THE DEVELOPMENT OF CITIES IN ITALY
1300 - 1861

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Abstract

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 paper we study the evolution of Italian cities over the period 1300-1861. The first contribution of our paper is that we use various descriptive statistics on individual city sizes and the city-size distribution as a whole to highlight the main characteristics of Italy's urban system such as the differences between northern and southern Italy. Our second, and main, contribution is that our 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. We show that, although large shocks such as the plague epidemics are clearly visible in the data, the main determinants of Italy's city growth invariably are physical geography and political predominance. Also the North-South difference turns out to be important.

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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 mix of agglomeration and spreading forces, a mix that is city-specific and varies over time (see Fujita and Thisse: 2002 or Gordon, et al.: 2000). The rise and decline of cities is a process that may take many years. By taking a long-term perspective (de Vries: 1984), these changes become visible. In pre-modern times relative costs of transportation were much larger than today, and perishable goods could not be transported over long distances. Urbanization went hand-in-hand with nearby intensive agriculture. Therefore most medieval European cities were quite small according to modern standards. With the development of colonies outside Europe and the increase of overseas trade from 1500 onwards port cities became dominant, especially those with easy access to the Atlantic, leading to the relative downturn of Mediterranean harbors (Acemoglu et al: 2005). From 1750 onwards, early industrialization relied on waterpower, and the access to water became an important factor in determining the location of economic activity and for that matter of urbanization.

It is easy to produce many more examples like these. They serve to illustrate that over (long stretches of) time the balance between agglomerating and spreading forces changes. One might thus expect that city-size distributions and also the ranking of individual cities in the distributions change over time – growing cities that were once only of local importance overtake former important centres. This, however, is not the general conclusion from the literature. As illustrated in, for example, de Vries (1984) and Hohenberg (2004), the European system of cities seems remarkable 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). The aim of this paper is to see whether or not this conclusion is also confirmed when focusing on one European country, Italy, only, and also to provide empirical evidence on the factors that are mainly responsible for the observed evolution of city sizes.

Theories regarding the existence and development of cities recently experienced a revival.[2] Davis and Weinstein (2002) mention three main approaches that can be distinguished in the modern literature: random growth theory, increasing returns to scale theories and finally, models that emphasize physical geography or other fixed endowments. All of these theories no doubt contain important elements to explain the actual development of cities. 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. And it is precisely here that the present paper hopes to make a contribution.

The main contribution of this paper is twofold. First, and building on Malanima (1998, 2005), we use a large historical data set on more than 400 Italian cities for the period 1300-1861. The reason to choose Italy is that it is one of the first urbanized countries in early-modern history. In sketching the development of urban hierarchies in Europe as early as 1250, Russell (1972) labeled Italy as 'the most advanced and urbanized country in Europe and probably even in the world'. Also, Italian cities experienced many shocks with different characteristics. We use a wide array of descriptive statistics on individual city sizes and the city-size distribution as a whole to highlight the main characteristics of Italy's urban system such as the differences between northern and southern Italy. Our conclusion from this section is that "stability amidst change" is a better description than that the system of cities is "remarkable stable". The second contribution of this paper is the presentation of panel data estimates to provide a deeper understanding of the development of Italian cities for the period 1300 and 1861. Our data allow for panel estimation where city-size is regressed on various geographical, political/institutional and economic determinants of city size for the period 1300-1861. We show that, besides the

[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. The contributions in this handbook illustrate that in the past 15 years or so, new theories have come to the fore. In this respect the contribution of Krugman (1991) deserves to be mentioned. This paper initiated a whole new sub-discipline, the so-called New Economic Geography (NEG), that formalizes the most important agglomerating and spreading forces that are responsible for the spatial distribution of economic activity. The big step forward in this approach is that the spatial distribution of economic activity can be derived endogenously.

two pest epidemics, the main determinants of Italy's city growth invariably are physical geography and political predominance. Also the North-South divide turns out to be important and we provide tentative evidence regarding the relevance of some economic variables.

The paper is organized as follows. In section 2 we give a short history of the development of Italian cities between 1300 and 1861, after which we provide ample descriptive statistics on city sizes and city size distributions. This section forms the prelude to section 3 in which we present our estimation results. Section 4 concludes.

2. City Size and City Size Distribution in Italy from 1300 to 1861

In this section we provide descriptive statistics and various other summary measures on our main variable of interest, Italian city size. By way of introduction we provide some historical background in section 2.1. Section 2.2 presents summary statistics on city sizes, and section 2.3 does the same for the Italian city size distribution. Finally, as a (crude) measure of the Italian urban system and in particular of the spatial interdependencies between cities, section 2.4 defines and calculates determinants of city growth, so-called 'urban potentials'.

2.1. Italian urbanization in historical perspective[3]

The urban nature of Italy was already developed by the Etruscans and Greeks and later by the Romans. The Italian towns survived the fall of the Western Empire and preserved their continuity as agricultural and trade centres into medieval times. Around the year 1000 AD the largest Italian cities were to be found in the south of the peninsula. But the northern towns witnessed a large expansion between 1000 and 1300. 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 were surrounded by about 100 smaller towns with more than 5,000 inhabitants. Other large cities were the coastal towns of Genua, Pisa, Ravenna and Ancona and, in the interior, Pavia, Lucca and

[3] See Appendices A and B for a short chronology of early and modern Italy for our sample period, and for a map of Italy respectively.

Verona. Compared to other countries, population densities were high: already around 1300 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). Between 1000 and 1300 this northern area increasingly dominated economic life in Europe. Urbanization rates in Italy were high compared with the rest of Europe. Bairoch calculated an average European urbanization rate of 9.5 for 1300 (Bairoch: 1988, p. 258) whereas urbanization rates in Italy were almost 20 percent (Malanima: 2005, p. 101). Only regions like Flanders, Brabant and Holland came close to the Italian urbanization ratios in the first part of our sample period.

Urbanization rates, however, fluctuated through time because city populations changed under the influence of politics, wars, epidemics, and long-term economic change. As an example we will concentrate on northern Italy in the sixteenth and seventeenth century. Having an estimated urbanization rate of 16.4 percent in 1500, the north-Italian rate declined to 14.4 and 13.0 percent in 1600 and 1700 respectively (see Table 1). Traditionally, in Italian economic history the seventeenth century has been labeled as an age of economic crisis, with an absolute decline of living standards. Recent analyses, however, paint a subtler picture, i.e. one characterized by only relative decline, due to the loss of economic primacy in Europe.[4]

Still, there is ample evidence of an absolute decline of urban population in the seventeenth century. The cities in the north of Italy had already been struck by the Italian Wars. Until the peace treaty of 1559 cities fought against foreign powers but also among themselves, in changing alliances. Many cities were sacked, such as Ravenna, Rapallo, Prato and Rome (in 1527) or besieged for lengthy periods: Pisa, Verona, Florence and Siena. These hostilities coincided not incidentally with plagues, bad harvests and famines. Surprisingly most cities were able to recover from the demographical shocks resulting from these disasters. At the end of the 16th century northern Italy was still the largest industrial area in Europe with important centres like Milan, Cremona, Pavia and Florence. A reversal of fortune came with the severe food crises at the end of the 16th

[4] For a discussion see Malanima: 2006, pp.108-111.

century. The Mediterranean countries became dependent on grains from the Baltic area, brought in by Dutch and English traders. On top of that Italy was launched into new large-scale hostilities connected to the Thirty Years' War. This major conflict affected the economies of the cities heavily, especially in Piedmont and Lombardy.[5] The economic domination of the cities was brought to a stop and within a period of only 50 years urban industrial activity declined rapidly.

