

# Demographic shocks, labor institutions and wage divergence in early modern Europe

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## Abstract

Why did real wages in European regions diverge in late medieval and early modern times thus characterizing a different pattern towards industrialization? This question, which is fundamental for the understanding of the long run development of Europe, is at the basis of the present paper. It combines a simple theoretical framework for wage determination in late medieval rural and urban sectors with an empirical analysis of population and wage trends to check the hypothesis that the early modern divergence was the result of different late medieval rural labor institutions, which caused a differential impact of mid-14th century demographic shocks on the long run evolution of northern and southern economic systems.

Keywords: Pre-industrial Europe, North-South economic divide, real wages, labor market institutions, rural-urban sectors.

JEL Classification Numbers: J11, N13, N33.

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## 1 Introduction

One of the most relevant issues in early modern economic history is the emergence of a striking and persistent divide in real wages between northern and southern regions at least 150 years before the advent of the industrial revolution. The study of such a divergence is important for at least two reasons. First, because according to several economic historians, as such Allen (2009), this divide was so striking and long that was at the root of the industrial revolution in England and Low Countries and the economic stagnation of southern regions. Second, because regional differences in Europe still persist nowadays, as pointed out for example in Carlin (2010) and Boltho (2010). Hence, the analysis of their origins and path dependence might help to understand contemporary problems of preventing a convergence that would create a unified social and economic European area.

The main conjecture of this paper is that at the origins of the divide were the different institutions governing wage bargaining in late medieval rural labor markets. In particular, this hypothesis is investigated checking whether the complementarity between such organizations and the mid-14th century demographic shock, caused by the devastating bubonic plague commonly known as the "Black Death", determined the subsequent different paths in real wage response to population change in early modern Europe.

Several economic historians have dealt with the divergence of economic growth and income distribution between northern and southern European areas in late Middle Ages and early modern time.

The great divide in real wages was first discovered by Robert Allen, who made an extensive comparative analysis of skilled and unskilled real daily salaries in several European cities in the period spanning the 16th-18th centuries, see also Allen (2001). He showed that northern urban centers, such as Amsterdam, Antwerp and London, experienced, at least two hundred years before the advent of the industrial revolution, higher real incomes than several southern cities, such as Florence and Valencia.

Then, the economic historian Şevket Pamuk, provided a fundamental contribution to the subject linking the divergence to the 1348 bubonic plague (see Pamuk (2007).) He has argued that the decreased labor force subsequent to the plague caused a sharp rise in real wages while, on the other hand, the increased land-to-workers ratio caused a decline in the relative price between agricultural and manufacturing goods. Per capita incomes and wages increased throughout all European regions in the decades following the Black Death, remaining higher than pre-plague levels until the end of the 15th century. But in the following decades long term effects differed dramatically in Europe and the divergence appeared. These evidence have motivated many contributions that have tried to provide an explanation to this long run divide in income distribution and economic growth.

Several authors have focused on the demographic regimes that might have caused the striking rise of northern real wages. These works, which usually confront the issue using a Malthusian approach, have theoretically and empirically stressed how long run higher per

capita incomes might have been caused by a combination of persistent high death rates (see Voigtländer and Voth (2013)) and technological improvement (see Sharp et al. (2012).) Leaving aside the fact that the Malthusian demographic regime for pre-industrial Europe is far from being empirically proved, as shown in Lee (1973), these studies have additional shortcomings. For example, they motivate the higher northern Europe real wages as the consequence of the persistence, in early modern times, of higher death rates due to precise causes, such as wars, plague, and spread of disease through urbanisation and trade. However, they do not explain why these factors, while being effective in northern areas, were not capable of determining higher per capita incomes in the south, where war and urbanisation were equally great and high death rates were no less persistent.

A second group of interpretations focuses on the possible institutional explanations for the economic divergence. What made some regions have long lasting higher wages was the adoption of particular societal or economic organizations in early modern times.

Some have focused on the importance of geographical or technological advantages of northern regions and the role of these factors in the adoption of growth enhancing institutions. In Acemoglu et al. (2005) Atlantic trade has been suggested as a key factor for the earlier economic development of northern areas. Those countries, England and the Netherlands in particular, having easy access to the Atlantic maritime trade, had the sufficient stimulus for the development of economic and social organizations fostering growth. These explanations, although revealing important features of the development of northern regions, have the limit of do not, however, fully explain the delay of other regions with similar geographical or technological endowments (such as Spain or Germany). In addition, as the historical works of Davis (1954) and Rapp (1975) show, also the timing of development pointed by Acemoglu et al. (2005) seem to be wrong. While, in fact, according to the latter, northern growth occurred in 16th-17th centuries, as a response to the discovery of Atlantic routes, the former studies show that British maritime trade was already developed in the 15th century, hence indicating an earlier growth of such regions.

In North and Weingast (1989), the emergence of social and political institutions securing property rights and, therefore, enhancing economic activities, are the fundamental explanation for the exceptional northern development. In particular, the changes occurred after the 1668 Glorious Revolution and the adoption of the constitutional law, are pointed out as the key factors securing the property rights of the arising British entrepreneurs and justifying, therefore, the following exceptional economic development of these areas. This explanation, although capturing an important feature in the consolidation of northern development, might misunderstand the real causes and effects of such institutional changes. As shown in Greif (2008), early modern constitutionalism often emerged to regulate the relationships between the ruler and the other important social groups in a certain political entity. It might have been associated to growth, as in early modern England, but it might also have been the cause of stagnation. The constitutionalism process in 16th-17th centuries Poland, for example, which legally fixed the relationships between the King and

the aristocracy, limited the possibilities for the economic initiative of lower social groups. Therefore, since the adoption of rule of law has actually ended up in divergent economic paths, it is possible to conclude that this factor may only partially explain the northern distinctive development.

An important contribution to the institutional explanation for the divide has been given in Pamuk (2007). The work is relevant, as the author carefully presents the great variety of institutional differences that might have account for the divergence between northern and southern European regions. However, also because it is out of his scope, he does not provide a definitive explanation of the causal mechanisms why the plague might have had different effects on workers' bargaining power, wages and the other political and social changes that occurred after the mid-14th century demographic crisis. Causal mechanisms that might have played a relevant role in determining different paths in economic development.

Finally, Robert Allen has also investigated the possible causes of early northern economic development. In Allen (2003) the author analyzes a large set of data through a simultaneous equation model and checks the importance of the different explanations given in literature. Results reveal two crucial factors for the north early development: trade growth and the effective improvements in urban labor productivity. He also shows that these factors explain northern prosperity more than the political and legal changes occurred in 16th-17th centuries, such as the ones mentioned above, or particular demographic regimes. This contribution is important because it quantitatively assesses the role of each possible determinant in the divide. However, it does not provide a comparative explanation of the reasons why the relevant causes for growth in the north did not emerge in the southern regions.

Many scholars, therefore, have analyzed the real wages divergence between European areas but several important questions remain. Why did the divergence occur? What was the actual role of the Black Death? To what extent were northern regions exceptional with respect to southern ones?

