominated the island of Sicily during the thirteenth century, lost its primacy in the fourteenth century, then became the official capital during the Catalan–Aragonese monarchy. However, it could only increase its lead over its peers after 1600.

Returning to our baseline estimation results, the bottom half of Table 2 finally shows the estimated century-specific dummies. These dummies capture how the average city size changes over time. As can be seen, century effects are always highly significant. When also allowing these century effects to differ between North and South Italy, they are found to be significantly different in the case of our baseline sample. Instead of merely including these time dummies to control for the evolution in average city size between 1300 and 1861, the next subsection tries to find an explanation by relating the observed evolution of these century-specific effects and its difference between North and South to the institutional development of the two parts of the peninsula.

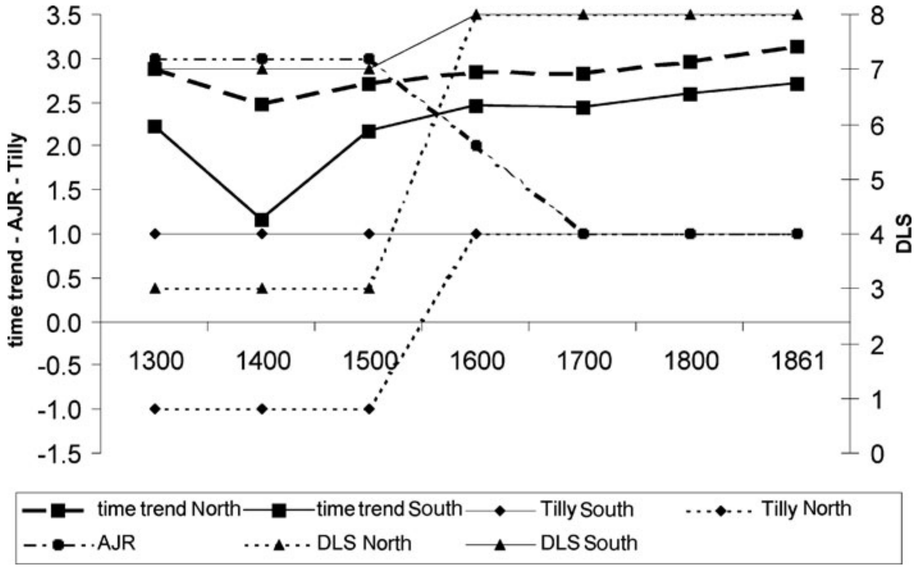

Figure 3. *Time trend and institutional variables*

Note: Time trends shown in the figure are based on column 5 of Table 2.

4.3. Institutions in more detail – extending the baseline estimations

We start by showing the evolution of the estimated time trend over the centuries (See Table 2, Column 5). Figure 3 plots the corresponding time trend for both North and South.

The decrease in the time trends that shows up for both North and South (more pronounced in the South) in Figure 3 in the fourteenth century coincides with the negative shock of the plague mentioned earlier. After 1400, average city size increases for two centuries. Subsequently, average city size decreases again in the seventeenth century, due to the turmoil of the Thirty Years' War and new plague epidemics. Recall Figure 1 where for some cities the importance of the plague shock clearly comes to the fore with population losses of more than 40 per cent. Up to the 1861 unification, average city size increased again. As to the difference between North and South, the evolution of the average city is, except for the more pronounced drop in the fourteenth century in the South at the end of the sample period, largely the same. Average city size in the South is however always lower than that in the North, in line with the simple statistics in Table B1. What other factors could explain these time trend(s) besides the plague shocks?

Ideally, we would like to have city-specific data on economic development and the political or institutional changes within each city to answer this question. These are however, to our knowledge, not available for our sample of cities. The only appropriate and available data are on the quality of institutions. These data are *time-variant* but *city-invariant*. More specifically, we use indices on the evolution of the quality of institutions from three different sources.[18] From Acemoglu *et al.* (2005) we use the 'protection for capital index', which measures the extent to which the political institutions that are in place limit the arbitrary use of power by the ruler. The index ranges from +1 (there is no effective protection against arbitrary confiscation by the ruler) to +7 (the government is formed by and largely influenced/controlled by merchants and middle classes). From Tilly (1990), we use the index measuring the relative development of coercion on the part of the ruler versus the strength of the merchant class (capital). The index distinguishes explicitly between the North and the South and ranges from –1 (capital outruns coercion) to +1 (coercion outruns capital). Finally, from DeLong and Shleifer (1993) we collected a classification of western European regimes. Their index distinguishes explicitly between North and South Italy and takes on values between +1 (there is a full constitutional monarchy or republic in place) to +8 (the political system is characterised by full bureaucratic absolutism or by rule of military conquerors). Figure 3 plots each of these three institutional variables together with the estimated time trends in average city size. It shows clearly that all three political-institutional indices suggest that after 1500 a movement in the direction of absolutist regimes took place. The two political regime variables that distinguish between the North and the South show that this change was much more pronounced in the North.