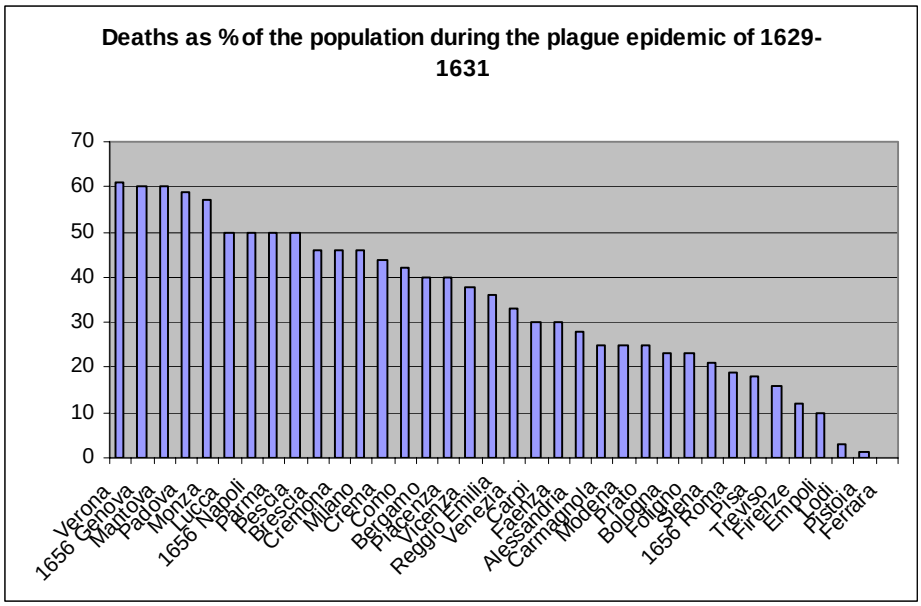
But there were more structural forces at work. Venetian leadership in the Mediterranean economy witnessed a downturn from 1600. Venice lost the spice trade to Holland and England and it missed the surge for new colonial products. These shifts in international trade patterns coincided with the loss of northern markets for textiles and luxuries. High production costs, caused by high input prices, high taxation rates and restrictive practices of guilds moved industrial producers to the countryside, where rates of wages and taxation were lower. Italy lost its competitive edge to northwestern Europe (Broadberry and Gupta: 2006, p. 10). Commercial wealth went into landed estates (Hanlon: 2000, p. 206). The rise of new activities such as the manufacturing of silk was located outside urban centres and did not compensate for the decline of the urban textile industry. Despite these urban economic and demographical drawbacks, however, Italy remained the country with the largest urban population in Europe (De Long and Shleifer: 1993, p. 678). Also if we count the number of cities with more than 10,000 inhabitants, Italy was both in 1300 as well in 1861 still the leading European country with respectively 79 and 201 cities (see Table 1 below), which was way ahead of countries like France and England.

As to major shocks that hit Italian cities during our sample period the plague epidemics have to be mentioned here separately. Between 1346 and 1353 the Black Death wiped away about 40 percent of the population of Italy. Recent calculations by Malanima (2005) 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 urbanization rate fell

[5] Most dramatic was the siege of Mantua by a German army. The combination of a bubonic plague and systematical looting by 14,000 soldiers resulted in a decline of the population from 30,000 to only 6,000. The town lost a booty 18 million ducats, twice the tax revenue of the kingdom of Naples; see Hanlon: 2000, 195.

from 15 percent to 9 percent for Italy as a whole (see Table 1 below). By 1500 the overall population had increased again to 5.31 million and the urbanization rate had regained its 1300 level (Malanima: 1998, 2005). But between 1600 and 1700 another wave of plague epidemics swept across Italy, killing more than one million people. Particularly the plagues of 1629-1631 and of 1656-1657 had detrimental effects on the population level, with an average death rate of at least 20 percent (see Figure 1). Urban recovery from these disasters was very slow. In 1700 the urbanization rate had further declined to 14 percent, well below that of 1600. Many cities would not regain their earlier population size. "*There is no doubt that in Italy the consequences of the plagues were always heavier for the urban than for the rural populations*" (Malanima: 1998, p. 99). Figure 1 gives the death toll for the seventeeth century plague epidemic for a number of cities. There are only city-specific data for a limited number of mainly northern cities. It illustrates the large variation in deaths as a percentage of urban population. We will refer back to Figure 1 when discussing our estimation results in section 3.

Figure 1



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

2.2 City Sizes in Italy

We use centennial data on city sizes as compiled by Malanima (1998). He has compiled a

dataset comprising over 500 Italian cities over the period 1300-1861, hereby heavily relying on the seminal work work on Italian population history by Beloch (1937, 1961, and 1965). 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 paper is cities with at least 10,000 inhabitants. By using this cut-off value we hope to exclude large villages and - this is especially relevant for the southern part of Italy - so-called agro-towns, which were mainly agricultural centres[6]. By looking only at cities with at least 10,000 inhabitants we aim to capture 'true' cities, i.e. centres of exchange, having links with other cities and having (some) influence over the surrounding area through their juridical, ecclesiastical and educational functions (see also De Vries: 1984 and Cowan: 1998).

Table 1 shows various descriptives that each provide information on an interesting aspect of the Italian urban system. Given the importance of the North-South divide (*Nord –Sud)* in Italy (de Vries: 1984, De Long and Shleifer: 1993), we will present our information for Italy as a whole and for *Nord* and *Sud* separately, with the present regional south-borders of Tuscany, Umbria and Marche as the dividing line (Malanima: 1998, p.95). Total city population (see the first row) increased almost threefold in the period 1300-1861, but in the fourteenth as well as in the seventeenth century the total city population decreased markedly. Both developments can to a large extent be explained by the plague epidemics (recall Figure 1). Over time, the share of the northern cities in total city population falls. The latter is also reflected in the number of cities (see the third row of Table 1). The rise of the number of cities in the South is particularly the result of the increase of new and relatively small cities in this part of Italy. Here too, the impact of large shocks, notably the plague epidemics, shows up, which is reflected in a reduction in the number of cities, especially in the South in the 14th century. The second row of Table 1 gives the urbanization rate, which is high by European standards and confirms the notion that Italy was indeed one of the first countries to urbanize. Combining the first and the third row gives the average number of inhabitants per city. This is fairly constant over time

[6] Also Malanima (1998, 2005) himself argues that taking a 5,000 cut-off instead of 10,000 inhabitants has the drawback of including many of these agro-towns.

especially for northern cities; also northern Italian cities are clearly larger on average than their southern counterparts.

Table 1: Descriptives Italian city size (Nord and Sud)

	1300	1400	1500	1600	1700	1800	1861
				TOTAL CITY POPULATION (x 1,000)			
Italy	1840	692	1339	2148	1916	3105	5011
% Nord	0.76	0.84	0.65	0.53	0.54	0.47	0.43
% Sud	0.24	0.16	0.35	0.47	0.46	0.53	0.57
				URBANIZATION (% total population living in cities >= 10,000)			
Italy	0.15	0.09	0.15	0.16	0.14	0.17	0.19
% Nord	0.18	0.12	0.16	0.14	0.13	0.14	0.13
% Sud	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
% Nord	0.67	0.81	0.61	0.49	0.52	0.40	0.33
% Sud	0.33	0.19	0.39	0.51	0.48	0.60	0.67
				AVERAGE NUMBER OF INHABITANTS PER CITY (x1,000)			
Italy	23.29	26.62	26.25	28.64	29.03	24.64	24.93
Nord	26.30	27.76	28.10	30.54	30.68	28.37	32.29
Sud	17.15	21.80	23.40	26.79	27.28	22.11	21.33
				URBAN PRIMACY (1)			
Italy	0.08	0.14	0.11	0.13	0.11	0.10	0.08
Nord	0.11	0.17	0.12	0.12	0.13	0.09	0.09
Sud	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
Nord	0.27	0.40	0.31	0.30	0.31	0.23	0.24
Sud	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
Nord	27.20	24.02	24.78	29.31	28.55	27.11	38.02
Sud	10.15	7.82	32.48	47.76	45.25	41.28	40.63

Notes: 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.

Looking at the bottom row of Table 1 we find an increase in the standard deviation indicating that the differences between city sizes increase over the years. Looking at the development of Italy as a whole the standard deviation increases from 23.3 in 1300 to

40.0 in 1861. However, most of the change takes place in the southern part of Italy, between 1300 and 1600. The increased standard deviation in the *Sud* must be linked with the increased number of small cities in the South over time, which is also reflected in the urban primacy (i.e. the share of the largest (row 5 in Table 1) and three largest cities (row 6 in Table 1) in total city population) measures. When comparing North and South, the initial (=1300) urban primacy is about the same. In the North the urban primacy indicators remain fairly stable but this not the case for the South. In the first part of our sample period the cities in the South are dominated by few, large cities, notably Naples and Rome. But from 1700 onwards the urban primacy data show that the position of large Southern cities becomes less dominant in this part of Italy with the result that the urban primacy falls and by 1861 the urban primacy indicators for the three largest cities are again more or less equal for the North and South. Again, the main force driving this change in the South is thus the growing number of relatively small cities.