The contributions mentioned above show two main limits in the literature. First, there is a failure in pure economic forces, such as changes in demographic patterns or technological advance, to explain alone the divide. Second, the institutional interpretations, while capturing relevant mechanisms of the divergence, do not always provide a convincing reason for the occurrence of certain organizations in some areas and not in others. Therefore, the approach given in Brenner (1976), might be more appropriate to face the issue. There different relationships among social groups in rural late medieval Europe, which implied different labor organisations and forms of wealth and income distribution, are stressed as the fundamental causes for understanding how subsequent changes in demographic patterns, technology and trade, affected the long run divergence among northern, southern and eastern European areas.

The main conjecture of the present paper follows this idea. What mattered for the long run different impact of the demographic changes on European incomes were the different rural labor institutions pre-existing the plague. In fact, this paper argues that in southern

Europe the complementarity between such late medieval labor organizations, characterized by strong feudal customs, and the dramatic population changes due to the 1348 demographic shock, caused a short run increase in real wages and, in the long run, as population levels restored, they determined a prolonged stagnation of incomes. In the north, where rural labor ties were already loose in the late Middle Ages, the same complementarity caused, instead, an exceptional real wage response to the subsequent population changes.

In order to prove such hypothesis, the paper presents a three-step analysis. First, in Section 2, a simple theoretical framework for the determination of urban wage in a two-sector late medieval economy is presented for the analysis of the possible effects of demographic shocks on European societies. It will single out the key relationships between wages, population and rural labor organizations that are likely to explain the long run divide. In Section 3, the Robert Allen's dataset on early modern European wages and a new dataset on long run regional and urban population trends are analyzed with the objective to test whether the different response of long run wages to population, introduced by the theoretical framework, did actually occur and in which regions. Then, in Section 4, an historical investigation is presented in order to integrate and support the theoretical and empirical findings, and to actually show which institutions might have accounted for the long run great divergence. Finally, Section 5 concludes.

## **2 A new hypothesis on the long run relationship between wages and population**

In order to understand how the complementarity between late medieval rural labor institutions and the mid-14th century demographic shock might have accounted for trends in incomes in early modern times, a simple representation of the mechanisms of wage bargaining in rural and urban late medieval Europe is here shown.

Firstly, a representation is needed of what might have been the relationships occurring between manufacturing and agricultural labor sectors in these societies. Following the Arthur Lewis' seminal study on expansion and growth in a two sector developing economy (see Lewis (1954)), his idea that wages in the manufacturing sector are determined on the basis of incomes in the subsistence sector, is here adopted for at least two reasons. First, because while it is historically plausible to assume that, in the late Middle Ages, workers in the agricultural areas earned a salary approximately equal to the average product, as the whole household was working in a farm and each member could get a share of the output, as shown in Bloch (1965), in the urban areas salaries for unskilled employers were higher and somehow repaying the relocation of workers from their countryside community to the city. Late medieval societies were likely to be similar to the modern developing economies where, quoting Lewis,

”[...] men will not leave the family farm to seek the employment if the wage is worth less than they would be able to consume if they remained at home”.  
(Lewis (1954, p.149))

Also, considering rural wage as one of the factor affecting urban salaries for unskilled workers, captures a distinctive processes of wage bargaining in medieval cities: the competition between unskilled urban workers and rural labor force. From one side, as shown in Epstein (1998), medieval urban skilled workers were protected by guilds and their position was probably not affected by raw labor force coming from the countryside. On the other side, unskilled workers were likely to suffer more from the competition of rural employees and their salary was probably set depending also on how much they could get returning to work on their land.

But how did the incomes of rural workers in the agricultural sector affect the wage determination in the urban one?

A possible answer to this question might be provided using a simplified version of the model for the determination of wage under the no shirking condition, as firstly theorized in Shapiro and Stiglitz (1984). In this framework, in fact, the presence of involuntary unemployment in equilibrium is motivated by imperfect monitoring on working activity, a situation which might also reflect the conditions of implementation of job tasks in late medieval urban centers, as shown in Rutenburg (1971). In addition, this type of analysis allows for considering rural wage as the fallback position of urban unskilled workers who, in late Middle Ages, were likely to compare the salary they get in the manufacturing sector with the income they would have got returning to cultivate their farm. Then they would have decided whether to be employed in the urban sector or not. Of course, interpreting the rural wage as a reservation salary, a sort of 'unemployment benefit' for unskilled workers, implies to assume that in equilibrium the manufacturing sector would have paid an higher wage than the rural one. This consequence, however, is not unrealistic, since the existence of such rent for unskilled urban workers could be justified by several historical reasons. For example, the higher wages could have been motivated by the fact that manufacturing employees, already working in the city, could have performed their tasks better than peasants called from the countryside, as shown in Cipolla (1994), or because guilds, even if not formally protecting these categories of workers, could have, while supporting skilled workers, also indirectly raised the wages of unskilled employees, a mechanism at work, for example, in medieval Florence, as described in Doren (1940).

A simplified version of the no shirking condition might, therefore, help to understand how the determination of the urban salary was affected by rural income. In a late medieval society the process of wage bargaining occurred in the manufacturing sector, where a master craftsman contracted with the unskilled workers a certain level of effort  $e = \underline{e}$ , which they had to provide under imperfect monitoring performed by the guild. Then, the workers decided either to supply the effort contracted or to shirk and provide a lower effort (for simplicity it is assumed that the unique alternative to  $e = \underline{e}$  was not working at all,  $e = 0$ .) If the worker put a proper effort in the job, then he obtained an utility equal to  $w - \underline{a}$ , where  $\underline{a}$  was his disutility from effort. If he decided to shirk then, with a probability  $0 < \tau < 1$ , depending on monitoring technologies, he was detected and terminated. In this case, in

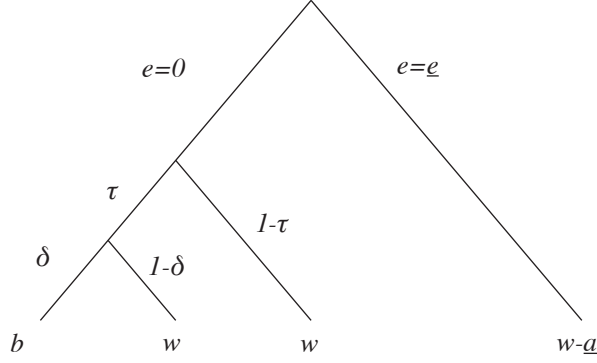


Figure 1: **The effort decision and utility determination in a simplified version of the Shapiro-Stiglitz model of no shirking condition.** The decision process of the workers starts at the top of the tree and, at the bottom of each branch it is shown the utility of the worker depending on his initial choice, monitoring techniques and labor market conditions.

turn, with a probability  $0 < \delta < 1$ , capturing the difficulty in the market to find a new job, he would have remained unemployed and got a benefit,  $b$ , corresponding to the average product from cultivating land in his farm of origin. Otherwise, with probability  $1 - \delta$ , he would have found a new job in the city and get the salary  $w$  (assuming that all the firms paid the same salary and abstracting from intertemporal issues.) The sequentiality of this wage determination is also described in Figure 1.

