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# **Pandemics and asymmetric shocks: evidence from the history of plague in Europe and the Mediterranean**

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## **Abstract**

The history of plague suggests that severe pandemics can have extremely important and potentially permanent asymmetric economic consequences. However, these consequences depend upon the initial conditions and could not be foretold *a priori*. To support this view, this short article illustrates the ability of major plagues to cause asymmetric shocks. The Black Death might have been at the origin of the Great Divergence between western Europe and East Asia, but also within Europe it had quite heterogeneous consequences. The last great European plagues of the seventeenth century favoured the rise of North Europe to the detriment of the South. Additionally, within Italy, they had a differential impact allowing for the rise of the Sabaudian State and contributing to the decline of the Republic of Venice. The article argues that the implication for today societies facing Covid-19, is that given that the final demographic and economic consequences of this pandemic are impossible to predict, collective answers to the crisis, possibly coordinated by the EU, are highly advisable.

## **Keywords**

pandemics; plague; Covid-19; Black Death; Great Divergence; Little Divergence; historical demography; economic history; Italy; Europe

The crisis triggered by the spread of the Covid-19 virus has brought our attention to the long-term economic consequences of pandemics. Many fear that the direct demographic impact of Covid-19 might turn out to be very uneven, not only across Europe and the world but also within individual countries, depending on epidemiological factors and on national mitigation strategies that together will shape the overall mortality of the pandemic (which is still ongoing at the moment of writing). This might lead to asymmetric economic shocks whose extent is currently impossible to predict. In the worst-case scenario, such shocks might have large and permanent consequences. To better understand the nature of the problem, it is useful to consider some lessons from history.<sup>1</sup>

The history of plague offers particularly interesting examples. This, because the main plague epidemics are to be counted among the worst mortality crises in recorded history and had a large and relatively easy-to-observe impact. Additionally, they are episodes remote enough that we can observe their consequences across many centuries. Indeed, of the three worst pandemics (in terms of number of victims) in human history, two were caused by plague: Justinian's Plague of 540-41, which caused 25-50 million victims in Europe and the Mediterranean, and the Black Death of 1347-52, which killed up to 50 million people in those same areas plus unquantified numbers in the Middle East, central Asia, parts of China and possibly elsewhere (Alfani and Murphy, 2017). Only the Spanish Flu of 1918-19 is considered to have caused more victims than the Black Death (50 to 100 million worldwide: Johnson and Mueller, 2002; Le Moglie et al., 2020). However, in terms of mortality rates (the percentage of the overall population dying) the Black Death was much worse than the Spanish Flu, having killed about 50 per cent of the population of Europe and the Mediterranean.

## **1. The asymmetric consequences of the Black Death**

Of all pandemics in recorded history, the Black Death is usually credited to have had the strongest economic impact. For example, across the European continent, it re-balanced population and available resources and led to a useful reorganisation of