The important shift in the political-institutional structure in the North as illustrated by Figure 3 is connected to the shift from independent city-states to territorial states. The alleged switch from city-state-based rule by merchant oligarchies to the assertion of Habsburg authority over northern Italy after 1500 is mentioned as the cause of declining urbanisation and the shift of gravity of the European economy to the north of the Alps (DeLong and Shleifer 1993, p. 677). In the South this change is much less pronounced; Tilly's less finely graded index does not indicate a switch at all. Throughout our sample period, the South consists of the Kingdoms of Naples and Sicily and a large part of the Papal States. Both are examples of absolutist states centred around their respective capital cities. The observed change after 1500

[18] In an earlier version of our article (see Bosker *et al.* 2007, figure 3 for the corresponding results), we also looked at the relevance of a number of city-invariant, time-invariant economic variables. However, we decided to focus on the political-institutional development here, as these economic variables, e.g. agricultural labour productivity and prices of agricultural and non-agricultural goods (as rightly pointed out by two anonymous referees), are collected for Tuscany and Lombardy only (see Federico and Malanima 2004), which makes it at least doubtful to use them for Italy as a whole. In addition, the interpretation of the impact of these economic variables on Italian cities is far from clear-cut.

in the DeLong and Shleifer index coincides with the South of Italy coming under the control of absolutist rule, most notably the Spanish monarchy.

What are the expected effects of the strengthening of the 'princely' rule on city size? And more importantly, can we find empirical evidence that explains the observed evolution of Italian cities over time? The *first effect* of the formation of largely absolutist states that can be expected is an increase in the redirection of resources from both the countryside and other cities to the capital city, due to an increased ability of the government to enforce central rule. Especially for the northern Italian urban system this was a novelty: 'Perhaps the most striking effect of state formation on urban structures was the invention during the later Middle Ages of the capital city as the political and administrative heart of the state' (Epstein 2000, p. 89). The reasons why capital cities might be larger are well documented by Ades and Glaeser (1995). They argue that in more absolutist regimes, capital cities are much more successful in relocating wealth from other cities and the countryside to the capital city through extraction of large rents and taxes; capital cities act like 'parasite' cities. The *second effect* of such a change is a detrimental effect on the population size of the non-capital cities. DeLong and Shleifer (1993) hypothesise that in absolutist states compared to non-absolutist or free states, urbanisation ratios will be lower, but capital cities will be relatively large. They explicitly mention the Kingdom of Naples as a prime example in favour of their hypothesis. Trade diversion via Naples and resulting economic constraints for others cities is only half of the story, however. Recent analyses have shown that the low number of towns of intermediate size was as much the result of Spanish rule on the one hand and the political dominance of Naples on the other. Many towns had been punished by the monarchy for their pro-French role in the Italian Wars, which deprived them of important economic privileges. Spanish rule was generally hostile to local autonomy and southern towns could not dominate their hinterlands, as was the case in the North after the Black Death (Marin 2001, p. 322). As a result, Naples did not meet serious competition from nearby or distant neighbours.

To see if we can find systematic evidence in favour of these two hypotheses, we look at each of them separately. First, we would expect the 'capital city bonus' to become larger over time, given Italy's institutional development (see Figure 3). Second, we expect a perverse effect on other, non-capital, cities that suffer more from the parasitic nature of the capital city under absolutist regimes. Also we postulate that those cities located close to the capital are potentially affected differently than cities at a larger distance from the capital city. In principle, being located close to a capital city should not affect the development of cities in its immediate surroundings negatively. It could even have a positive effect, as the capital city constitutes an attractive, large market from which cities at close range can reap the benefits through, for example, trade but also military protection. However under more absolutist regimes the predatory nature of the capital city may offset this positive effect by the extraction of rents and imposed taxes.

To check the first hypothesis we first of all focus explicitly on the evolution of capital cities over time and then relate their evolution to our collected measures of institutional quality. The first two columns in Table 4 present the estimation results.[19] The first column extends the baseline estimates by not only allowing the capital city bonus to be different between North and South, but also to be century-specific. This allows us to track the evolution of the capital city bonus over time. The result is best illustrated in Figure 4, which plots the estimated century- and North–South-specific coefficients on the capital city dummy.