Therefore, the worker would have not shirked, if the wage would have been set at a level such that

$$w - \underline{a} = (1 - \tau)w + \tau[\delta b + (1 - \delta)w] \quad (1)$$

which means that the utility from providing the contracted effort (left hand side of the equation) should have been at least as equal as the utility from shirking (right hand side of the equation.) Rearranging Eq. (1), the no shirking wage is, therefore, equal to

$$w = \frac{\underline{a}}{\tau\delta} + b \quad (2)$$

Equation (2) reveals which factors could have been critical in determining the minimum wage accepted by the urban workers. It was increasing in the disutility from effort  $\underline{a}$  and decreasing in  $\tau$  and  $\delta$ . Both the two probabilities can be reasonably assumed to have been strictly different from 0 and 1 in the late middle Ages, as monitoring was not perfect and exit from unemployment pool was not always guaranteed by reduction in working hours, as shown in Malanima (2007). However, what is more important for the present analysis is the role of  $b$  on  $w$ . The reservation income of unskilled workers positively affected the wage in the urban sector, hence, accounting for the increasing effect that the mid-14th century demographic shock had on manufacturing wages throughout all Europe. In fact, a drastic reduction in population, such as the one occurred in 1348, might have risen the average product in the rural sector, because of the sharp decline in agricultural labor force,

with a consequent increase on urban wages in all the European regions. In addition, once population levels would have recovered, urban salaries would have declined as a consequence of the reduction in the average agricultural product due to increasing population, a situation describing the trends in income of the southern European regions.

How is, therefore, possible to explain the exceptional long run increasing salaries of northern countries? The framework presented above suggest an hypothesis about the factors that could have accounted for the divide. Once population restored, in fact, the divergent behavior of urban wages might have been caused by the different institutions governing the determination of the income in the rural areas. In particular, in those societies where, before the shock, feudal links were strong, the post-plague higher incomes of rural workers could have been less persistent, because of the permanence of seigniorial constraints on rural activity. Therefore, when population restored, the maintained strength of lords would have characterized a persistent decline in salaries. On the contrary, in those societies in which feudal links were already weaker before the demographic shock, post-plague changes in population, and the consequent short run increase in rural and urban wages, would have either reduced the power of rural employers to cap real salaries or would have given to peasants a sufficient capacity to contrast the feudal strenght. In both two cases, this would have ended up in changing the rural structure and the response of salaries to demographic trends. Agricultural incomes could have remained high also under increasing population and, correspondingly, higher wages would have persisted also in the manufacturing sector.

Summarizing, this synthetic representation of the urban wage bargaining in late medieval economies shows that if an exceptionality of northern societies existed, this would have been likely caused by the complementarity between weaker rural feudal institutions existing before the plague and the consequence of the demographic shock on such organizations. The population decline would have created a temporary change capable of improving the peasants' economic position. This, because of the weaker seigniorial constraints, would have not being transitory and, in turn, would have permanently affected the real wages in the urban sector. Overall, this particular combination would have resulted in a long run capacity of such regions to detach, already in early modern times, urban wages from population trends.

### **3 An empirical analysis on real wages and population in early modern Europe**

This section presents an empirical investigation to check the long run wage response to changes in population in late medieval and early modern European regions. The method implemented directly follows from the theoretical framework shown in the previous section and tries to assess how past levels in population might have affected future trends in income.

To do so it is set up a two-step analysis. First, the short run impact of urban real wages is detected estimating, for each area where data are available, the following equation:



$$\ln(w_{it}) = b_0 + b_1 \ln(w_{i,t-1}) + \sum_{j=1}^n b_{j+1} \ln(pop_{i,t-j}) + e_t \quad (3)$$

where  $w_{it}$ , the urban real wage of unskilled workers in the city  $i$  at time  $t$ , is regressed on population sizes, the variable  $pop$ , in previous years (with optimal number of lags determined for each region and city according to the Akaike information criteria, see also Greene (2003) for more details on the method), but not on population in year  $t$ , as it is unlikely that demographic changes immediately influenced the level of salaries. Also, one lag for real wages,  $w_{i,t-1}$ , is added to account for time dependence. Finally,  $e_t$  is the error term and  $b_0, \dots, b_n$  are the coefficients to be estimated.

A second step is then implemented. Since the estimation of the above model provides a series of results of population effect that are not easily comparable, as each population series has a different number of lags, a long run coefficient for the effect of demographic changes on real salaries has been built. The coefficient, additionally to allow comparability, will also capture one of the two main implications of the model: if a region had exceptionally persistent higher real wages, then these would have had at least a long run non-negative relationship with levels of population in previous years.

The procedure used to create such coefficient is here shown with the optimal number of lags assumed equal to two, and is then generalized. For a given city having a certain population with two as optimal lag distribution, the Eq.(3) has the form

$$\ln(w_t) = b_0 + b_1 \ln(w_{t-1}) + b_2 \ln(pop_{t-1}) + b_3 \ln(pop_{t-2}) + e_t \quad (4)$$

with  $b_0, b_1, b_2$  and  $b_3$  being the parameters estimated with OLS. Assuming long run stationary distribution in wages and population, then

$$w_t = w_{t-1} \quad \text{and} \quad pop_{t-1} = pop_{t-2} \quad (5)$$

Substituting (5) in (4) and considering that the long run variance of  $\beta_0$  is 0 under the assumption of stationarity, then (4) becomes

$$\ln(w_t)[1 - \beta_1] = \ln(pop_{t-1})[\beta_2 + \beta_3] \quad (6)$$

Rearranging (6), the coefficient  $\eta$ , when the optimal number of lags for population is two, is

$$\eta = \frac{\ln(w_t)}{\ln(pop_{t-1})} = \frac{\beta_2 + \beta_3}{1 - \beta_1} \quad (7)$$

The generalized coefficient computed with  $n$  as optimal number of lags for population lags is shown in equation (8)

$$\eta = \frac{\sum_{i=1}^n b_{i+1}}{1 - b_1} \quad (8)$$

The coefficient  $\eta$ , which can be interpreted as an elasticity since variables are all in logarithms, will be relevant for showing, under the assumption of long term stationary distribution of wages and population, the long term effect of a unit change in population on real wages.

### 3.1 Dataset description

The dataset used to estimate the above equations has been built through a critical analysis of several edited sources.

The series for unskilled real wages has been taken from Allen (2001), where daily salaries are provided for main European cities. These data have been adjusted according to some modifications suggested by more recent studies. In fact, some economic historians have contested the existence of the divergence itself on the basis of the nature and quality of the data. In Malanima (2013) several corrections have been convincingly suggested to the wage series for late medieval and early modern Florence. In Stephenson (2014) the series of real wages for 17th-18th century London has been criticized. In this last case, the author has observed that during that period, salaries of unskilled workers were usually contracted by their masters who, according to historical sources, retained on average about 15% of the daily wage contracted and reported in the historical sources. Direct evidence of these bargaining practice is not available for other European regions, even if Franceschi (2003) suggests that similar customs were at work also in central Italy and even before the 17th century. However, in the present study these modifications suggested for Florence and England are taken into account. The series for the Tuscan city is the one corrected by Paolo Malanima, while London real salaries are reduced by an average 15% in the 17th and 18th century. As shown in Figure 2, the divergence is however still striking.