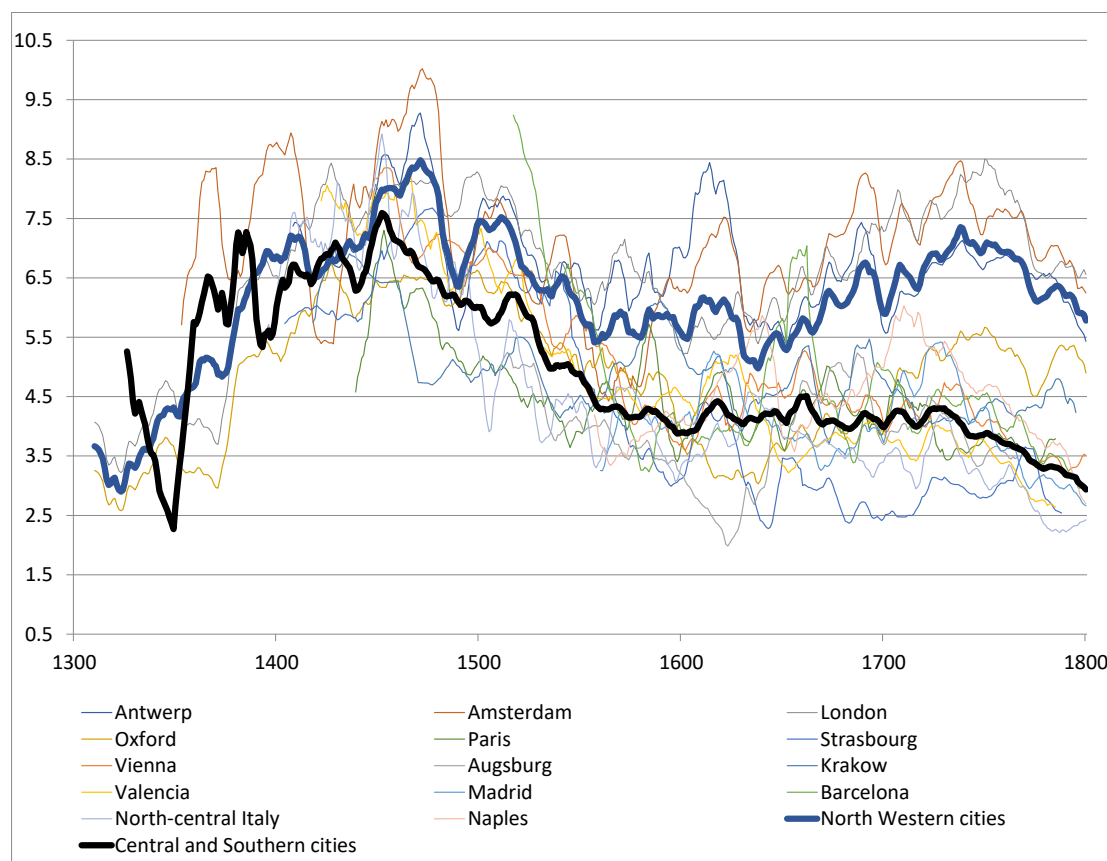
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<sup>1</sup> This short article expands upon a Voxeu column (<https://voxeu.org/article/pandemics-and-asymmetric-shocks> , 9 April 2020) and a public webinar given at the University of Warwick on *The economic consequence of large-scale pandemics: lessons from the history of plague in Europe and the Mediterranean* (27 April 2020). I am indebted to the participants in the webinar for many useful comments. I am also grateful to Mattia Fochesato for providing me with data about the impact of the Black Death on real wages.

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agrarian production (Herlihy, 1997; Alfani and Murphy, 2017;). Additionally, it triggered significant increases in real wages (Pamuk, 2007; Fochesato, 2019), as can be seen in Figure 1.

Fig.1 Real wages in Europe, 1300-1800 (daily real wages, in grams of silver)



Source: Fochesato, 2019

However, recent research has underlined that the shock caused by the Black Death was asymmetric. An interesting, albeit highly speculative, hypothesis is that the Black Death began the process which led to the Great Divergence between Western Europe and East Asia. In Western Europe, the Black Death and subsequent plagues led to the establishment of a new high-mortality and high-income equilibrium which allowed for quicker economic development (Clark, 2007; Voigtländer and Voth, 2013). Somewhat paradoxically, relatively advanced Asian countries did not benefit from the long-run positive consequences of the Black Death, especially in terms of the improvements in living standards and per-capita GDP, because they were spared (Japan) or only lightly affected (China) by the pandemic and by the recurrent plagues that followed it. Instead, they remained stuck in a low-mortality, low-income equilibrium (Clark, 2007). Somewhat paradoxically, East Asian countries might have been economically disadvantaged in

the long run because their hygiene standards were higher than in Europe, especially in cities, reducing disease mortality in general (Voigtländer and Voth, 2013: 780). In China, also the “Mongol interlude” might have played a role, as it overlapped with the Black Death period and compromised the institutional framework that had led to relatively high per-capita incomes in earlier epochs (Broadberry, 2013).