2.2 City Size Distribution

It is a well-known fact that for many countries and episodes the distribution of city sizes adheres to a specific power law in the upper tail, an empirical regularity that is better known as Zipf's law (see e.g. Gabaix and Ioannides: 2004). Zipf's law roughly implies that a city's size and its corresponding rank in the city size distribution follow the rank-size rule. This rule states that the second largest city is half the size of the largest city, the third largest city is one-third of the size of the largest city, and so forth. To test for Zipf's law in our sample, we performed so-called Zipf-regressions (see Gabaix and Ibragimov: 2006) regressing the log rank of cities (with the largest city getting rank 1) on the log of city sizes[7]. The value of the coefficient on log city size (the Zipf coefficient) reveals information about the city size distribution. If the total population of a country or region were clustered in one single large city the coefficient equals zero, else, if all cities are of equal size the coefficient would equal minus infinity, displayed by a vertical line. For Zipf's law to hold the coefficient should equal -1. The top panel of Table 2 gives the estimation results. For the coefficients (standard errors in parentheses) denoted in *italics*,

[7] Following the suggestions made in Gabaix and Ibragimov (2006), we estimated the 'adapted versions' of the standard Zipf-regression in order to get unbiased estimates of the Zipf-coefficient and the standard errors.

the conclusion is that the coefficient does not differ significantly from –1, and thus Zipf's law is not rejected. For Italy as a whole the results of the Zipf-regressions show that at the beginning (1300) and at the end of our sample period (1800, 1861) the Zipf-coefficient is significantly lower than -1, which indicates that the size of cities was more evenly spread than predicted by Zipf's Law.

Table 2 Zipf's law, and rank and city size correlation, 1300-1861

	1300	1400	1500	1600	1700	1800	1861
				ZIPF (Gabaix and Ibragimov, 2006)			
Italy	-1.613	*-1.480*	*-1.254*	*-1.258*	*-1.239*	-1.444	-1.467
	(-0.257)	*(-0.410)*	*(-0.248)*	*(-0.206)*	*(-0.216)*	(-0.182)	(-0.146)
Nord	*-1.488*	*-1.317*	*-1.269*	*-1.297*	*-1.359*	*-1.351*	*-1.233*
	(-0.289)	*(-0.406)*	*(-0.322)*	*(-0.301)*	*(-0.330)*	*(-0.268)*	*(-0.215)*
Sud	*-1.944*	*-2.879*	*-1.138*	*-1.156*	*-1.086*	-1.476	-1.672
	(-0.539)	*(-1.821)*	*(-0.360)*	*(-0.265)*	*(-0.272)*	(-0.241)	(-0.203)
				RANK CORRELATION RELATIVE TO 1861			
Italy	0.473	0.460	0.711	0.686	0.785	0.744	1.000
Nord	0.658	0.533	0.808	0.751	0.819	0.858	1.000
Sud	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
Nord	0.917	0.896	0.908	0.737	0.792	0.876	1.000
Sud	0.627	0.842	0.987	0.978	0.980	0.995	1.000

Notes: Standard errors in parentheses. Results under ZIPF (Gabaix and Ibragimov: 2006) obtained from the following regression: $\ln(Rank_i - 1/2) = a + b\ln(Size_i) + \varepsilon_i$, with standard errors $(2/n)^{1/2}b$.

The overall conclusion that we can draw from these Zipf regressions is that for Italy as a whole the slope coefficient describes a U-shape over time (when Zipf's Law is used as a benchmark). The lowest value is 1.24 (in absolute terms) in 1700, before and after 1700 the coefficients are larger (in absolute terms). This indicates that by and large Italy moved from a situation from relatively equally sized cities towards more differentiated city sizes and then moved back again. This, however, obscures the fact that, as with the data presented in Table 1, developments differ markedly between the North and the South. According to our regression results, the overall city-size distribution in the North is much more stable over time than in the South.

Estimating Zipf-regressions does not provide information on the position of individual

cities within the Italian urban system. It is for example possible that the Zipf-coefficients (or standard deviations for that matter) do not change, but that the relative positions of individual cities are overturned completely. To give information on the changes in the positioning of individual cities we calculated rank correlations as well as city size correlations with respect to 1861. The bottom half of Table 2 gives both correlation coefficients. For Italy as a whole, from 1500 onwards the city size correlation is stable and above 0.9. This is mainly driven by the South, the North shows more variation. In the South the city size correlation is fairly stable and at a high level from 1400. The rank correlations for Italy as a whole, however, show more variation than that of the city size correlations. For this measure the ranking of individual cities is fluctuating less over time (with 1861 as benchmark) for the North as compared to the South. Apparently the South is characterised by many small cities that stay small (high city size correlation), but because of their size are more easily switching rank. In the North both rank (be it to a much lesser extent than in the South) and size are changing over time.

2.4 Urban Potential

As was already observed 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 headed urban systems that stretched beyond the Italian territory. We have calculated so called (within-Italy) urban potentials that may help to illustrate the existence of urban subsystems. For each city the urban potentials, much like the well-known market potential function, give an indication of the spatial interdependency between a city and the other cities. In our estimation of the determinants of Italian city growth in section 3, these urban potentials will also prove to be useful because there they will serve as our proxy for the size of the markets, apart from its own, a city has access to (market access).

Urban potentials measure the accessibility of a city to other cities. It measures the distance-weighted population of all cities surrounding the city under consideration. When using distance in terms of kilometers only, this might give a distorted view because some

cities are landlocked, and others are connected through navigable waterways. In order to deal with these differences we use distance weights that highlight special transportation characteristics of certain cities. Following de Vries (1984) we calculated urban potential for each city *i* as follows:

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

, 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:

a) if city *i* and city *j* are both major seaports, $w_{ij} = 0.5$

b) if city *i* and city *j* are both connected by navigable water, $w_{ij} = 0.75$

c) if city *i* and city *j* are both located on a Roman road, $w_{ij} = 0.8$

d) if city *i* is a seaport and city *j* is on the coast but not a major seaport, $w_{ij} = 0.95$

e) if city *i* and city *j* are both on the coast but not major seaports, $w_{ij} = 0.975$

f) if none of the above or $i = j$, $w_{ij} = 1$

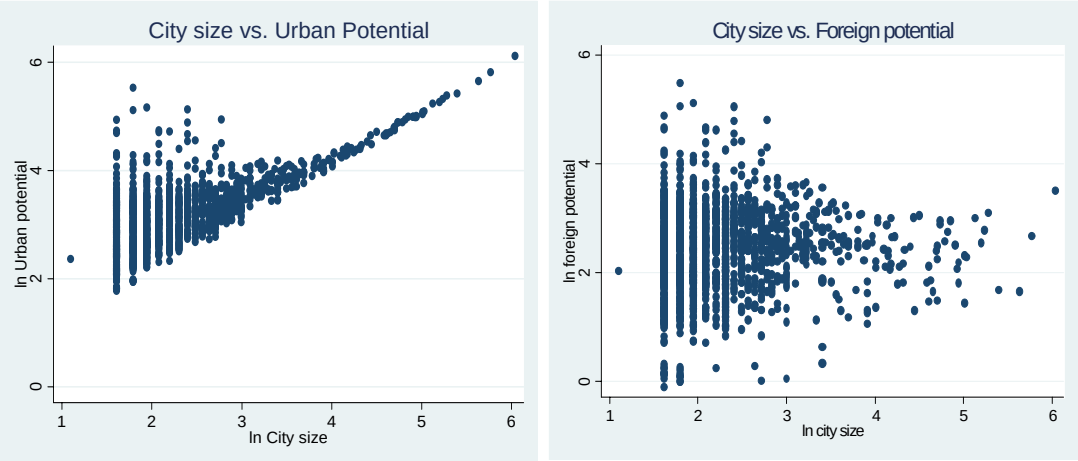
Contrary to De Vries (1984) who uses $D_{ij} = 20$ if $i = j$, we assume that $D_{ij} = 1$ if $i = j$ and we therefore do not weight own city population when calculating the urban potential. We see no reason to weight own city population, as one could argue that own city population constitutes the most relevant accessible pool of potential workers/consumers to a specific city.