After the mid-14th century demographic shocks, real wages sharply increased in both northern and southern areas, while around the 16th century, even taking into account the criticisms mentioned above, an undeniable divergence emerged with certain northern regions having higher real wages and other having salaries returning to the pre mid-14th century levels. Summarizing, the dataset that is used in the present work includes the real wages provided in Allen (2001), with the modification suggested in Malanima (2013) and Stephenson (2014), for the following seven European cities (with dates in parenthesis), which present longest time series: Amsterdam (1500-1800)<sup>1</sup>, Antwerp (1399-1800), Florence (1326-1800), London (1301-1800), Paris (1431-1786), Strasbourg (1395-1800) and Valencia (1413-1785). Wages have deflated following the procedure used in Allen (2001). Series have been deflated using a Laspeyres CPIs for each city provided in Allen (2001).

Two kind of population data have been collected, compared and critically aggregated: urban and regional population (details of sources used are in Appendix A). In particular, to identify the region it has been used the idea of the most historically representative area

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<sup>1</sup>An extension of the Amsterdam wage series to the 14th century is under construction.

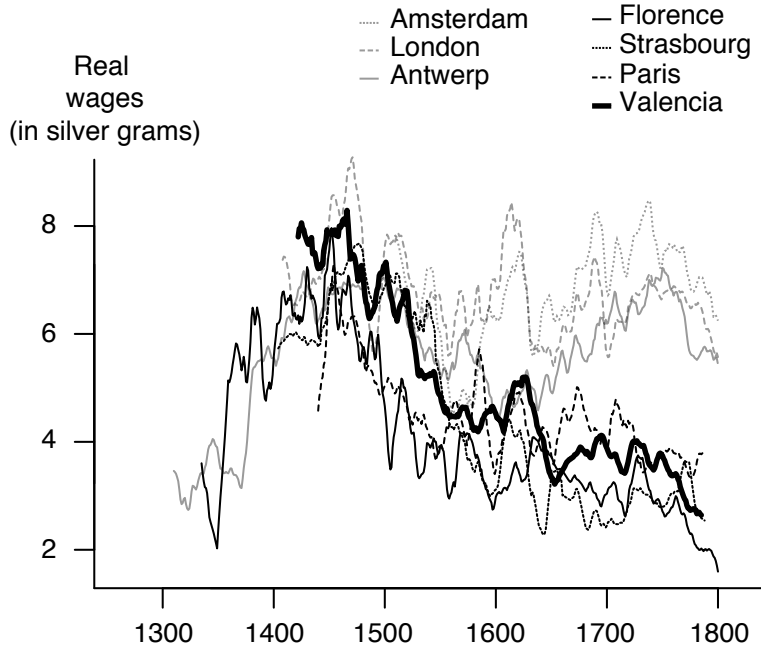


Figure 2: **The long run European divergence in real wages.** Lines show the real wages trend for seven cities in Europe. Series have been smoothed by 10-years moving average. Sources: Allen (2001), Malanima (2013), Stephenson (2014) and the text.

around a certain urban center. Hence, for each city the population of the following regions, in parentheses, have been created: Amsterdam (Holland), Antwerp (Brabant), Florence (Tuscany), London (Southern England), Paris (Ile-de-France), Strasbourg (Alsace), Valencia (the territory of the Kingdom of Valencia, 1238-1707.)

### 3.2 Empirical results

The model presented at the beginning of this section has been estimated using both regional and urban population. There are two reasons behind this choice. First, since there is no historical consensus about the nature of late medieval labor markets and the degree of mobility across different urban areas and surrounding countrysides, two different scenarios have been tested. When using the urban urban population, which includes usually those living in the closer rural communities, the model assume low mobility across urban areas, limiting rural-urban migration to a single city. Instead, when testing the model using regional population, it is assumed that a greater degree of mobility existed and labor force migrated from one city to another inside a certain region. In addition, testing the model with both populations might represent a simple check on the robustness of results.

Long run coefficients are shown in Table 1 and Figure 3.

Results for coefficients computed using urban population reveal that a divide across European regions existed in the response of real wages to population changes. A group of countries experienced a long run negative effect of demographic changes on population. In addition, a large heterogeneity is observed in this group with some cities, experiencing a great long run elasticity, e.g. Florence, Valencia and Strasbourg, while others, as Paris,

Table 1: Long run effect of population size on urban real wages

City	Relation tested	Coefficient**
Amsterdam	Unskilled workers vs city population	0.14(0.03)
	Unskilled workers vs regional population	0.14(0.07)
Antwerp	Unskilled workers vs city population	-0.04(0.03)
	Unskilled workers vs regional population	-0.14(0.12)
Florence	Unskilled workers vs city population	-1.42(0.15)
	Unskilled workers vs regional population	-1.01(0.08)
London	Unskilled workers vs city population	0.05(0.04)
	Unskilled workers vs regional population	-0.09(0.14)
Paris	Unskilled workers vs city population	-0.16(0.07)
	Unskilled workers vs regional population	-0.50(0.09)
Strasbourg	Unskilled workers vs city population	-1.15(0.18)
	Unskilled workers vs regional population	-1.48(0.15)
Valencia	Unskilled workers vs city population	-0.83(0.30)
	Unskilled workers vs regional population	-1.28(0.10)

\*\*Standard errors of the coefficients are in parenthesis and are computed using the delta method (See also Greene (2003, p.175) for the use of delta method to estimate standard errors of transformed coefficients.)

showing a smaller coefficient. Three cities, instead, show non negative (or very small negative) elasticities, and seem to have detached already in early modern times, wages from population: Amsterdam, Antwerp and London. These conclusions are confirmed by the coefficients computed using the results from the regressions with regional population. The only discrepancy between the two coefficients is detected for London, where the small negative effect when considering regional population might suggest that the England distinctive growth was probably due to the outstanding development of the sole London area, as observed also by Allen (2003) and Malanima (2013).

### 3.3 Simulating a permanent shock in population

An additional test on the wage response to population changes might be done using the impulse response function. This statistical tool allows to understand how a permanent exogenous shock in one variable might affect the behavior of another one. This situation, of course, does not exactly describe what happened in the late medieval and early modern Europe, where shocks in population, although they were prolonged, were not permanent. However, it might provide two important information. First, it can confirm or not the results shown with the estimation of the linear model shown above, providing, therefore, a robustness check . Second, it might partially support one of the main insights of the conjecture of this paper: the role of the pre demographic shock institutions. In fact, if some countries would show a flat response to a permanent shock in population, then this would suggest that their economies were already capable of detach their incomes from demographic changes before any shock and this distinctive behaviour was not due to changes occurring

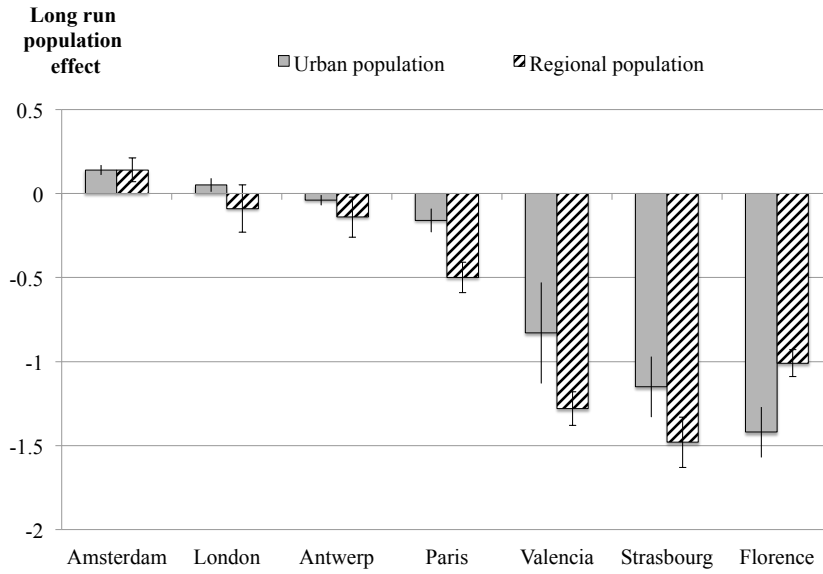


Figure 3: **Urban and regional population effect on real wages.** Grey and dashed bars are long run coefficients computed using the results of the regressions with respectively urban and regional population. Standard errors are computed using the delta method. Sources: see text.

after it. The impulsive response function are computed estimating the effect of a negative shock (the positive shock effect would be just the mirrored version) on both regional and urban population.