Within Europe, the shock caused by the Black Death proved asymmetric not because of differences in mortality rates, but in the initial conditions. In areas that were relatively under-populated to begin with, like Ireland<sup>2</sup> or Spain<sup>3</sup>, the Black Death set economies on a lower, not a higher path of development. In Spain, it interrupted a phase of quick growth that had been ongoing for 70-80 years:

“In pre-plague Spain, Malthusian forces were mostly absent except for a few, if any, areas along the Mediterranean coast. Sustained progress took place after the Reconquest in the context of a frontier economy, urban expansion, and openness to trade. Although its death toll was lower, the plague had a much more damaging impact in Spain than in western Europe since, far from releasing non-existent demographic pressure on land, it destroyed the equilibrium between scarce population and abundant resources. Pre-Black Death per capita income levels were temporarily recovered by the late sixteenth century, but were only exceeded after 1820” (Álvarez Nogal and Prados de la Escosura, 2013: 3).

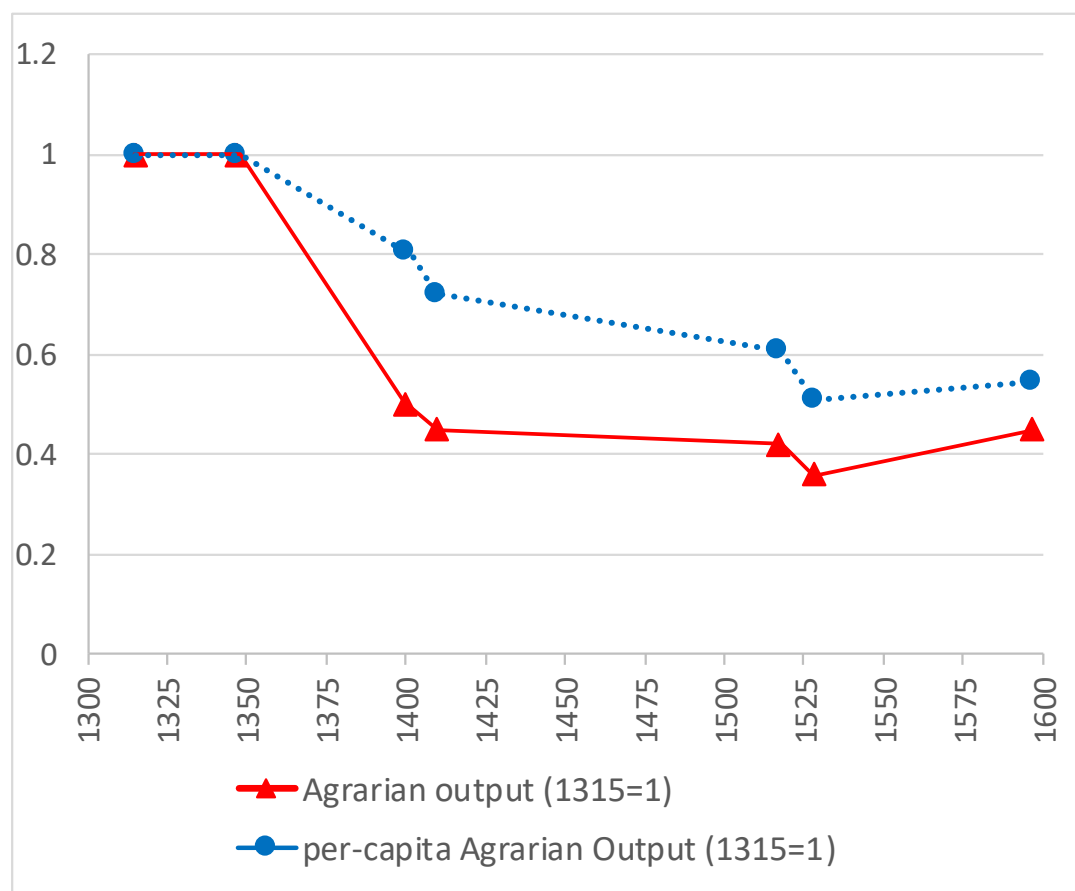
In Eastern Europe, an old hypothesis (Domar, 1970) holds that the pandemic contributed to foster the so-called ‘second serfdom’ and this led to negative economic consequences in the long run. Although this hypothesis has been challenged based on historical evidence (Dyer, 1998: 111), it is still given some credit (for example, Acemoglu and Robinson, 2013: 100-101). Finally, in the Mediterranean, the Black Death proved very damaging to Egypt, as rural depopulation hindered the maintenance of the irrigation system, which finally collapsed remaining for centuries in a precarious condition made worse by local crashes (Borsch, 2015). This led to a huge and permanent drop in agrarian output (Figure 2).