Using the calculated urban potentials we are able to sketch the development of urban subsystems in Italy over time. The maps in Appendix C show contour shades of urban potentials over the centuries, starting in 1300 and ending in 1861. They show how in the North a pronounced urban system is present over the centuries, with major cities such as Firenze, Milan, Venezia. In the South two large subsystems (Rome and Naples) appear (with Bari and Palermo also clearly present from 1800 on). The map of 1400 clearly shows moreover the devastating impact of the bubonic plague of 1346 on the urban (sub)systems in Italy. Also the effect of the Thirty Years' war, raging mostly in the northern parts of Italy, and the subsequent plague episodes show up. 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 seems to extend itself.

Figure 2a moreover shows that for relatively large cities, e.g. Naples, Rome, Milan, the urban potential is almost fully captured by its own city population (see also Table A1 in Appendix C). It is only for smaller cities that urban potential clearly exceeds the own city size. We also calculated the urban potential excluding the own city size (foreign urban potential). The foreign urban potential is not clearly correlated with own city size (see Figure 2B). This is confirmed by a look at Table A2 in Appendix C, which shows the largest Italian cities in terms of foreign urban potential, thus excluding own city population from the (within-Italy) urban potential in equation (1).

Figure 2A



Also a look at Table A1 and A2 (and also Figure C) gives additional information on the actual movement of the largest individual cities within the city distribution, hereby supplementing the information given by the rank and size correlation shown in Table 2. It shows clearly that in the beginning of the sample period the northern Italian cities dominate their southern counterparts in terms of size. From the 15th century on however the southern cities quickly gain importance, culminating in 1800 when Napoli, Roma 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 large northern cities in 1300 are generally also the largest northern cities in 1861, interesting changes in rank do take place even among these largest cities (much less so in the South). Firenze for example was the 2nd of the northern cities in 1300, degrading to the 5th place in 1500, and ending as the 4th largest northern city in 1861. Siena, Cremona and Brescia are other examples of cities moving down the northern ranks. Other cities, like for example Genova, gain in rank, most pronounced of them being Torino. Being one of the smaller cities in the earlier centuries, this city (after becoming the capital city in 1568) quickly moves up in the city size ranking, ending as the 2nd largest (!) northern city in 1861[8].

2.5 Summary of the descriptives

Overall the descriptive statistics presented in Section 2 lead to the following observations. There is a marked difference between the development of northern and southern Italian cities over time. The city sizes as well as the city size distribution are more even in the North than in the South. The South contains more cities but the distribution is skewed; there are few very large cities amidst many small cities. For Italy as whole, the impact of large shocks (for example, the plague in the fourteenth century, the plagues and the political and economic turmoil in the seventeenth century) is clearly visible in the data and we also show that the position of individual cities is not constant through time. Having said this, and taking into account the turbulent history of Italian cities as described in section 2.1, there is however a remarkable degree of continuity in the urban system as a whole. Depending on the summary measure, this is true for both the North and the South. *Stability amidst change seems to sum up the material presented in this section*. This conclusion immediately raises a new question. What are the determinants of Italian city growth between 1300 and 1861 that help to explain the city trends discussed above? It is to this question that we turn next.

[8] When looking at the foreign urban potential rankings in Table A2, 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.

3. The Determinants of Italian City Growth 1300-1861

3.1 Methodology and Data

As we have data on individual cities over a long period of time, panel data analysis is the obvious choice to analyze the development of Italy's cities. This enables us to distinguish between factors that are constant over time (or during part of the time) and those that are not. Our methodology is as follows. The dependent variable is always the log of city size. This implies that the coefficients can be interpreted as relative changes, e.g. the coefficient of the capital city dummy indicates how much percent 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 a population size of at least 10,000 in the period 1300-1861 as our baseline sample (see section 2 for the reason for this cut-off). 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 allows for unobserved heterogeneity over the cities in our sample that is uncorrelated with the regressors. In all cases the Breusch-Pagan statistic (see p-value BP) indicates that this specification is preferred over a standard pooled panel regression. In the regressions we allow for century-specific fixed effects, which are the same for all cities.

Our main explanatory city-specific regressors are geography variables, political and institutional variables, and region dummies. Our geography variables relate to physical geography and market access (i.e. a city's location relative to other urban centres).
Market access, i.e. the closeness to other markets is captured by the constructed foreign urban potentials in Section 2.4 (see also Appendix C). To capture the effect of physical geography we constructed the following five dummy variables:

- Location in a mountainous area (more than 800 m. above sea level);
- Location along a navigable waterway, i.e. the Po-valley river system (the river Po and its subsidiary rivers like for example the Adige, Adda, Mincio and Ticino) and the river Arno[9] in Tuscany.

[9] Outside the Arno Valley (with cities like Pisa and Florence) and Po Plain there was no canal construction and many rivers dry up completely during the summer, which limits the economic potential of these waterways.

- Location along a major Roman road (see Figure B2 in appendix B)[10];
- Roman road crossing in the city (hub city);

The two city-specific political/institutional (dummy) variables we include are:

- Location in the South of Italy –*Sud*- or in the North –*Nord*- (see Figure B1 in Appendix B)
- Capital city of an Italian state (see Table B1 in Appendix B)

Moreover, we include dummy variables for present-day provinces (see Figure B1 in Appendix B). These region dummies are included to control for unobserved city-specific variables such as weather, soil quality, etc. that are likely to be in 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, Toscana, etc.).

Finally, we also have data on some city-*in*variant, century-specific variables, taken from the database in Federico and Malanima (2004) and Acemoglu et al. (2005) reflecting economic and institutional developments in Italy, like relative prices, productivity in agriculture, and the quality of institutions in place to check the use of power by the ruler. The ability of these data to give conclusive evidence about the relevance of the variables they aim to capture can however be argued to be questionable due to their city-unspecific nature (essentially such city-unspecific variables assume that the economic/institutional situation was the same in all Italian cities in the sample). Nevertheless we decided to still introduce these variables as a first pass in the absence of better city-specific data.

3.2 Baseline Estimation Results

Before we present our baseline estimation results in Table 3, we say a few words on the organization and presentation of the estimation results. In Table 3 as well as in Table 4 in section 3.4, below each coefficient the p-value is given (the maximum confidence level at which the parameter estimate is significant, i.e. if it says [0.023] the parameter is

[10] We use Roman roads and not the road infrastructure of the time-period under consideration in order to avoid circular explanations (important roads connect large cities and reflect city sizes). Roman roads were developed during the Roman Empire and can be considered exogenous.

significant at a 2.3% level or higher, and not at e.g. the 2% level) corresponding to the robust standard error, allowing for autocorrelation in the error term for each individual city. It is likely that (especially given the fact that we cannot control for some city-specific unobserved characteristics) the error terms for each specific city display a substantial degree of autocorrelation over time. This will, when using standard or heteroscedasticity corrected standard errors, 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 R^2, the number of observations, in some cases the p-value of a test (or tests) of equivalence when distinguishing between *Nord* and *Sud*, and the p-value of a test regarding the significance of the included year and/or region dummies. As mentioned before the region dummies are included to capture a part of the unobserved city-specific variables such as weather, soil or differences in region specific institutions that are of a localized regional nature.

The estimation results in Table 3 are for three main cases:

a) the total sample of cities with a population larger than 5,000 (column I);
b) only cities with a population larger than 10,000 (column II)
c) only cities in the North with a population larger than 5,000 (column III).

Case (a) is included as it gives the largest sample, case (b) is our baseline sample and case (c) is included as this leaves out the South altogether providing a robustness check (Malanima 1998, argues that the 5,000 cut-off is less problematic in case of northern cities).

The estimation results are shown when distinguishing between three sets of explanatory variables (i) physical geography variables; (ii) political/institutional variables and (iii) city-invariant century-specific variables, here captured by a set of time (i.e. century) dummies[11]. The capital cities receive a separate dummy, as it is well known that capital cities are larger than 'expected'– being a (regional) capital is expected to contribute

[11] We do not introduce the city invariant, century specific variables here given their city-unspecific nature. See section 3.3 for more details.

positively to city size (Ades and Glaeser, 1995; Epstein, 1993). We also check to see if (*Nord/Sud*) century-specific effects matter, following DeLong and Shleifer (1993), Allen (2001), Federico and Malanima (2004), and Broadberry and Gupta (2006).