Results are shown in Figures 4 and 5. Results confirm that the three northern countries with a long run exceptional response of wages to population changes might have also distinctively reacted to a permanent shock in population. In fact, Amsterdam, Antwerp and London have an almost flat response of wages to a permanent increase in both rural and urban population. The other areas show a different path with all of them experiencing sharply increases in wage after persistent reduction in population (rural and urban.)

#### 4 Rural labor market institutions in late medieval Europe

The empirical results in the previous section have shown that three cities in Europe had an exceptional long run relationship between wages and population. Amsterdam, Antwerp and London are the only urban centers in the the dataset that experienced a different response of wages to demographic changes across the period spanning the 14th-18th centuries. These findings raise some historical questions that will be answered in this section. Which were the characteristics of rural-urban labor market institutions in these regions that accounted for the different long run impact of demographic changes? Were really the institutions existing prior the plague different such as to justify a long run divergent path in urban real wages?

This section answers to these questions comparing the main characteristics of rural-urban

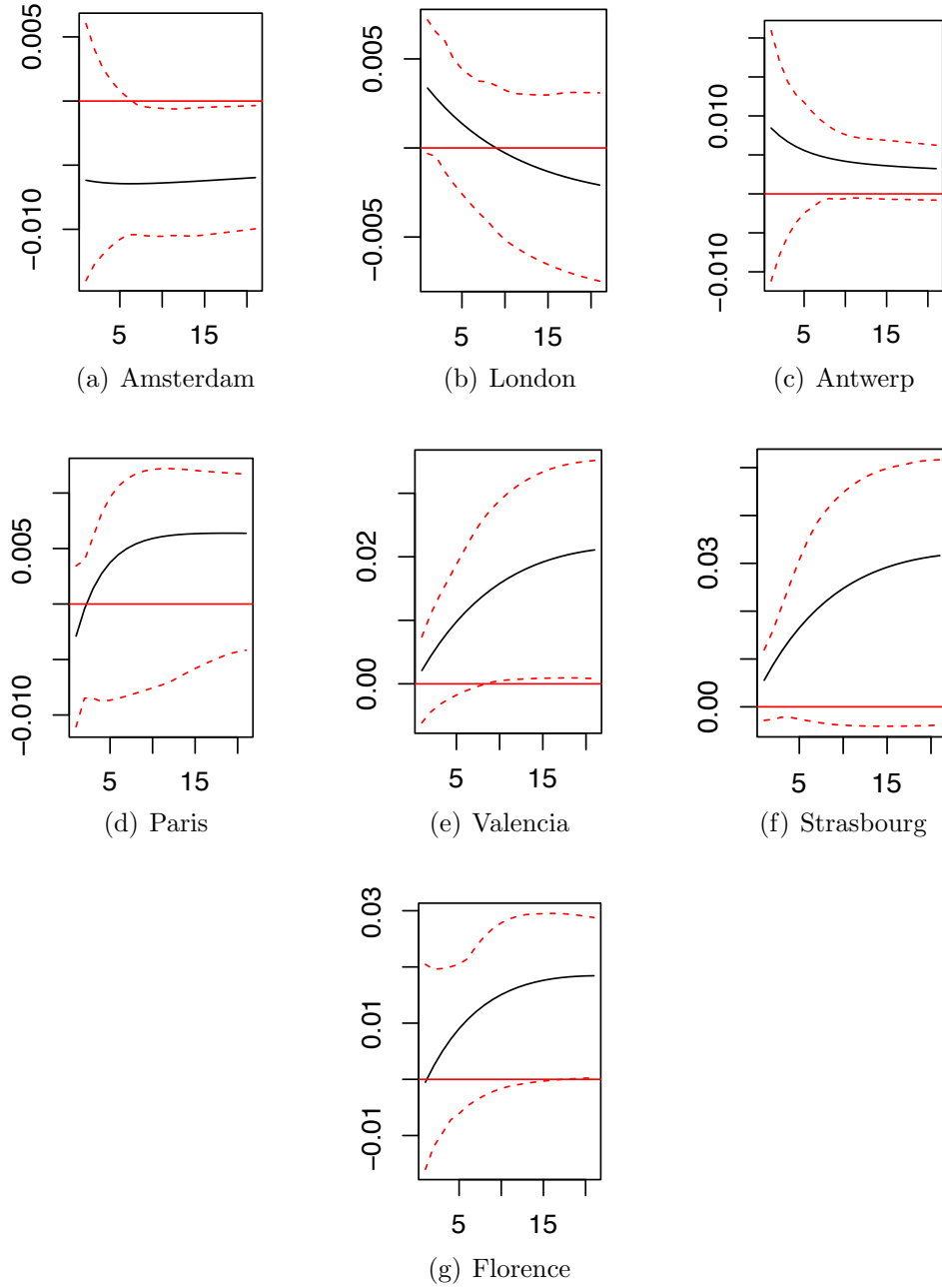


Figure 4: **Impulse response function of real wages to urban population.** Functions are computed for 20 periods ahead the impulse. Dashed lines are the confidence intervals computed using bootstrap methodology. Source: see text and Appendix A.