Turning to Table 4, note first of all (see p-value capitals) that it is justified to include the various capital dummies. Invariably, being a capital city is beneficial for city size but the 'capital bonus' is *larger* in the South, as is illustrated by the two different axes in Figure 4. According to DeLong and Shleifer (1993), southern Italy can be seen as an example of an absolutist state throughout our sample period. This would help explain why the 'capital bonus' is larger in the South with the Kingdom of Naples and the Papal States. As to the evolution of the capital city bonus over time, for southern cities the relevance of being a capital city increases markedly over time after 1400, corresponding to the rise to dominance most notably of Rome and Naples as the capital cities of the Papal States and the Kingdom of Naples respectively. The North shows a very different evolution over time, being fairly constant until about 1600; thereafter it starts to increase slightly, taking off only in the 1800s. Apparently the transformation from city-states to territorial states, and later on to Habsburg rule, had a much less pronounced effect.

The results in the second column of Table 4 corroborate this finding. Here we do not estimate the capital city bonus over time, but instead relate its increases to the change in absolutist rule as measured by the DeLong and Shleifer (1993) index (DLS from now on).[20] Note that we also replaced the century dummies by a linear time trend and two 'plague' dummies, as it is impossible to use the DLS variable together with century dummies, because this would result in perfect multicollinearity.[21] The results can be

[19] We will focus on the political/institutional variables in this section. The results on the other included geography variables are always the same as in the baseline results discussed earlier in Table 2.

[20] Results are similar when using either the Acemoglu *et al.* (2005) or Tilly (1990) variable. We show the results using the DeLong and Shleifer (1993) data as their index distinguishes explicitly between the North and the South of Italy as well as being time-varying for both parts of the peninsula.

[21] The plague dummies are both negative and significant; also we find that the Black Death in the fourteenth century affected the average city to a much larger extent than the plagues of the seventeenth century.

Table 4. *Capital cities and institutional variables 1300–1861*

All cities	>= 10	All cities	>= 10	Non-capitals (South)*	>= 10
Geography		**Geography**		**Geography**	
Not reported, see Table 2		Not reported, see Table 2		Not reported, see Table 2	
Institutions		**Institutions**		**Institutions**	
capital		capital North	0.330	Distance capital	−0.923
North 1300	0.405		[0.008]		[0.040]
1400	0.370	capital South	−8.180		
1500	0.426		[0.000]	Distance capital x DLS	0.119
1600	0.446	p-value North = South	[0.000]		[0.036]
1700	0.560				
1800	0.543	capital x DLS North	0.035		
1861	0.961		[0.074]		
South 1300	0.630	capital x DLS South	1.278		
1400	0.140		[0.000]		
1500	1.208	p-value North = South	[0.000]		
1600	1.786				
1700	2.062	DLS North	−0.029		
1800	2.141		[0.109]		
1861	2.253	DLS South	−0.077		
max p-value	[0.756]		[0.020]		
year/region	1400 South	p-value North = South	[0.065]		
Century related		**Century related**		**Century related**	
p-value years	[0.000]	time trend	0.066	p-value years	[0.000]
p-value North = South	[0.004]		[0.000]		
		plague 13th	−0.343		
			[0.000]		
		plague 17th	−0.112		
			[0.000]		
p-value regions	[0.095]	p-value regions	[0.076]	p-value regions	[0.116]
R^2	0.60	R^2	0.591	R^2	0.188
p-value BP	[0.000]	p-value BP	[0.000]	p-value BP	[0.000]
nr observations	623	nr observations	623	nr observations	281

Notes: The results regarding the geographical variables are not shown in order to save space, but the results are very similar to the results presented in Table 2. p-values in brackets. p-value years/regions respectively denotes the p-value of the F-test for the joint significance of the time/region dummies. p-value (North = South) denotes the p-value for a test of equality of the North and South coefficients for each of the 'North-South divided' variables. p-value BP denotes the p-value of the Breusch–Pagan test for random effects. The capital variables in the first column are *always* significant except for 1400 South, which has been indicated below the capital results.

*The sample of non-capital cities in the South used for this estimation contains only cities with more than 10,000 inhabitants, whose nearest capital city does not change over the whole sample period (1300–1681).