Table 3: Baseline estimates Italian city growth 1300-1861

	Cities >=5	Cities >=10	Nord >=5	Cities >=5	Cities >=10
Geography					
Seaport	0.335	0.315	0.494	0.303	0.255
	[0.002]	[0.012]	[0.059]	[0.003]	[0.043]
roman road	0.206	0.070	0.229	0.196	0.040
	[0.000]	[0.284]	[0.041]	[0.000]	[0.527]
Hub	0.265	0.331	0.126	0.214	0.277
	[0.211]	[0.065]	[0.698]	[0.231]	[0.045]
Navigable waterway	0.620	0.375	0.716	0.665	0.429
	[0.000]	[0.010]	[0.000]	[0.000]	[0.004]
Mountains	-0.118	-0.088	-0.032	-0.112	-0.085
	[0.002]	[0.107]	[0.751]	[0.003]	[0.109]
Institutions					
Capital	0.934	0.731	0.607	-	-
	[0.000]	[0.000]	[0.000]	-	-
Nord	-	-	-	0.748	0.543
	-	-	-	[0.000]	[0.000]
Sud	-	-	-	1.735	1.596
	-	-	-	[0.001]	[0.001]
p-value (capital Nord = capital Sud)	-	-	-	[0.000]	[0.000]
Constant	2.016	2.689	2.050	2.116	2.757
1400 Nord	-0.434	-0.426	-0.467	-0.442	-0.359
1500 Nord	-0.204	-0.101	-0.307	-0.284	-0.141
1600 Nord	-0.012	0.073	-0.133	-0.121	-0.026
1700 Nord	-0.027	0.054	-0.148	-0.128	-0.037
1800 Nord	0.161	0.169	0.048	0.056	0.073
1861 Nord	0.280	0.297	0.175	0.154	0.237
1300 Sud	-	-	-	-0.386	-0.614
1400 Sud	-	-	-	-0.877	-1.627
1500 Sud	-	-	-	-0.517	-0.664
1600 Sud	-	-	-	-0.299	-0.399
1700 Sud	-	-	-	-0.316	-0.410
1800 Sud	-	-	-	-0.126	-0.291
1861 Sud	-	-	-	-0.004	-0.186
p-value years	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
p-value (time Nord = time Sud)	-	-	-	[0.097]	[0.072]
p-value regions	[0.025]	[0.403]	[0.154]	[0.003]	[0.165]
R^2	0.46	0.51	0.44	0.49	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 (capital Nord = capital Sud) denotes the p-value for a test of equality of the capital dummy in Nord and Sud Italia. p-value years/regions respectively denotes the p-value of the F-test for the joint significance of the time/region (region = current day Italian province) dummies included. p-value (time Nord = time Sud) denotes the p-value for a test of equality of the time trend in Nord and Sud Italia. p-value BP denotes the p-value of the Breusch-Pagan test for random effects. If only the time dummies for Nord are shown these denote the time dummies for all Italian cities.

Turning to the estimation results, we find that for the physical geography variables, two geography variables stand out: seaports, and cities that have access to navigable waterways. In all specifications shown in Table 3 these geography variables are significant. It suggests that transport over water is an important factor determining Italy's city growth. Being a city with a seaport gave a city a big advantage as the bulk of international trade took (and takes) 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 if a city could have a seaport this gave it a huge advantage over other non-seaport cities. The two navigable river systems, the river Arno connecting cities such as Pisa and Firenze and the river Po connecting cities such as Verona, Ferrara, and Piacenza, provided the cities located on the these riverbanks with a cheap means of transportation, opening up a much larger hinterland to these cities that allowed them to engage in international finance and commerce and to diversify their industries (Braudel: 1972; Hanlon: 2000, pp. 82-83). The additional physical geography variables (Roman road, hub, mountains) turn out to be less relevant. But note that both the Roman roads and mountains do have a significant positive and negative effect respectively for the sample, which includes smaller cities (between 5,000 and 10,000 inhabitants, column I).

Turning to the political/institutional variable, our estimation results indicate a positive effect of being a capital city on city size. Being a capital attracts people as public expenditure is likely to be biased towards the capital city (think of the construction monuments, government buildings, roads, etc.), hereby creating jobs and business opportunities alike. The capital city acts as a so-called 'parasite' city (see DeLong and Shleifer, 1993) attracting both capital (in the form of taxes) and people. Also being close to the one(s) in power can be argued to be beneficial. Columns IV and V in the table moreover show that the effect of being a capital city differs between the Nord and Sud (see p-value (capital Nord=capital Sud)). The impact of the capital city variable on city size is much stronger for Southern cities. We will look more closely into this particular North-South difference and its development over time in section 3.4. (see Table 4 and Figure 4).

As to our third set of explanatory variables (city-invariant but century-specific), the bottom half of Table 3 shows the estimated effects of the included century-specific dummies (the bold line). First note that these century effects are significant (p-value years) and also that they do *not* differ significantly between North and South.[12] Figure 3 plots the corresponding time-trend. Without any further information on the economic and political changes over time, these time effects are difficult to explain. Ideally we would like to have city-specific data on the evolution of these economic and political changes. However, as already mentioned in section 3.1, the useable data we have are *city-invariant but time varying economic and political/institutional variables*. Even though these variables are clearly far from perfect we do, as a first pass, try to relate them to the observed estimated time trend, hereby also relying heavily on findings in previously published literature.

3.3 Explaining the time trend

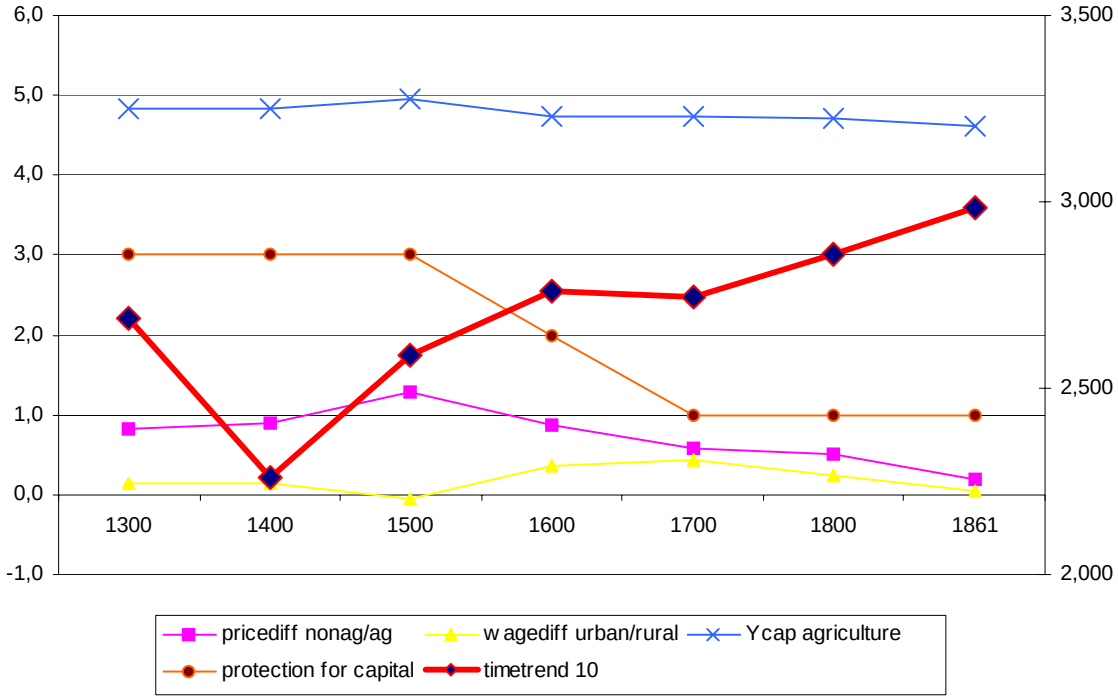
The decrease in the time trend that shows up in Figure 3 for the centennial observation of 1400 coincides with the negative shock of the plague mentioned earlier. After 1400, average city size increased during two centuries. Subsequently, average city size decreased again (see time trend for 1700), due to the turmoil of the Thirty Years' War and a new round of plague epidemics. Recall Figure 1 (city-data on 17th century plague deaths) where for some cities the importance of the plague shock clearly comes to the fore with population losses of more than forty percent. Then up to the 1861 unification, average city size increased again.

Besides these pest-shocks, what could explain this time trend? In Figure 3 the time trend is plotted against the following Italy-wide variables: the ratio of the price of non-agricultural goods (textiles) to the price of agricultural goods, which reflects the cities' terms-of-trade; the wage differential between urban and rural areas, which reflects the pull-factor of rural labour to the city; labour productivity in agriculture and an index that measures the extent to which political institutions are in place that limit the power by the

[12] On a more disaggregated level, we also checked whether the century-specific effects differed when we used the present day Italian provinces instead of our Nord-Sud split, see *p-value regions* at the bottom of Table 3. It turns out that there is not clear support for the relevance of such region-specific effects.

ruler (the index of constraint on the executive taken from Acemoglu et al.: 2005). This index ranges from 1 to 7 with higher values indicating more limits to the arbitrary use of power by the ruler. Basically, this variable captures information on how secure property rights of the merchant class are and can therefore be considered to be a proxy for the investment climate.