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<sup>2</sup> About Ireland, where for this period we have much less information (due to paucity of surviving documentation) compared to Spain, see Kelly, 2001.

<sup>3</sup> About Spain, beyond Álvarez Nogal and Prados de la Escosura, 2013, also see the recent synthesis about the local consequences of the Black Death in comparison to other European areas in Álvarez Nogal et al., 2020.

Figure 2. The Black Death and the economic collapse of Egypt (total and per-capita agrarian output, 1300-1600)



Source: Alfani and Murphy (2017), based on data by Stuart Borsch (2005; 2015)

More controversially, the Black Death might have had asymmetric effects also among the countries where its overall consequences are considered to have been positive. Usually the implication is that North Europe enjoyed greater advantages in the long run compared to South Europe. For example, according to Clark (2007), England was exceptionally well placed to profit from the new demographic equilibrium created by the Black Death, due to its social-demographic specificities<sup>4</sup> as well as to its institutional stability. Instead, according to De Moor and Van Zanden (2010), northern Europe enjoyed additional advantages in the labour market: in the labour-scarce years following the Black Death, women had an economic incentive to enter the market, leading to a permanent change in behaviours with positive and very long-lasting consequences for the economy as well as for gender balance.

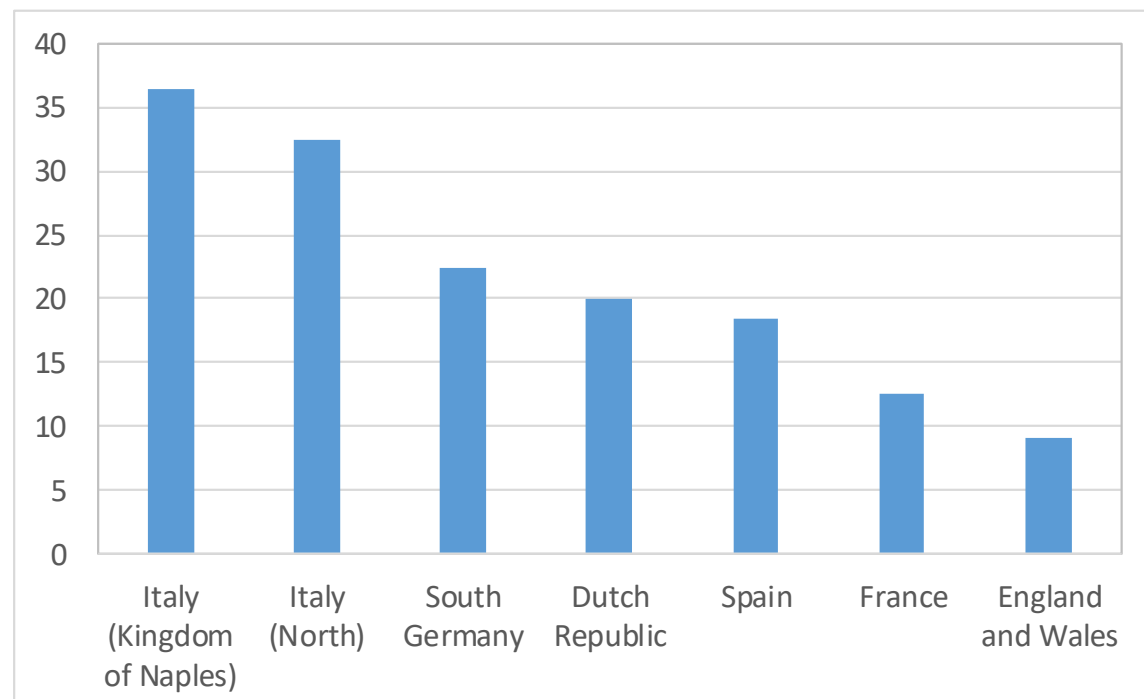
<sup>4</sup> In particular, Clark (2007) focused on the exceptionally high fertility of the English elites. These were the most cultivated and dynamic classes. For Clark, more children, and better chances of survival, led to systematic downward social mobility because not all children of the elites could maintain the same status of their parents. Across the centuries, this would lead to the diffusion of good practices (“memes”) down the social ladder, favouring gains in productivity and ultimately triggering the Industrial Revolution. Note that this interpretation has been strongly criticized by many scholars, for example McCloskey 2008.