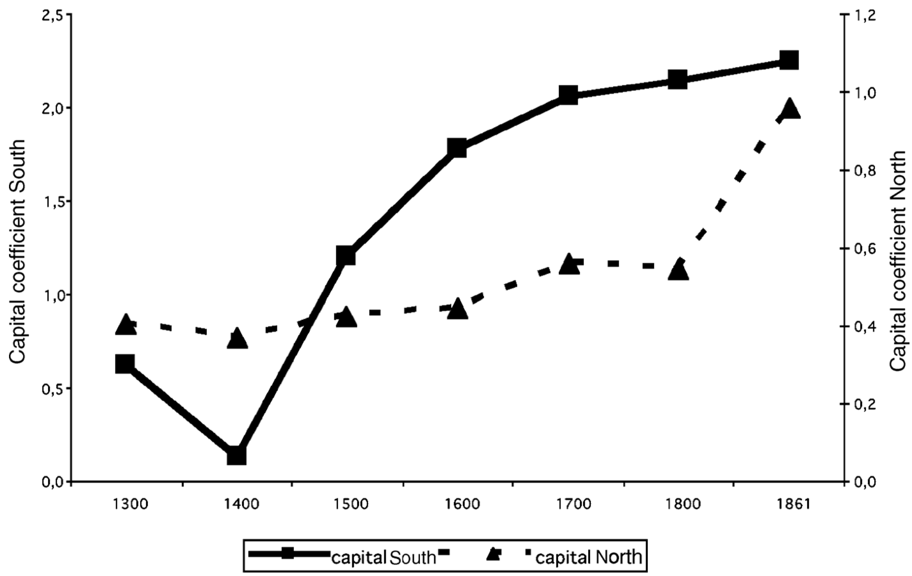

Figure 4. *Capital city bonus over time (in North and South)*

Notes: Results shown in the figure are based on column 1 of Table 4.

interpreted as follows. The total effect of being a capital city is in this case not just the estimated coefficient of the capital city dummy. We have to add to this the estimated coefficient on the 'capital city x DLS' variable multiplied by the actual value of the DLS variable (as shown for both the North and the South in Figure 3). So, in the baseline sample of cities larger than 10,000 inhabitants, the capital city bonus in the period up to 1500 is estimated at $-8.180 + (7 \times 1.278) = 0.766$ for the southern capital cities and $0.330 + (3 \times 0.035) = 0.435$ for their northern counterparts. From 1600 onwards these 'bonuses' increase to $-8.180 + (8 \times 1.278) = 2.044$ in the South and to $0.330 + (8 \times 0.035) = 0.6$ in the North. Moreover, the estimated coefficient on the 'capital x DLS' variable by itself can be interpreted as the effect on the capital city bonus when moving up on the DLS scale of the degree of absolutism of the state. The results clearly indicate that *first*, capital cities are indeed larger in more absolutist regimes and *second,* that this effect was much stronger in the South, clearly corroborating the estimates of the century-specific capital city bonus (see Figure 4).

Next we turn to the effect on the non-capital cities. In the second column of Table 4 the estimated coefficient on the 'DLS variable' shows the effect of an increase in the degree of absolutism on non-capital cities. The sign is negative for both the North and the South, confirming our hypothesis that non-capital cities are smaller under more absolutist regimes. These cities suffer from the parasitical nature of the capital city; they also experience the detrimental effect on the incentives for the merchant class to engage in

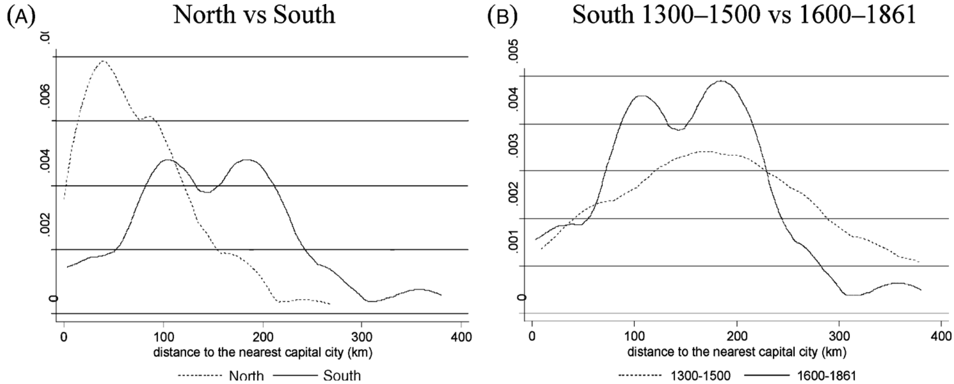

Figure 5. *Distribution of cities at different distances from the nearest capital*

Notes: The distributions are calculated using only cities with more than 10,000 inhabitants and in (B) it is furthermore restricted to those cities whose nearest capital city does not change over the whole sample period (1300–1861).

profitable economic activity given the much larger constraints imposed by the rulers in more absolutist regimes. These results are in line with the findings on city growth and urbanisation of, for example, DeLong and Shleifer (1993) and Acemoglu *et al.* (2005) that indicate that the more the power of the ruler is limited, the less restricted is the investment climate, which is beneficial to urban growth. Again the effect is stronger in the South.

The results in the third column of Table 4, together with Figure 5, provide additional evidence on the spatial reach of the parasitical nature of the capital city. Both focus, each in a different way, on the strength of the spatial influence of the capital city and as such capture the effect of a city's location in the broader urban system centred around the capital city. Figure 5 shows the distribution of cities larger than 10,000 inhabitants at different distances from the nearest capital city.