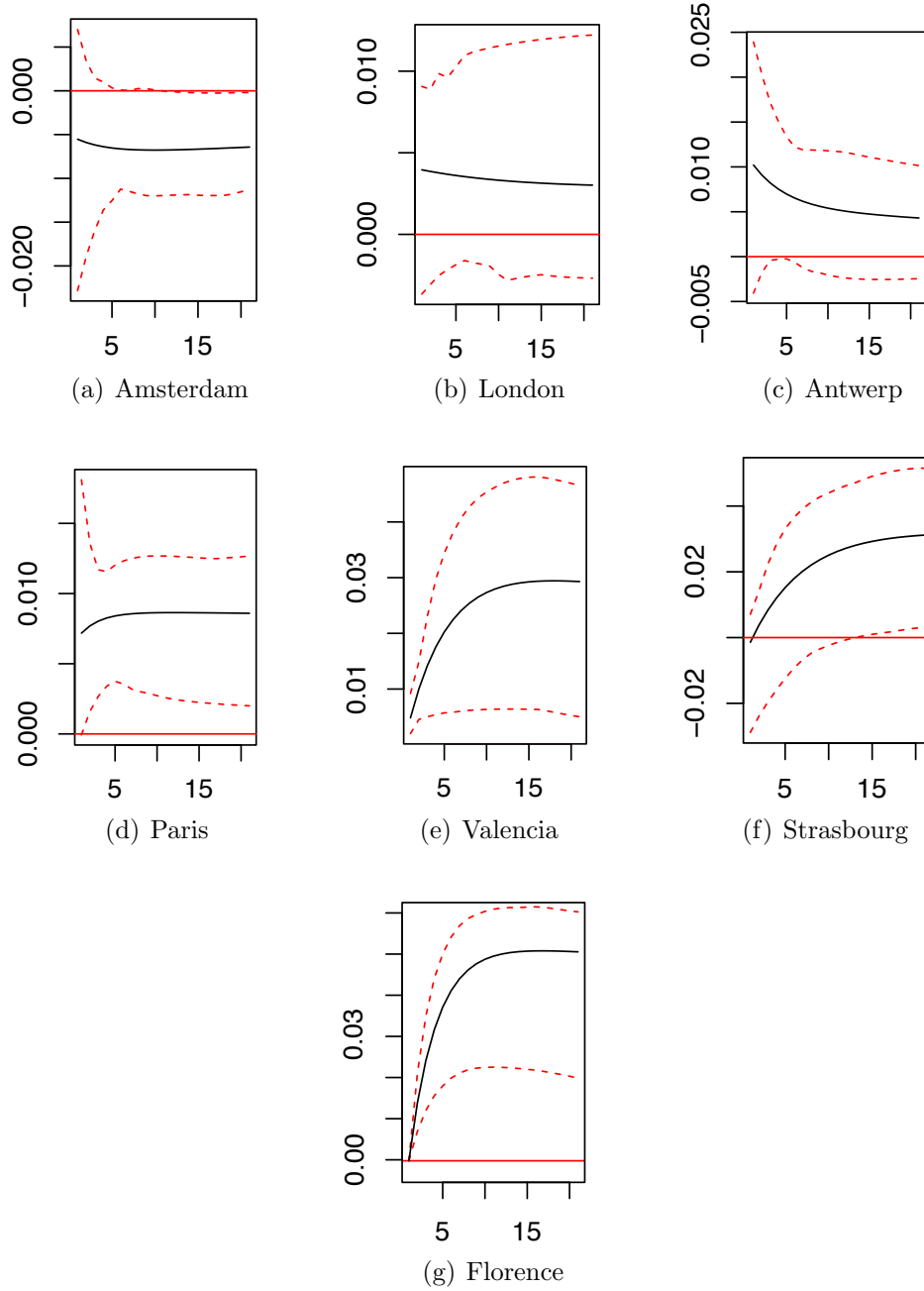


Figure 5: **Impulse response function of real wages to regional population.** Functions are computed for 20 periods ahead the impulse. Dashed lines are the confidence intervals computed using bootstrap methodology. Source: see text and Appendix A.

labor relationships in some exemplifying regions of preindustrial Europe with the ones in England and the Netherlands.

#### 4.1 Central and southern Europe

During the period spanning the 11th-13th centuries almost all European areas experienced a generalized improvement in economic conditions. In particular, urbanization and trade rose, and the majority of continental cities developed sophisticated forms of political, judicial, fiscal and economic organization (see also Lopez (1976) for the late medieval commercial and urban revolution in Europe.) These cities, for example, northern Italian ones, as well as those in the regions of the Netherlands and Belgium, became prominent economic centers for the exchange of goods and the circulation of people and ideas.

However, rural areas, usually restrained by either the political control of major urban centers or by the feudal power of historical lords, were in relatively less developed conditions and rarely caught up with the improvements occurring in nearby urban centers. In Italy, for example, as described in Cortonesi (2006), land ownership was organized around the system of large manors, usually owned by aristocratic families and labor was subjected to feudal customs. Workers were granted the right to farm from the lords under sharecropping agreements. They could inherit the use of land but usually were not free to transfer to other manors. Where farmers with small property holdings existed next to the large manors, they were continuously subjected to land expropriation implemented under the direct control of urban centers and favoring large ownership structure, as observed in Cherubini (1984). Therefore, even if urban centers were experiencing rapid economic growth, rural areas were still characterized by strong feudal burdens, farmers living under conditions of mere subsistence and consequent underdevelopment of trade of agricultural products.

A similar process of reinforcement of feudal relationships took place in other areas of continental Europe. According to the vast analysis of medieval rural France presented in Bloch (1976), during the process of land reclamation occurred in the country between the 11th and 14th centuries, fundamental changes harshened the relationships between lords and tenants. The seigniorial sector, which mainly relied on the system of unpaid work provided by tenants (the so-called *corvée*) already in 8th-9th century, saw a reinforcement of the power of lords who monopolized administration of justice in their legal disputes with tenants, and introduced new forms of monetary charges (the tithe and the *taille*). Both free men and serfs were attached to the lord rather than to land. They could not move without the lord's permission and several cases of agreements between lords were set up to reinforce such constraints.

The advent of the Black Death in 1348 dramatically impacted on the land ownership structure and labor organization of these areas. In the decades immediately following the demographic decline, real wages increased, as observed in van Bath (1966) and, as shown in the previous sections, also urban salaries. However, in the following centuries, deep changes



occurred in rural areas of central and southern Europe, causing an almost general tendency towards economic stagnation.

In Italy, as observed in Piccinni (2006a), although the rise of wages in the countryside was striking, there were also immediate attempts from the city-states to limit salaries of rural workers. Rules were set to impede them to demand higher incomes, their mobility was even more limited and the adoption of sharecropping was favored where wage labor was still in use. These changes, which reveal the strong capacity of landlords to react to the increased rural workers bargaining power, also affected the subsequent evolution of agricultural organization. The relative size of cultivated land was reduced in favor of cattle as it gave rise to a more immediate profit to the land owners, while those workers who had accepted sharecropping could have benefitted from temporary special fiscal reductions granted by the urban political power. In this way also city-states would have had an immediate return, consisting in their maintained capacity to collect fiscal resources from rural areas, as widely described in Piccinni (2006b). In the long-run there were three main effects of the combination of pre-plague conditions and demographic shocks: a general impoverishment of rural society, the persistence and extension of the system of large manors with sharecropping and the limited mobility between rural and urban labor markets. Together they prevented the creation of a self-sustained internal market for non agricultural goods.

In France, a different evolution of the rural sector in the post-plague decades led to a similar stagnation in the following period. As shown in Bloch (1976), in the 14th-15th centuries the conjoint effect of the demographic decline, the Hundred Years' War and the continuous depreciation of the currency made by the monarchy in order to obtain resources to finance warfare, caused a slow but deep crisis in the seigniorial structure. Lords became land rentier, they were less able to require the *corvée* and preferred to impose additional monetary charges to peasants rather than directly command their work. Legal conditions of tenants (both free men and serfs) changed: they were progressively less attached to the lord and more to the land, even if their mobility was limited and the manor could not be left without the lords' permission. This process of decline of the power of the old seigniorial sector was also characterized by the participation of the monarchy in the rising contrasts between lords and tenants. The central State favored small ownership of land and contributed to the reduction of feudal power of lords. For example, the monarchy effectively substituted the landowners in the administration of justice but this did not translate into an actual improvement of the rural sector. As observed in Brenner (1976), the State simply substituted lords in the surplus extraction causing a long term depression of rural production, a tendency towards subsistence agriculture and, consequently, the inability for the urban sector to effectively develop.