According to these authors, this did not happen (or it happened to a reduced extent only) in South Europe due to the spread of the dowry system, which, by limiting women's ability to inherit from their husbands, dis-incentivized women from entering the labour market. These arguments, however, and more generally the idea that the Black Death might have led to changes in European marriage patterns and in within-marriage dynamics with detectable economic consequences in the long run, have been strongly criticized (Dennison and Ogilvie, 2014).

## **2. The great plagues of the seventeenth century as cause of economic divergence**

After the sixth-century Justinian's Plague and the fourteenth-century Black Death, the worst plagues to affect Europe were those of the seventeenth century. Recent research has argued that also these epidemics caused an asymmetric shock to the economies of the continent (Alfani, 2013; Alfani and Percoco, 2019). In this instance, the asymmetry resulted primarily from large differences in human losses across the affected areas. If we add up the victims caused by different plague waves during the seventeenth century and compare them to the population ca. 1600, we discover that in south Italy (Kingdom of Naples) they were in the range of 30 to 43%, and 30 to 35% in north Italy. At the other extreme, seventeenth-century plague intensity in England and Wales was in the order of 8-10% of the population existing at 1600 (Figure 3). Additionally, in north Europe these losses were the accumulated result of a series of plagues (for example, the city of Amsterdam was affected by six distinct ones during the seventeenth century), while in the case of Italy, no community we know of was affected by more than one plague during the century. So, for Italy, the reported results can be understood as the mortality rates for the plague of 1629-30 in the North (about two million victims) and for that of 1656-57 in the South (870,000 – 1,250,000 victims) (Alfani, 2013).

Figure 3. Plague intensity in Western Europe during the seventeenth century (cumulated number of victims throughout the century over population at 1600, %).



Sources: elaboration from data in Alfani (2013: 411). The figure reports mid-points in ranges of estimates.

Interestingly, Italy was affected more severely than other European areas notwithstanding its exceptionally good institutions and practices to fight the plague. Indeed, Italy had been the forerunner in the development of effective systems to combat the plague, starting soon after the fourteenth-century Black Death. By the seventeenth century, anti-plague interventions included health controls at river and sea harbours, at mountain passes, and at political boundaries. Within each Italian state, infected communities or territories were isolated. Within each infected community, human contact was limited by quarantines and other temporary restrictions on the freedom of movement (Cipolla, 1981; Alfani, 2013; Alfani and Murphy, 2017; Henderson, 2019). These and other instruments that were developed to fight the plague remain crucial components of our strategy to contain pandemics, including Covid-19. But, today as in the past, not always do the best anti-pandemic policies prove successful. For example, in 1629-30 plague entered north Italy with infected armies coming from France and Germany to fight in the War of the Mantuan Succession – and nobody has ever been able to impose a quarantine on an enemy army. This being said, the exceptional severity of plague in seventeenth-century Italy remains an epidemiological puzzle. It is even possible that, similarly to what happened to China after the Black Death, having a



particularly effective public health system proved a mixed blessing for seventeenth-century Italy:

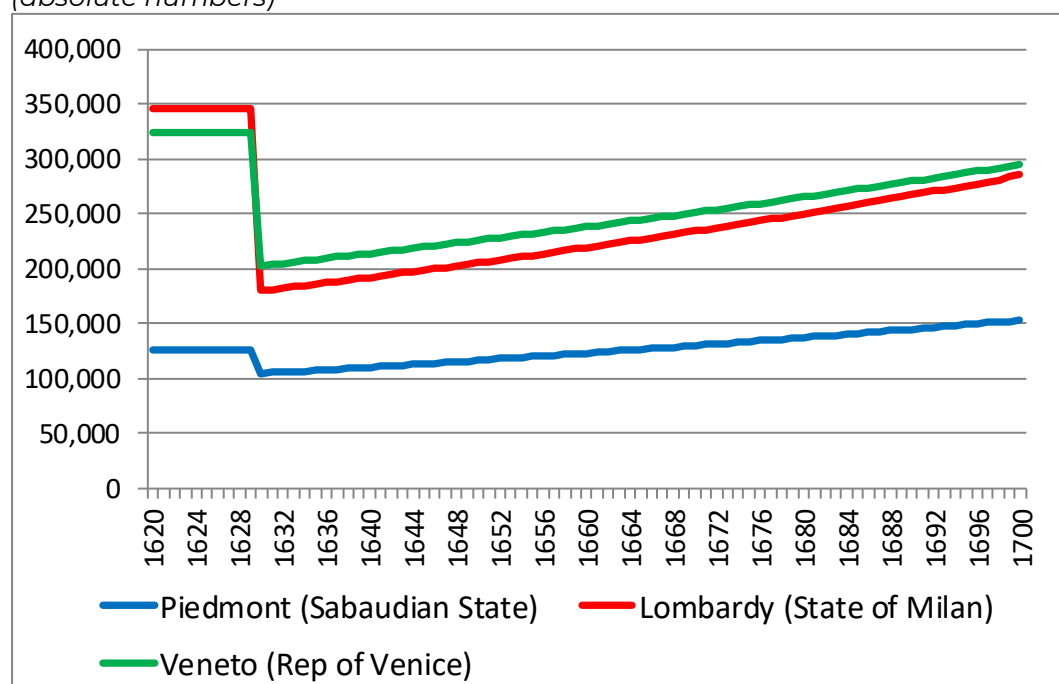
*“arguably the main achievement of the Italian health authorities was to make the Peninsula free of endemic plague from the mid-sixteenth century. There is clear historical evidence that all subsequent outbreaks were due to re-introduction of the infection from the outside, usually by war or trade. (...) This might have been a mixed blessing. When war brought the plague back to Italy in late 1629, the Peninsula had been plague-free for decades and some areas had not experienced any plague since the end of the Italian Wars (1494-1559). As a consequence, the vast majority of the population had never been in contact with the pathogen, which may help to explain why this European plague wave proved exceptionally harmful to the Italian population” (Alfani and Murphy, 2017: 329).*

More relevant to our argument, is that these exceptionally severe plagues affected Italy (and other parts of south Europe) at the worst possible moment. In the early seventeenth century, the Italian economies were facing very intense economic competition from north Europe, partly due to the opening of the Atlantic trade routes. In this context, which was also one of rampant mercantilism, damages to the labour force and the sharp contraction in domestic demand due to large population losses prevented a quick recovery. Consequently, the contraction in total produce levels and in the fiscal capacity of each Italian state proved permanent. In other words, the seventeenth-century plagues had helped shift some of the formerly most-advanced European economies to a lower development path, contributing to the so-called “Little Divergence” between North and South (Alfani, 2013; Alfani and Percoco, 2019). To confirm the view that the medium and long run consequences of the 1630 plague were overall negative for North Italy, we find no trace, after the epidemic, of an increase in real wages. Indeed, as shown by Alfani and Percoco (2019: 1195-1196), if we look at a range of series of real wages of masons in northern Italian cities, the only place where some increase after 1630 can be detected is Genoa – which was also the only major city of North Italy spared by plague in that year. Interestingly, Genoa would be the only major city of the area struck by plague in 1656-57. Regarding this later epidemic, which, exception made for a part of Liguria, affected exclusively the South and the centre of Italy, a recent study of real wages in Rome did not detect any increase after the crisis. On the contrary, real wages of both skilled and unskilled workers declined quite significantly after the plague (Rota and Weisdorf (2020). Another possible positive consequence of pandemics which was absent (or at least, was very limited and

short-lived) after the seventeenth-century plagues in Italy was inequality reduction (Alfani, 2010; 2015; 2020; Alfani and Di Tullio, 2019).