Figure 5A focuses on the North–South difference and Figure 5B on the development over time in the South alone, for two subperiods. Unfortunately, we had to restrict the sample to non-capital cities in the South when looking at the development over time. In the North the number of (regional) capital cities drops from 13 to 7, which has the inevitable effect of increasing many cities' distance to the nearest capital city. This makes it impossible to unambiguously ascribe the observed change in the number of cities at close distance to a capital city to a change in political regime. In the South only Messina loses its capital status, so that most cities face the same capital city during a large part of the whole sample period.

Figure 5A shows that in the South fewer cities are located at close distance to the nearest capital city; the bulk of non-capital cities larger than 10,000 inhabitants are located more than 100 km away from a capital city. In the North this is different, with many more cities located close to the nearest capital city. When making a distinction between the period before and after 1500, when the change in political regime was most clear, we observe that in the South the density of cities at close range to a capital city declines slightly in the second period, whereas we observe a substantial increase in cities between 90 and 200 km from the capital city. These are mainly cities located around Bari, as is shown in the urban potential maps in Figure C1. Overall these results strengthen the notion of a parasitical capital city that does not 'tolerate' the development of other large cities in its vicinity.

The results in the third column of Table 4 provide complementary evidence to this. Instead of focusing on the *existence* of cities larger than 10,000 inhabitants (as in Figure 5), we provide results that show the impact of being close to the capital city on a *city's population size* (given that a city is larger than 10,000 inhabitants). To do so, we include the distance to the nearest capital city as an additional explanatory variable to the baseline regression, both by itself and interacted with the DLS variable to see if we can observe a change in the effect in the period after 1500 as a result of the change in political regime. The results show that in principle being located close to a capital city in the South positively affects city size. However, this positive effect is reduced as the absolutist grip is strengthened, which is shown by the significantly positive coefficient on the interaction term. When using the actual values of the DLS variable in the South (again see Figure 3), we see that in the period 1300–1500, distance to the capital city negatively affects city size ($-0.923 + (7 \times 0.119) = -0.090$), whereas in the period thereafter this turns into a positive effect ($-0.923 + (8 \times 0.119) = 0.029$). This indicates that the institutional change that went along with the imposition of Spanish rule in the South not only affected non-capital city growth negatively (see the second column of Table 4), but also that cities at closer range to the capital city suffered more from this than cities at a greater distance.

When we combine all the empirical evidence provided in this subsection, we conclude that a movement away from governments whose arbitrary use of power is limited negatively affects the growth of the average city, confirming the evidence provided in Acemoglu *et al.* (2005) and DeLong and Shleifer (1993). Moreover we show that the increase in the degree of absolutism does not affect all cities negatively: capital cities benefit from such a development. The difference in the capital city bonus between North and South as well as its evolution over time confirms the notion of the 'parasitical nature' of the capital city, relocating wealth from other cities and the countryside to the capital city through extraction of large rents and taxes (Ades and Glaeser 1995). For the South, this is further confirmed by looking at the evolution over time of the number of cities with at least 10,000 inhabitants located at close range to the capital city. Moreover, the evidence on the effect of distance to the capital city on the average size of those cities that are relatively close to the capital city seems to indicate that those cities that are closer to the capital city are generally larger than those further removed from the capital, although this positive effect weakens substantially with an increase in absolutist rule.

We are aware of the fact that the nature of the North–South difference in city growth that we found may be artificial. The reason why we always find a weaker effect in the North on the capital city bonus and on non-capital cities is to a large extent due to the absolutist/non-absolutist classification we applied. This measure is probably too rough to precisely capture the political and economic reality of northern Italy with its change from free republics to princely rule and imperial domination. First, absolutism never got hold of the region fully. For example, even after the rise of Spanish domination in Lombardy the internal organisation of the state remained polycentric and was characterised by pluralism (Belfanti 2001, p. 307). The multi-polar structure of the North, with a less articulated urban hierarchy and spatial specialisation, was in a sense the fruit of long-term political fragmentation. Second, although after 1500 the urban hierarchy became more pronounced through political and institutional forces, it certainly did not result in identical patterns of urbanisation and urban growth across the various territories. Epstein has shown convincingly that, for example, in the case of Lombardy the urban economies profited from a clear regional leader that took up the role of central coordinator (Milan). In contrast, in Tuscany the defence of urban vested interests by a narrow-minded Florentine oligarchy was not only detrimental for the economy of the town itself but also for the surrounding cities (Epstein 2000, pp. 95–6). Thus, as far as there were 'absolutist' tendencies replacing the economic hegemony of the city-states, it had the effect of either weakening central vested interests or of strengthening institutional privileges of a core city. Both outcomes, however, had as a result the displacement of merchants and artisans to the countryside instead of to one or two large cities. This could to some extent explain the smaller capital city bonus and the smaller negative effect on the non-capital cities that we find for the North compared to the South.