Figure 3: Time trend and city invariant variables



Corresponding correlations

	Rel. price nonag/ag	Rel. wage urban/rural	Ycap agriculture	Constraint on the executive
timetrend 10	-0.606	0.152	-0.664	-0.760

Notes: Time trend shown in the Figure are based on column II of Table 3.

As Figure 3 and the corresponding correlations below Figure 3 show, the time trend and the constraint on the executive are highly negatively correlated. This result corroborates findings on city growth and urbanization of e.g. DeLong and Shleifer (1993), Acemoglu et al. (2005) that indicate that a less restricted investment climate is beneficial to urban growth. Agricultural output per worker (*Ycap agriculture* in Figure 3) is also negatively correlated with the time trend. Output per worker in the agricultural sector stayed below

its peak of 1420 until the interwar period of the twentieth century. Even during a large part of the 19th century agricultural labour productivity remained close to its level in the 11th century. This is an important stylized fact behind the long-term decline of Italian urbanization until 1700.[13] This is corroborated by the ratio of urban versus rural wages, which shows a (very) modest increase from 1300- until 1700, but declines relative fast from 1700 onwards, and also coincides with city growth. Combined with the relative prices of non-agricultural goods this implies a real urban wage increase until 1700. After 1700 levels of real wages of urban wage earners in Italy declined. Allen (2001) has calculated real consumption wages for European cities from 1500 to 1900. The results show an increasing gap between northwestern Europe and the rest. The Italian cities in his sample (Florence, Milan, Naples) show continuously declining real consumption wages until 1850. City-laborers shifted their spending more toward bread, being the cheapest source of calories. Low welfare ratios maintained bad health and high levels of mortality in the cities (Allen 2001, 429-431). We believe that after 1700 Harris-Todaro-like elements (this is also mentioned by Malanima, 2005, p 110) might have been of influence, in the sense that a labour surplus is drawn from rural areas towards urban areas even when the odds of finding work or a decent living are less than one. This explains city growth that goes along with a decline in relative (real) wages.

3.4 Capital cities over time and market access

In this section we will in more detail focus in on the found positive effect of being a capital city and also introduce market acces, the effect of a city's location relative to other cities as a potential explanation of city size. The estimation results in Table 3 already indicated that being a capital city is positive for city size. We also noted that the impact of a capital city on city size differed notably between the *Nord* and *Sud* of Italy with its impact being larger for southern cities. To see how the influence of this political variable changed over time, and keeping the North-South division in mind, we estimated the time (=century) specific effect of capital cities. Column I of Table 4, which corresponds to our baseline case in Table 3, shows the results.

[13] We have to be careful here with the nature of the causality, however. The share of the agricultural workforce in the total Italian population was estimated by Federico and Malanima by using a backward projection of the calculated relation between the urbanization rate and the agricultural workforce between 1861 and 1936 (Federico and Malanima: 2004, p. 450).

Table 4: capital cities over time and urban potential

	Cities >=10	Cities >=10	Cities >= 5	5 =< Cities < 10
Geography				
Seaport	0.258	0.250	0.305	0.044
	[0.041]	[0.046]	[0.003]	[0.622]
roman road	0.038	0.035	0.198	0.060
	[0.550]	[0.571]	[0.000]	[0.001]
Hub	0.249	0.277	0.218	0.063
	[0.071]	[0.047]	[0.224]	[0.233]
navigable waterway	0.432	0.433	0.668	0.090
	[0.003]	[0.003]	[0.000]	[0.074]
Mountains	-0.078	-0.091	-0.109	-0.009
	[0.134]	[0.098]	[0.000]	[0.596]
Political				
capital 1300 Nord	0.405	0.535	0.741	0.040
capital 1400 Nord	0.370	[0.000]	[0.000]	[0.529]
capital 1500 Nord	0.426	-	-	-
capital 1600 Nord	0.446	-	-	-
capital 1700 Nord	0.560	-	-	-
capital 1800 Nord	0.543	-	-	-
capital 1861 Nord	0.961	-	-	-
capital 1300 Sud	0.630	1.575	1.729	-
capital 1400 Sud	0.140	[0.001]	[0.001]	-
capital 1500 Sud	1.208	-	-	-
capital 1600 Sud	1.786	-	-	-
capital 1700 Sud	2.062	-	-	-
capital 1800 Sud	2.141	-	-	-
capital 1861 Sud	2.253	-	-	-
p-value capitals	[0.000]	-	-	-
Urban potential				
Foreign	-	-0.042	0.017	0.010
	-	[0.566]	[0.713]	[0.622]
p-value years	[0.000]	[0.002]	[0.000]	[0.005]
p-value (time Nord = time Sud)	[0.004]	[0.110]	[0.302]	[0.177]
p-value regions	[0.095]	[0.196]	[0.003]	[0.002]
R^2	0.60	0.57	0.48	0.08
p-value BP	[0.000]	[0.000]	[0.000]	[0.000]
nr observations	623	623	1702	1180

Notes: p-values in brackets. p-value capitals denotes the p-value of an F-test for the joint significance of all the capital dummies. p-value years/regions respectively denotes the p-value of the F-test for the joint significance of the time/region (region = current day Italian province) dummies included. p-value (time Nord = time Sud) denotes the p-value for a test of equality of the time trend in Nord and Sud Italia. p-value BP denotes the p-value of the Breusch-Pagan test for random effects. In columns 3-6 only capital Nord and capital Sud, without making it time specific, are included in the regression.

Looking at the physical geography variables the results are in line with those reported in Table 3 and the same goes for the time and other dummy variables that were already introduced in Table 3, so we focus here on the political variable of being a capital city. 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 whereas the "capital bonus" is more or less constant for northern cities, it is clearly not for southern cities. For southern cities the relevance of being a capital city increases over time. This, of course, raises the question why this might the case, but before we address this in more detail, we discuss our second addition to the set of explanatory variables namely urban potential.

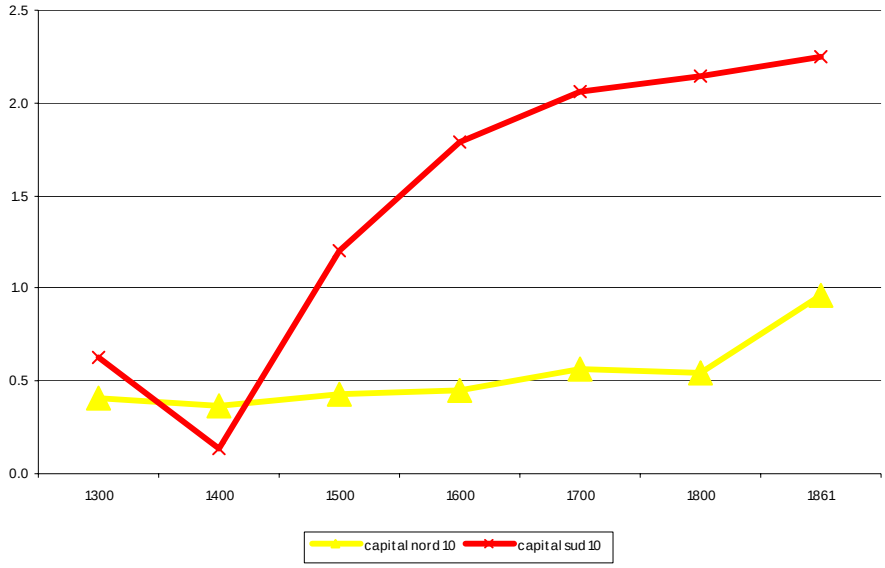
So far, the role of geography in determining Italian city size has been limited to physical geography. From modern location theories, like the new economic geography (Krugman, 1991), we know, however, that it might not be so much the physical aspect of geography but instead the relative (man-made) aspect of geography that matters for, in our case, Italian city growth. To this end, recall section 2.4, we included urban foreign potential among the set of regressors as a measure of a city's access to other cities' markets.[14] Columns II-IV in Table 4 show for three different city-size cut-offs (1. our baseline sample, 2. including cities smaller than 5,000 inhabitants, and 3. only including cities with a population between 5,000 and 10,000 people) the estimation results when we add foreign urban potential. We show these three different cases as one can argue that the effect of having other relatively large cities nearby depends on the size of your own city. Small cities will more likely benefit from being close to large urban centers, as this will increase its own market (in terms of both goods and jobs) substantially. For a large city these positive effects may however be overshadowed by the fact that it could also be harmed (given the time period under consideration this may even be taken literally) by the more severe competition coming from other nearby large urban centers. The conclusion in all three cases is that urban potential is not significant. More research on

[14] We went for foreign urban potential because, compare Figures 2A and 2B, urban potential (which include own-city population) largely coincides with own-city population. 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.

this is needed but this finding might corroborate the idea that in the period under consideration the kind of spatial linkages that are captured by the urban potential variable were (still) limited in Italy (de Vries, 1984). Note however that the sign of the estimated coefficient (although not significant) is negative when focusing on the larger cities and positive when looking at the smaller cities, which points (be it insignificantly) to a possibly stronger competition effect between the larger cities.