But there is more. Even within Italy the shock caused by the seventeenth-century plagues was asymmetric. First, the 1629-30 plague affected more severely the urban economy than the rural (in cities, many skilled workers died and could not be replaced quickly). Secondly, plague severity was not the same across regions. Mortality was exceptionally high in the Republic of Venice in the northeast of Italy (up to 40% of the overall population: Alfani and Di Tullio, 2019: 114-116) and relatively mild in the Sabaudian State in the northwest, possibly thanks in part to its mountainous and hilly morphology that allowed for a somewhat more efficient containment of the epidemic (Alfani 2013). Figure 4 shows the differential impact of the plague on the urban populations of these two northern Italian states, plus the State of Milan.

Figure 4. Size of the urban population in northern Italian regions, 1620-1700 (absolute numbers)



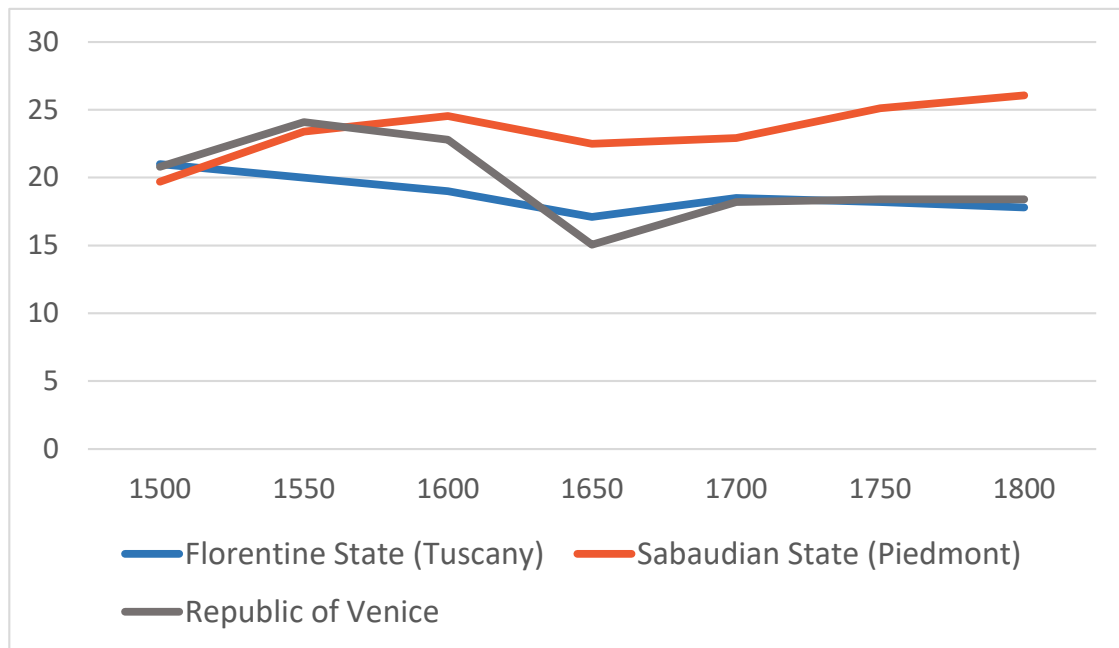
Source: Alfani and Percoco, 2019

The different demographic impact of the seventeenth-century plagues might have led to within-Italy divergence, adding a further layer to the overall picture of how such epidemics might have caused divergence on a continental scale. This additional layer, though, has so far remained substantially under-researched. A recent article by Alfani and Percoco (2019) offered some insights, underlying how the 1630 plague was able to displace the Republic of Venice towards a lower growth