5. Conclusions

In this article we study the evolution of a large sample of Italian cities for the period 1300–1861. We use various descriptive statistics on individual city sizes and urban potential indicators to highlight the main characteristics of Italy's urban system. The southern parts of Italy experienced a relatively more pronounced change in the city-size distributions over time, with a few cities, i.e. Rome, Naples and Palermo, gaining dominance from 1400 on and exceeding their northern counterparts in terms of population size. The city-size distribution of the northern part of Italy is relatively more stable compared to the southern part, although zooming in on the actual rankings of cities over the centuries reveals more dynamic movements than one would see by only looking at aggregate statistics. The overall picture we find seems to be best characterised by 'stability amidst change'.

Our second contribution is that we go beyond merely describing the evolution of the Italian urban system(s) and explicitly look for important determinants that are behind this observed stability. Our centennial data allow for panel estimation where city size is regressed on various geographical, political and other determinants of city size for the period 1300–1861. Using an existing data set from Malanima (1998a, b, 2005), we perform panel estimations where the development of city size and urban patterns can be explained by various geographical, institutional and other determinants of city size for the period under consideration. Although large shocks such as the plague epidemics are clearly visible in the data, our baseline estimation results show that the main determinants of Italian city growth are physical geography and the predominance of capital cities. With respect to geography, being a seaport or having access to navigable waterways increases city size whereas a city's relative location, as measured by urban potential, is not significant. Being a capital city also increases city size. The estimation results also reveal strong century-specific effects on city growth and these effects differ markedly between the North and South of Italy. Additional estimations show that these time effects can be linked to a change in the political and institutional development in Italy over time. We find that the capital city bonus increases and non-capital cities suffer when absolutist rule is strengthened. This underlines the idea that the specific nature of the political and institutional regimes is a key factor in explaining Italian city growth during the period 1300–1861.

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Appendix A. Additional information on the data set

Figure A1. *Italy and its regional and provincial subdivisions*

Major Roman roads:

Via Aurelia
Via Clodia
Via Cassia
Via Flaminia
Via Aemilia
Via Appia
Via Postumia
Via Popillia-Annia
Via Salaria
Via Valeria
Via Latina
Via Traiana
Via Capua-Rhegium
Via Dominaria

Figure A2. *The Roman road network in Italy*

Table A1. *Capital cities 1300–1861*

Italian (city-)state capitals	
Capital	Period
Bologna	–1506
Cremona	–1334
Ferrara	–1597
Florence	–1861
Genoa	–1861
Lucca	–1847
Mantua	1328–1805
Messina	–1675
Milan	–1861
Modena	1452–1859
Naples	–1861
Padua	–1405
Palermo	–1734
Parma	1545–1861
Perugia	–1540
Piacenza	1545–1861
Pisa	–1406
Reggio	1452–1859
Rome	–1861
Siena	–1557
Spoleto	–1347
Turin	1568–1861
Urbino	–1631
Venice	–1800
Verona	–1387

Source: Own survey of the literature (various sources, available upon request).
Note: One date means that the city was already a capital city before 1300.

Appendix B. Additional summary statistics on urban development

Table B1. *Italian city size (North and South)*

	1300	1400	1500	1600	1700	1800	1861
				URBAN PRIMACY (1)			
Italy	0.08	0.14	0.11	0.13	0.11	0.10	0.08
North	0.11	0.17	0.12	0.12	0.13	0.09	0.09
South	0.11	0.28	0.32	0.28	0.25	0.19	0.15
				URBAN PRIMACY (1–3)			
Italy	0.20	0.34	0.26	0.25	0.26	0.20	0.16
North	0.27	0.40	0.31	0.30	0.31	0.23	0.24
South	0.28	0.73	0.54	0.47	0.54	0.37	0.27
				STANDARD DEVIATION CITY SIZE (x1,000)			
Italy	23.34	21.84	27.84	39.52	37.32	36.22	40.03
North	27.20	24.02	24.78	29.31	28.55	27.11	38.02
South	10.15	7.82	32.48	47.76	45.25	41.28	40.63
				AVERAGE NUMBER OF INHABITANTS PER CITY (x1,000)			
Italy	23.29	26.62	26.25	28.64	29.03	24.64	24.93
North	26.30	27.76	28.10	30.54	30.68	28.37	32.29
South	17.15	21.80	23.40	26.79	27.28	22.11	21.33

Source: Malanima (1998a, b).
Note: Urban primacy (1) and urban primacy (1–3) refer to the share of the largest and the share of the three largest cities in total urban population (in cities >= 10,000 inhabitants) respectively.