The region of the Alsace, surrounding Strasbourg, knew a similar process of strengthening of rural feudal ties in the late Middle Ages. Being a march, although experiencing important improvements in land administration and use of common fields, the region was also subjected to several processes of reinforcement of landlords' power. They maintained strong property

of lands and, when giving the grant of use them to farmers, were receiving in change services, rents and, in some cases, the capacity to limit their freedom. As described in Hauner (1865) and Juillard (1992), the post-plague development of the region did not show impressive improvements in the conditions of these rural areas.

The evolution of the rural labor markets and feudal organization was not different in Spain and, in particular in the region of Valencia. As shown in Garcia-Oliver (1991) and Furió (1995), during the 12th-14th centuries a process of strong transformation of land ownership occurred in the region. The seigniorial sector, which controlled 73% of cultivated land at the beginning of the 13th century, acquired even more power in the following two hundred years, owning almost 4/5 of the cultivated land of the region at the end of the 15th century.

However, as observed in Furió (1997), the lords had a contrasting relationship with the Crown of Castile in this period. From one side, in the 12th century, the King attempted several times to limit their power. Measures were taken by the kingdom administration to keep landholdings small, lords had property on land but not on peasants and their jurisdictional power was limited. As a response, aristocracy continuously protested against the Crown and, also because of their importance for the provision of military support, the King granted to them in 1329 the so-called *jurisdicción alfonsina*, a large set of jurisdictional powers in both civil and penal disputes.

During the 14th century, the region of Valencia and its seigniorial sector went through a series of reforms similar to the ones occurred in early modern France. The Crown tried again to weaken the old aristocracy through heavy tax impositions and to limit their power in legal disputes. The overall objective of the King was to create a new aristocratic class sufficiently rich to support his military expenditures, but not enough powerful to compete with him. The objective was pursued limiting the large land concentration of the old aristocracy and counterbalancing the ancient lineages with the creation of new ones, usually representing urban families that had become wealthy after investments in land. However, these new lineages were still granted feudal customs and rights that would have repaid their loyalty to the King. Overall, in the 12th-15th centuries, although several changes had involved the seigniorial sector, and the majority of these were made to weaken its power, the Crown progressively substituted the old aristocracy with a new one, smaller and more loyal to the King but not less capable of exerting feudal customs and, thus, preventing economic development in the rural sector from occurring.

Therefore, after the demographic decline in mid-14th century, even if with significant differences, several of the main regions of central and southern Europe experienced a long run tendency towards stagnation. History shows that this process was likely to be linked to the strong pre-shock feudal conditions and limited a sustained increase in the economic conditions of rural areas.

## 4.2 England and Holland

A different economic trajectory with respect to central and southern European regions is the one experienced by London and Amsterdam and their respective regions.

With less developed urban centers (see also Carus-Wilson and Coleman (1963)), the rural areas of England went through, in 12th-13th centuries, a unique transformation process of the legal and economic status of rural inhabitants. As shown in Postan (1973), these areas experienced a continuous tendency towards the increase in the number of free-holder individuals. They became progressively more immune to arbitrary impositions of landlords and, once the land became scarcer and landlords forced to renegotiate their contracts with peasants, the latter were not burdened by worse contractual conditions. Hence the increasing strength of the economic position of peasants during these centuries characterized a slow but continuous loosening of feudal constraints. According to Campbell (2000), these progressive changes lead to a rural system that, at the eve of the demographic shock, was characterized by a minor significance of the seigniorial sector with respect to the peasants' one. In addition, lords did not make use of feudal privileges preferring, rather, having recourse to hired work. However, following Brenner (1976) and Allen (1992), low investments were made in the rural sector. Landlords used their capital to maintain their status rather than investing in productivity gains, and peasants, who were overtaxed, also made low investments to raise productivity. Less economically developed than central European regions at least with respect to trade, manufacturing and banking activities and with low gains in productivity due to irrelevant technological changes, at the same time England experienced a progressive waning in its feudal relationships in the countryside and, hence, a different structure of land ownership arose.

Following the work of Campbell (2000) and Overton (1996), it is possible to summarize the main effects of the Black Death on the rural economic system of England. The decrease in prices and the increase in rural wages favored small-size tenants and provoked a crisis in the large demesnes. Lords either preferred to lease, thus fostering the development of small agricultural tenants, or if they wished to directly produce they continue to prefer hired to customary labor. In addition, the central state failed to control and limit salaries, as witnessed by the 1381 Peasants' revolt.<sup>2</sup> In the following centuries, even if England had unimpressive productive gains in agriculture (as shown in Clark (2009)), the structure of its rural economy and its relationship with the urban sector were drastically changed. Together with a deeper commitment to trade, the country also had, in the 15th century, an exceptional rise in manufacturing activities which fostered the creation of an internally sustained market for manufacturing goods and, hence, anticipated the industrial revolution.

An even more exceptional pre-industrial economic change than the one observed for London and England, is the one that, according to several historians, Amsterdam and the

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<sup>2</sup>More information on the England 1381 Peasants' revolt and its positive effects on farmers' economic conditions can be found in Dobson (1970) and Hilton and Aston (1984).

Holland region experienced. As shown in van Bavel and van Zanden (2004) and van Bavel (2002, 2006), before the Black Death the Holland rural area was characterized by three main factors. First, feudal relationships were weaker than in other contemporary European regions. Second, the manorial system was almost non-existent with a great number of free peasants who owned the land that they were farming (according to van Bavel and van Zanden (2004) those owning land made up two thirds of Holland farmers). Finally, agricultural production was already making great use of capital intensive technologies, a change which had been probably driven by its particular geographical constraints.

How did these characteristics of the rural sector affect the impact of the 1348 plague on the region? As all the other European areas, also Holland dramatically suffered from the plague experiencing a severe decrease in urban and rural populations. However the impact on the economic structure was rather different. In the decades immediately following the plague, real wages rapidly grew in Amsterdam and its surrounding countryside. This phenomenon was accompanied by an immediate increase in non-agricultural activities in the rural areas, e.g. textile and brewing activities, a factor that in the following centuries would have favored the emergence of a self-sustained internal market for manufacturing goods, as suggested in van Bavel and van Zanden (2004). In fact, during the 15th-17th centuries, the structure of Holland's economy radically changed taking on characteristics strikingly different from the rest of Europe. Urban capital owners, whose revenues from manufacturing activities were rapidly rising, largely invested in the rural areas, progressively bringing land ownership towards a structure characterized by a concentration of property and land accumulation (see also van Bavel (2006).) These changes in the property structure led to the extension of wage labor as opposed to the customary one in the countryside, pushing the whole region towards an early industrialization in both rural and urban markets.

Overall, as also suggested in Vries and van der Woude (1997), historical facts confirm that the outstanding performance of Amsterdam and Holland was primarily driven by the late medieval weaker feudal relationships which had facilitated rapid changes in the structure of rural and urban economic sectors after the mid-14th century demographic shock.