path. In this specific case, to the negative economic consequences of the plague, which as seen above was exceptionally severe in this area, we must add those of the terribly costly War of Candia (1645-69), waged by Venice against the Ottoman Empire to defend the island of Crete and other domains in the Aegean area. Although Venice finally lost Crete (but increased its domains in Dalmatia and Albania), the fact that it was able to face for so long, and basically alone, what was then the main military power of the Mediterranean is a clear testament to the Republic's enduring wealth and state capacity (Alfani and Di Tullio, 2019: 5-8).

While circumstances led the Republic of Venice to suffer more than others because of the 1630 plague, the only Italian state that might have been able to profit from the situation was the Sabaudian State. A crucial factor seems to have been the fact that this part of Italy was relatively spared by the epidemic, hence here demographic and economic recovery proceeded at a quicker pace – but soon, the Sabaudian State moved further on, arguably becoming, by the eighteenth century, the most economically dynamic of the Italian states, as well as the most economically powerful. This can be seen in Figure 5, which shows the divergent economic trajectories followed by some Italian states using urbanization rates as an indicator of overall economic development. Surely, plague alone could not have led to this outcome, but it seems to have provided a strong stimulus towards it, and to have contributed to create the ideal conditions for the rise of the Northwest, which in time would become the cradle of Italian industrialization. If seen from this perspective, then, for the Northeast (the Republic of Venice) the plague was the origin of a double process of decline: in comparison to its traditional competitors in North Europe (the Low Countries, to begin with), but also to other Italian areas.

Figure 5. Urbanization rates in some Italian pre-unification states, 1500-1800 (cities > 5,000)



Source: elaboration from data in Alfani and Percoco, 2019.

## Some conclusions for the age of Covid-19

History of plagues has two important lessons for today societies struggling to cope with Covid-19. First, it confirms that severe pandemics can have extremely important and potentially permanent asymmetric economic consequences. Secondly, it clarifies the “unjust” character of asymmetric shocks. The local economic consequences of a pandemic depend upon unpredictable epidemiological factors and not only upon the quality of the health institutions and of the policies for pandemic containment. In the seventeenth century, Italian health institutions and anti-plague policies were probably the most advanced and effective in Europe. Yet, when the infection was brought in the Peninsula by enemy armies, its population suffered an epidemic much worse than anything seen in North Europe in early modern times. In the case of Covid-19, too, it might turn out that within Europe, Italy suffered more simply because it was affected first.

Additionally, even in presence of a similar demographic impact, the economic impact of pandemics depends heavily upon a complex set of initial conditions and it is very difficult to foretell. For example, few, in 1630 Italy, could have imagined that plague would have favoured the development of the Northwest relative to the

Republic of Venice that was still, in that moment, one of the richest and more economically advanced areas of Europe. What is more, in the political-institutional context of medieval and early modern Europe, rivalry and open hostility among states seem sure to have amplified the capacity of pandemics to damage some to the advantage of others – notwithstanding some simplistic assumptions still to be found in the literature, even the Black Death made both winners and losers. So, in today situation, when we remain in the dark about the final severity that the Covid-19 pandemic will have in each single European state and about its impact on national economies, collective answers to the crisis, possibly coordinated by the EU, seem to be highly advisable. We have at least one important historical example of the benefits of solidarity and international cooperation after a large-scale catastrophe: the quick economic growth of western Europe after the Second World War<sup>5</sup>. Indeed, the progressive construction of the European Union, beyond having guaranteed peace and prosperity to the continent, offers an opportunity (unprecedented in history) to transform also a pandemic into an occasion for collective recovery, and maybe even for long-run growth – to the benefit of all. Otherwise, history teaches us that playing asymmetric games is extremely risky, for all the players involved.

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<sup>5</sup> About the specific context of post-World War II Europe, see for example Eichengreen, 2007; Vonyó, 2018: 190-202.

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