Appendix C. Urban potential 1300–1861

Table C1. *Top 10 urban potential (UP) and corresponding own city size*

1300			1400			1500			1600		
City	Pop (x1000)	UP (x1000)	City	Pop (x1000)	UP (x1000)	City	Pop (x1000)	UP (x1000)	City	Pop (x1000)	UP (x1000)
Milan	150	160.18	Milan	100	104.39	Naples	150	154.22	Naples	280	285.27
Florence	110	122.09	Venice	85	88.69	Venice	102	108.44	Venice	140	148.97
Venice	110	119.54	Genoa	50	53.74	Milan	100	108.36	Milan	120	133.24
Genoa	60	71.46	Florence	37	40.69	Genoa	70	76.06	Palermo	105	110.24
Siena	50	62.71	Bologna	35	39.94	Bologna	55	63.14	Rome	98	104.16
Bologna	50	62.39	Cremona	30	36.64	Rome	55	58.95	Florence	75	83.80
Cremona	45	58.08	Brescia	30	36.26	Brescia	48	57.33	Messina	75	81.18
Brescia	45	57.33	Rome	30	31.88	Florence	50	56.32	Bologna	63	74.15
Palermo	50	53.58	Naples	30	31.41	Palermo	50	52.90	Genoa	65	73.69
Padua	40	52.86	Piacenza	20	27.29	Cremona	40	50.11	Verona	49	61.34

1700			1800			1861		
City	Pop (x1000)	UP (x1000)	City	Pop (x1000)	UP (x1000)	City	Pop (x1000)	UP (x1000)
Naples	220	225.38	Naples	320	334.50	Naples	419	452.62
Rome	140	146.12	Rome	153	162.91	Milan	196	218.36
Venice	138	145.99	Palermo	135	147.43	Rome	188	204.12
Milan	109	120.00	Venice	135	147.22	Turin	181	193.80
Palermo	110	114.47	Milan	124	139.79	Palermo	168	188.11
Florence	72	80.26	Afragola	12	94.97	Portici	11	168.22
Bologna	63	73.20	Florence	81	93.05	Genoa	128	147.22
Genoa	64	71.91	Genoa	76	87.36	Afragola	16	139.85
Messina	50	55.10	Bologna	68	82.41	Florence	114	133.46
Padua	38	50.53	Turin	61	69.25	Venice	114	132.11

Source: Malanima and own calculations (1998a, b).