Finally, to come back to the effect of being a capital city, Figure 4, which is based on the estimation results in column I of Table 4, illustrates how the relevance of being a capital city changes over time for the *Nord* and *Sud*.

Figure 4 Capital cities over time and the *Nord-Sud* difference



Notes: Results shown in the Figure are based on column I of Table 4.

It shows that for northern cities the relevance of being a capital is smaller than for southern cities and the size of the "capital bonus" is, in contrast to southern cities, constant (at about 50% larger than the average non-capital city) across the 1300-1861 period. From 1400 onwards, the impact of the capital city for the Sud not only exceeds that in the *Nord* but it also increases remarkably over time (from being about 50% in 1300 to being about 225% larger than the average city in 1861).

The reasons why capital cities might be larger are well documented by Ades and Glaeser (1995) but why is there for the case of Italy such a (widening) difference between the northern and southern part of the country between 1400 and 1600? According to the indices used by DeLong and Shleifer (1993), southern Italy can be seen as an example of an absolutist state throughout our sample period. Their hypothesis is that in absolutist states and compared to non-absolutist or free states, urbanization ratios will be lower, but capital cities will be relative large. The reason for this is that in absolutist regimes capital cities succeed 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 (Ades and Glaeser: 1995). This would help explain why the "capital bonus" is so large in the South (see Table 4) with the Kingdom of Naples and the Papal States as good examples of (highly) absolute states. Naples' very large size in the seventeenth century is mentioned as an example of such a royal capital (De Long and Shleifer: 1993, 686). At the same time De Long and Shleifer observe that the North switched from non-absolutist to absolutist (princely rule) after 1500. 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 for declining urbanization and the shift of gravity of the European economy north of the Alps (De Long and Shleifer: 1993, p. 677). So if anything, we would expect a more pronounced increased capital city effect over time in northern Italy. This, however, is not the case (at least not until the 19th). We believe that the absolutist/nonabsolutist classification is too simple to capture the political reality of northern Italy. Absolutism never got hold of the region. As far as there were "absolutist" tendencies replacing the hegemony of the city-states, it displaced merchants and artisans to the countryside instead of to one or two parasite cities.

4. Summary and Conclusions

In this paper 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, the city-size distribution as a whole and urban potentials to highlight the main characteristics of Italy's urban system such as the differences between northern and southern Italy. The southern

parts of Italy experienced relatively more pronounced changes in the city size distributions over time, with few cities, i.e. Rome, Naples and Palermo gaining a large degree of dominance from 1400 on (even exceeding their northern counterparts in terms of population). The city size distribution of the northern parts of Italy is relatively more stable compared to the southern parts, although focusing in on the actual rankings of cities over the centuries shows that some dynamics are masked when only looking at aggregate statistics. The overall picture we find seems to be best characterized by "*stability amidst change"*. Our second contribution is that we go beyond merely describing the evolution of the Italian urban system(s) and we explicitly look for important determinants that are behind this observed *"stability amidst change"*. Our data allow for panel estimation where city-size is regressed on various geography, political and other determinants of city size for the period 1300-1861. The main determinants of Italy's city growth, besides the large shocks induced by the pest epidemics of the 14th and 17th century that are clearly visible in the data, are invariably physical geography and political importance, i.e. being a capital city. Also in our estimations the North-South difference is again clearly visible and we provide tentative evidence that, over time, the productivity developments in the agricultural sector and changes in institutional quality may have also had their effect.

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Appendix A Chronology of early modern and modern Italy

-Early 15th century: struggle among Milan, Venice and Florence to increase power and to absorb smaller cities.

-1454-1494: 'golden age of peace'

1453, Fall of Constantinople: influx of Greek scholars and classical revival

1454, Settlement between Milan and Venice (Peace of Lodi) and settlement between Florence and the Papacy.

-1494-1559, Italian Wars:

Italy as the centre of international conflict; 1494-95 Invasion of Italy by the French (King Charles VIII, claiming the throne of Naples); Spain invaded the South; 1494: sacking of Rapallo; 1512 sacking of Brescia, Prato, Ravenna; 1527 sacking of Rome; Siege of Pisa, Verona, Naples, and Siena; in 1520's plagues, typhus, and famine; 1559 Peace of Cateau-Cambrésis. South controlled by Spain: economic and cultural refeudalisation. Northern Italy had opportunities for investment and commercial exploitation. Secondary cities had lost political control but flourished. Power centralised in Florence, Venice, and Milan.

-Crises of the 1590's:

poor harvests, famines, recessions in textiles. Dutch and English traders entered mediterranean markets.

-1618-1648: Thirty Years'War.

Economic effects on Italy: Loss of northern European markets; 1630 sacking of Mantua by Imperial army; 1629-1631 Major plague epidemic

-Second half 17th century: economic stagnation

-1700-1763 Ongoing political turmoil, Spanish Succession crisis. Large parts of Italy exchanged between the Austrian, French and Spanish rulers.

Naples, Sicily, Lombardy and Tuscany became Austrian, Savoy ruled Sardinia, the Po-Valley states became Spanish.

-1763-1791 Period of peace

-Vienna settlement 1814-15: In the North: Kingdom of Sardinia, Austrian Empire, Duchy of Parma, Duchy of Modena, Duchy of Lucca, Grand Duchy of Tuscany, Papal States

-Early 19th century: beginnings of industrial change:

Abolishment of guilds, increase in agricultural productivity, rise of wool and silk industry in Piedmont, Venetia and Tuscany, cotton industry near Milan. Machine building came up, shipbuilding followed;

Railway building from 1839 on but progress slow, due to lack of political unification.

-1861: Kingdom of Italy: unification under the leadership of the North: *blocco storico.* Because of removal of tariffs between North and South, industry and handicraft of less productive and feudal South collapsed; Concentration of industry in the North.

Appendix B Map of Italy and the Roman roads and capital cities included

Figure B1: Italy and its regional and provincial subdivisions.

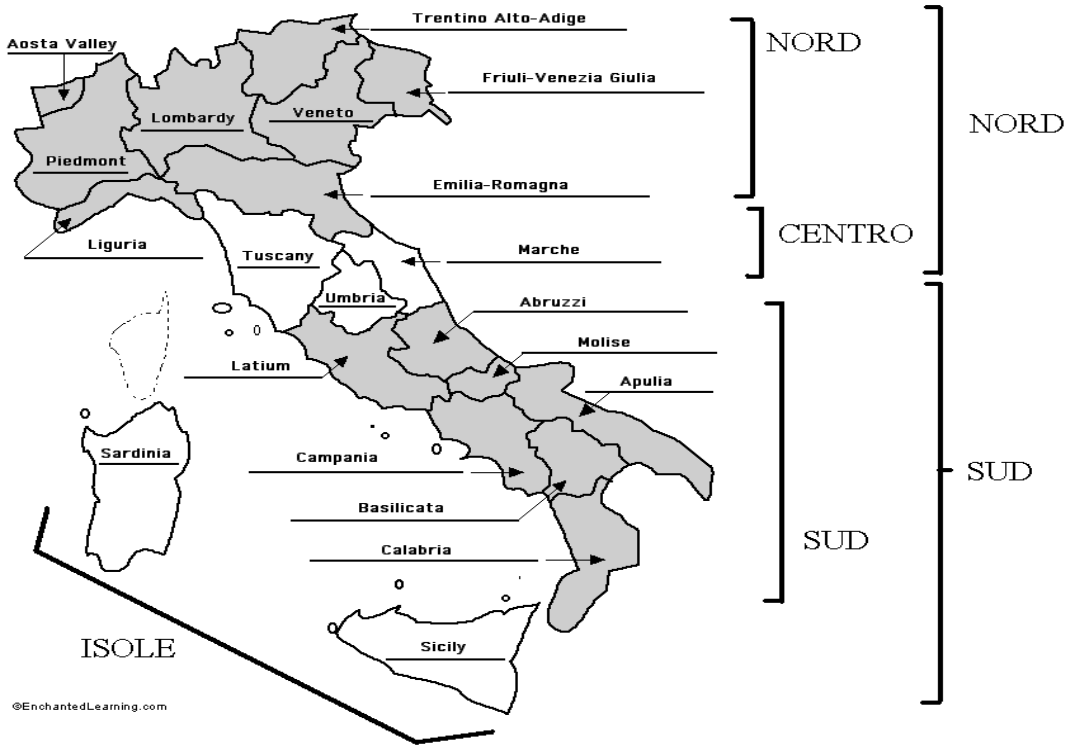


Figure B2: The Roman Road network in Italy

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.