The late medieval development of the city of Antwerp and the Brabant region was not different from the Holland one. Several cases of weakening of feudal constraints are witnessed in the centuries before the Black Death. When in 13th-14th centuries, for example, the Dukes of Brabant progressively occupied the northern lands of the region, they removed a large part of the preexisting feudal constraints, as widely described in Steurs (1982). In fact, they granted large privileges and autonomies to the new founded cities and rural communities, and at the same time, they weakened the feudal power of lords. In the process of imposing their sovereignty in the territory, they bought, collected and expropriated the ownerships of those seigniors that did not accept their authority, and offered their protection to the ecclesial demesnes in change of their loyalty. At the same time they favored the birth and economic development of new free cities, which were free to administer the rural areas around them. This example concerning the northern areas of the region, shows that also the Brabant

region had a distinctive weak feudal institutional, already in the centuries before the Black Death. As a consequence, even if having a less impressive growth than Holland, also the region of Antwerp had an exceptional development of rural areas after the 14th century, with sustained high real incomes due to the development of non agricultural activities, shown in Thoen (2006).

The historical information about the particular pre-plague institutions governing rural labor markets in late medieval England and Netherlands, support the main conjecture of this paper. What mattered for the long run trajectory of urban wages was the degree to which rural incomes were subjected to feudal links in the 12th-14th centuries. However, history has also shown, that in the two regions the changes in the wage response to demographic trends occurred because of two different reasons. While, in fact, in Holland, the almost absent feudal customs in the pre-plague times favored, after the shock, the striking development of rural non agricultural activities which, in turn, prevented average product in the rural sector from declining, England had a different trajectory. In the post-plague decades peasants in the region did not experience relevant gains in productivity. However, they eventually succeed in defending their incomes from agricultural activity, as the several rebellions occurred at the end of the 14th- century show. What was the origin of such peasants' bargaining power? Again, the answer confirms the main idea of the present work. The combination of weak pre-plague feudal links and the demographic decline occurred in the mid-14th century, likely gave to the few free farmers the strength to defend their position and get higher incomes even before they could get relevant improvements in productivity.

## 5 Conclusion

This paper has presented a new hypothesis to explain the puzzling question of the early modern north-south Europe divergence in real wages. In particular, it has been argued that what mattered for the different long run impact of the mid-14th century demographic changes on European income distribution, was the diverse combinations of late medieval rural institutions with the economic effects of population changes.

A simple theoretical framework has combined insights of the classical theory of a two-sector economy by Arthur Lewis, with the model for equilibrium unemployment developed by Shapiro and Stiglitz, with the objective to single out four key features of the problem. First, it has been shown that the rural income in a late medieval economy might have served as the reservation position for unskilled workers. Second, it has been formally represented how exogenous changes in population might have caused variations in the agricultural income of workers and, as a consequence, the correspondent modifications in the urban real wages. Third, it has been pointed out that if northern countries did show any exceptional trend in urban wages, this would have resulted in a long run capacity to detach salaries from demographic trends. Finally, it has been argued that, once this exceptionality would have been proved, the reason of it should have been searched in the rural institutions existing prior

the population shocks and that caused different degrees of bargaining strength in the rural areas. An econometric estimation conducted on a long run series of real urban wages and population in seven European major centers in the late Middle Ages and early modern times, has confirmed the insights of the theoretical framework. It has shown that the three cities, Amsterdam, Antwerp and London, which had persistent high real salaries across centuries, were also those which had a distinctive response of wages to population changes. While, in fact, for the other centers, a long run negative reaction of salaries to demographic trend has been detected, the three northern areas had a non negative relationship and, hence, they detached wages from population already before the industrial revolution. Finally, the historical comparison of rural labor institutions in the late medieval Europe has supported one of the main point of the conjecture. Different European areas did not approach equally to the mid-14th century demographic shock and, instead, already had in the previous century, varying degrees of feudal strength in the agricultural sector. The history of these areas, has shown that this factor crucially mattered when, after the population shock, farmers asked for higher incomes. In the areas where previous feudal links were stronger, the bargaining power of peasants ended up when population recovered. Instead, the declining feudal power of employers in the other areas, prevented peasants' incomes from declining and fostered a sustained development of rural and urban wages.

These results have two main implications. First, they reveal a new insight for the understanding of the long run divide across European regions. In fact, the work has shown for the first time that the exceptionality of northern regions consisted in their different response of wages to population already before the Industrial Revolution. In addition, it suggests a new interpretation for this different response, tracing back the divide to the late medieval rural conditions of European areas. Second, it also provides a different interpretation about the success of northern countries. While the Netherlands succeeded in fostering a non agricultural rural market, England kept higher wages through the increased bargaining power of peasants.

This work, of course, introduces several questions that might be the object of future studies. For example, it could be important to understand why in early and late Middle Ages different areas of the continent adopted different feudal relationships. Digging historical sources that might be informative on the issue, could further improve the knowledge of the fundamental causes of economic and social divides which, to some extent, still persist nowadays. Also, the persistence of large divergence between real wages in the early modern time might be object of further investigations. It could be studied, for example, the role that the different monetary and fiscal policies or the changes in urban labor market institutions, which occurred in Europe in the 15th-17th centuries, had on the different trends in real wages. Finally, the comparative analysis of the processes studied here could be profitably extended to the late medieval development of Eastern European regions. Several scholars, such as Domar (1970) and Brenner (1976), have mentioned the particular changes that occurred after the 14th centuries demographic shocks in eastern regions underlining, in

particular, their return to serfdom. The analysis made in this paper could improve the knowledge of the economic development of such regions showing the fundamental causes of their long run difference with respect to western ones.

## Appendices

### A Population data

This section reports the main sources for the construction of population time series for each city, for urban and regional areas. Linear interpolation has been used to gaps in the series.

#### Antwerp

*Urban population:* Russel (1958), Bairoch et al. (1988). *Regional population:* Russel (1958), Bardet and Dupaquier (1997), Klep (1976).

#### Amsterdam

*Urban population:* Russel (1958), Armengaud et al. (1968), Bairoch et al. (1988), Bardet and Dupaquier (1997), Vries and van der Woude (1997). *Regional population:* Armengaud et al. (1968), Bardet and Dupaquier (1997), Vries and van der Woude (1997), van Bavel and van Zanden (2004).

#### Florence

*Urban population:* Russel (1958), Armengaud et al. (1968), Bairoch et al. (1988), Bardet and Dupaquier (1997). *Regional population:* Malanima and Breschi (2002).

#### London

*Urban population:* Russel (1958), Armengaud et al. (1968), Bairoch et al. (1988), Bardet and Dupaquier (1997). *Regional population:* Armengaud et al. (1968), Bardet and Dupaquier (1997), Wrigley and Schofield (1981)

#### Paris

*Urban population:* Russel (1958), Armengaud et al. (1968), Bairoch et al. (1988), Bardet and Dupaquier (1997). *Regional population:* Armengaud et al. (1968), Malanima (2008).

#### Strasbourg

*Urban population:* Russel (1958), Bairoch et al. (1988). *Regional population:* Armengaud et al. (1968), Malanima (2008).

#### Valencia

*Urban population:* Russel (1958), Bardet and Dupaquier (1997). *Regional population:* Armengaud et al. (1968), Malanima (2008).



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