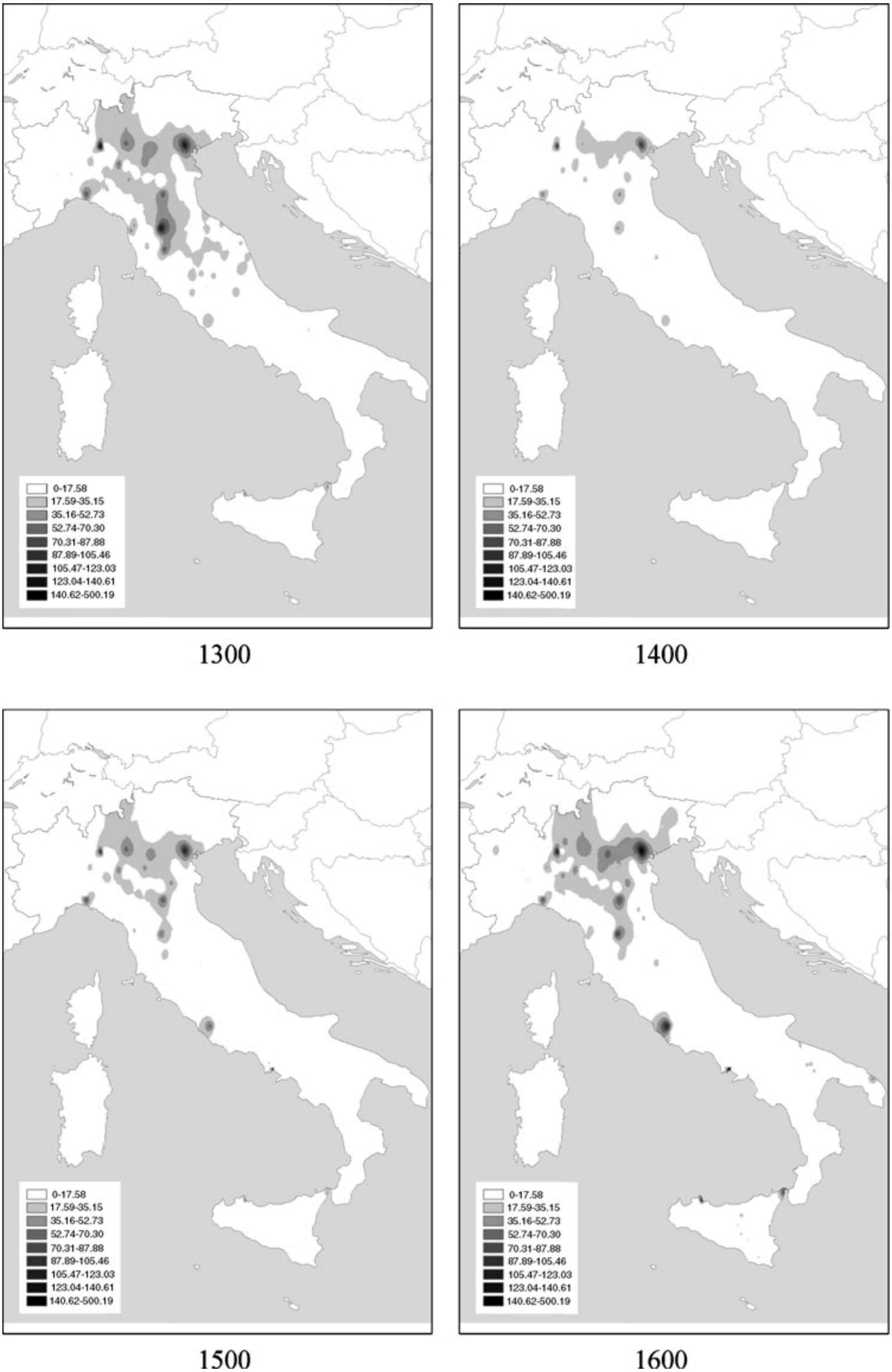
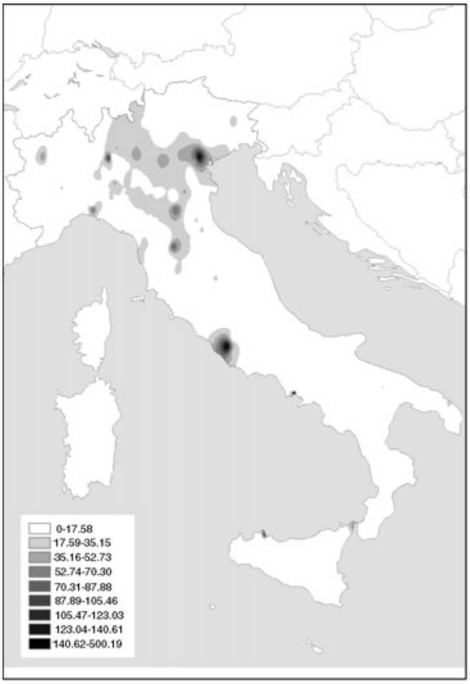
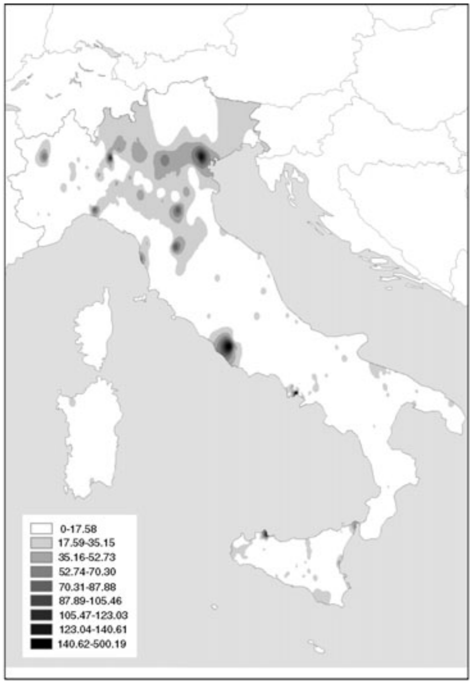


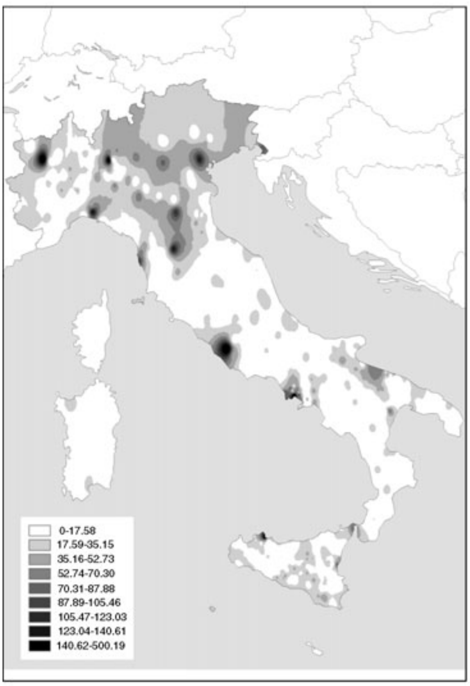
Figure C1. *Urban potential over the centuries*



1700



1800



1861

Figure C1. *(continued)*