Table B1: Capital cities

Italian (city) states capitals	
capital	period
Napels	1300-1861
Rome	1300-1861
Spoleto	1300-1347
Palermo	1300-1861
Venice	1300-1800
Milan	1300-1861
Genova	1300-1861
Turin	1568-1861
Mantova	1328-1805
Modena	1452-1859
Parma	1545-1861
Ferrara	1300-1597
Florence	1300-1861
Lucca	1300-1796
Siena	1300-1557
Pisa	1300-1406
Piacenza	1545-1861
Bologna	1300-1506
Messina	1300-1675
Padova	1300-1405
Perugia	1300-1540
Urbino	1300-1631
Verona	1300-1387

Appendix C Largest Cities Urban Potentials 1300-1861

Table A1: Top 10 urban potential (UP) on the basis of cities larger than 10,000

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

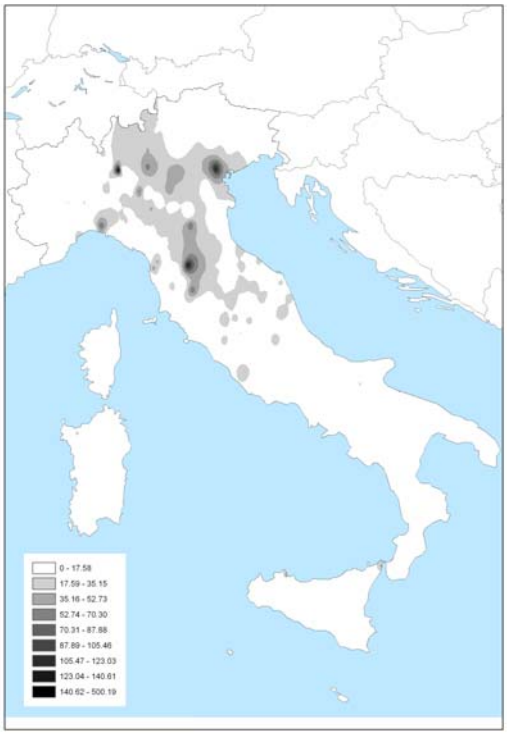
1700 City	1700 Pop (x1000)	1700 UP (x1000)	1800 City	1800 Pop (x1000)	1800 UP (x1000)	1861 City	1861 Pop (x1000)	1861 UP (x1000)
Napoli	220	225.38	Napoli	320	334.5	Napoli	419	452.62
Roma	140	146.12	Roma	153	162.9	Milano	196	218.36
Venezia	138	145.99	Palermo	135	147.4	Roma	188	204.12
Milano	109	120.00	Venezia	135	147.2	Torino	181	193.80
Palermo	110	114.47	Milano	124	139.8	Palermo	168	188.11
Firenze	72	80.26	Afragola	12	95.0	Portici	11	168.22
Bologna	63	73.20	Firenze	81	93.1	Genova	128	147.22
Genova	64	71.91	Genova	76	87.4	Afragola	16	139.85
Messina	50	55.10	Bologna	68	82.4	Firenze	114	133.46
Padova	38	50.53	Torino	61	69.3	Venezia	114	132.11

Table A2: Top 10 Foreign urban potential (FUP) on the basis of cities larger than 10,000

1300 City	1300 Pop (x1,000)	1300 FUP (x1,000)	1400 City	1400 Pop (x1,000)	1400 FUP (x1,000)	1500 City	1500 Pop (x1,000)	1500 FUP (x1,000)	1600 City	1600 Pop (x1,000)	1600 FUP (x1,000)
Prato	13	20.99	Pavia	10	7.77	Aversa	12	19.85	Crema	11	22.79
Bergamo	12	18.43	Piacenza	20	7.29	Bergamo	15	13.35	Lodi	14	22.66
Arezzo	18	17.84	Padova	18	6.92	Pavia	16	10.83	Bergamo	24	17.74
Imola	11	15.26	Cremona	30	6.64	Piacenza	25	10.53	Salerno	11	14.96
Faenza	10	14.77	Vicenza	19	6.62	Vicenza	20	10.35	Pavia	25	14.95
Pavia	20	14.50	Mantova	20	6.50	Cremona	40	10.11	Piacenza	33	14.60
Piacenza	23	14.30	Brescia	30	6.26	Padova	27	10.10	Padova	36	14.17
Ravenna	12	14.02	Verona	20	6.12	Mantova	28	10.01	Vicenza	36	13.89
Lucca	25	13.87	Ferrara	20	5.67	Como	10	9.92	Como	12	13.51
Reggio Emilia	13	13.81	Modena	10	5.67	Reggio Emilia	10	9.88	Cremona	40	13.26

1700 City	1700 Pop (x1,000)	1700 FUP (x1,000)	1800 City	1800 Pop (x1,000)	1800 FUP (x1,000)	1861 City	1861 Pop (x1,000)	1861 FUP (x1,000)
Torre Annunziata	10	24.81	Afragola	12	82.97	Portici	11	157.22
Lodi	14	19.29	Aversa	14	47.62	Afragola	16	123.85
Velletri	10	16.93	Torre Annunziata	14	40.83	Resina	11	121.08
Bergamo	22	15.35	Monreale	13	37.66	Frattamaggiore	11	95.47
Pavia	23	13.18	Sarno	11	30.47	Acerra	11	82.48
Chioggia	10	13.08	Lodi	16	24.71	Aversa	16	74.28
Piacenza	30	12.77	Avellino	11	23.22	Pozzuoli	10	71.33
Vicenza	26	12.70	Velletri	11	21.79	Torre Annunziata	15	67.48
Padova	38	12.53	Bisceglie	11	21.06	Castellammare di Stabia	15	56.34
Reggio Emilia	15	12.36	Partinico	10	20.27	Monreale	12	53.32

Figure C1 Urban Potential over the centuries



1300

1400

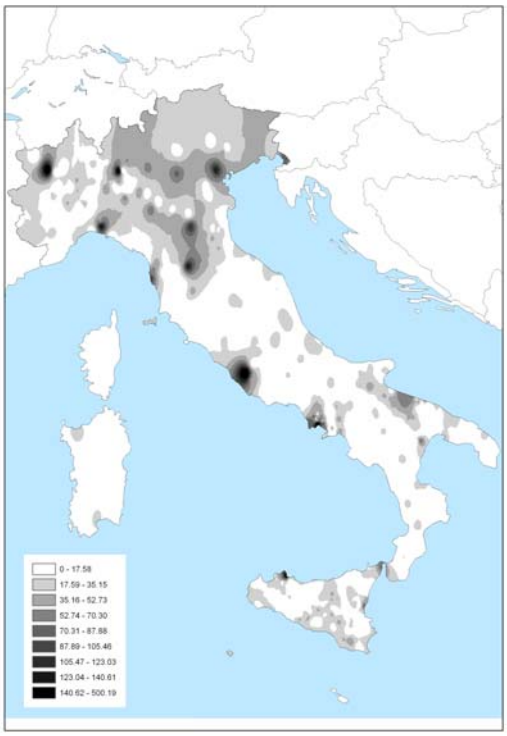
1500

1600

Figure C1 Urban Potential over the centuries (continued)

1700

1800



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