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**“The economic effects of the Spanish flu in Italy”**

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## Introduction

In the entire history of the human being, the world was affected by viruses, and thanks to the technological progress which decreased sharply the distances among countries, increased the easiness of contagion, transforming these diseases in pandemics. In this thesis I want to show that a pandemic, in this case the Spanish flu lead to negative economic effects and greater is the contagion and mortality and worse are the economic consequences. The country analysed is Italy, a country that in the period of the outbreak of the Influenza was fighting the World War One which was crucial for the spread of the virus. The thesis will start with a description of the Spanish flu, in the same chapter will be made an analysis to comprehend why was so lethal for a particular group age to understand its economic implications. Then, a description of the Italian economic situation is needed to figure the level of development the Italian economy had and even to understand the effect of the Spanish flu on this particular economy. The economic history described in the chapter will start from the unification (17th march of 1861) until the beginning of the World War One and hence the outbreak of the pandemic passing through the so called “Giolittian Age” and the First Globalization. Then, the following chapter will regard the Spanish flu in Italy, the virus mortality rate and which territories were more hit; it shows that Italy was one of the most hit country and the soldiers that came back to their hometowns from the war front for illness helped the spread throughout the country. The last part of the thesis is concerned about the economic effects led by the virus even in terms of output and income inequality. The Spanish flu led to an economic recession, but it was limited for few years. There is evidence that pandemic increase income inequality and furthermore its magnitude is greater for the poorer people, as the professor Octávio Luiz Motta Ferraz said: “there is a perverse interaction between pandemics and inequalities, depending on the scale of inequalities in your society—the real social distance—and where you stand economically, your chances of riding out a pandemic will vary significantly. The poorer you are, the worse your prospects will be”<sup>1</sup>. The economic effects caused by the Great Influenza pandemic are evident: decrease in GDP, in productivity and labor supply due to the virus’ deaths; all this macroeconomic shocks have a short term and long term impact and may explain the subsequent slow growth experienced by Italy. These effects will be analysed even by the Solow model, a useful macroeconomic model to gauge the effect of the shock in labor supply on the Italian economy. To support the thesis in which the flu mortality is positively correlated with negative economic effects will be provided evidence that the regions with lower mortality had milder economic consequences. As Harold James and Kevin H. O’Rourke state: “There is a

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<sup>1</sup>Octávio Luiz Motta Ferraz, 2020. “Pandemic Inequality. The two worlds of social distancing”, The Yale review, Yale University

natural tension in economic history between the tendency of economists to generalise, and the insistence of the historian on what is specific to particular times and places”. The Spanish flu, that happened in a specific time (1918) and place (Italy) may be generalized for the other pandemics in terms of economic effects. In fact, in the light of the analysis made on the Spanish flu in Italy, the conclusion will try to foster the economic impact of the actual pandemic, the SARS-CoV-2 also called COVID-19, and what we can learn from the influenza of 1918 in order to start to think about a resilient economy ready for the next pandemics.

# Chapter 1: The first modern pandemic: the Spanish flu

## 1.1 The history of pandemics

Throughout the history the human being was affected by pandemics, they even in the modern era are almost constant<sup>2</sup>, but they must be not confused with epidemics. A pandemic is a disease that affect a wide area in the world and affects a big portion of the world population. From the definition of the World Health Organization: “A pandemic is the worldwide spread of a new disease. An influenza pandemic occurs when a new influenza virus emerges and spreads around the world, and most people do not have immunity.” Therefore, an epidemic to be considered a pandemic must affect several countries making the spread of it, global. Thousand years ago, the world was not so connected making more difficult to transform a national epidemic in a pandemic. Nevertheless, the first pandemic recorded in the history was under the domain of the Roman empire.

In 165 A.D. the Roman empire was affected by a virus called the Antonine that began with the Huns which infected the Germans, who passed it to the Romans and then returning troops spread it throughout the Roman empire. This plague continued until the 180 A.D. including in the victims even the emperor Marco Aurelius<sup>3</sup>.

The pandemic with the highest death toll in the history of the human being was the so called “Black Death”, it was responsible for the death of one third of the world population. It was the second outbreak of the bubonic plague, in fact, it is even called “the great bubonic plague”. The pandemic started in Asia and moved west in caravans. Entering through Sicily in 1347 A.D. in the port of Messina, and then it spread throughout Europe rapidly.

A more recent pandemic was the influenza pandemic even called “Spanish influenza” due to the mistaken belief that the illness originated in Spain, but in reality, it was the first country to report officially the existence of such disease<sup>4</sup>. It was the most severe outbreak of the XX century and based on the death toll was one of the most catastrophic pandemics in the human history. The influenza lasted from 1918 to 1919 and occurred in three waves. The first one originated in western Europe in March of 1918 and due to the first world war it spread very quickly arriving to eastern Europe after few months. The second wave emerged around August of the same year and it was a more lethal form of the pandemics compared to the first wave,

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<sup>2</sup> World Health Organization (WHO) : [https://www.who.int/csr/disease/swineflu/frequently\\_asked\\_questions/pandemic/en/](https://www.who.int/csr/disease/swineflu/frequently_asked_questions/pandemic/en/)

<sup>3</sup> History, 2020. “the pandemics timeline” : <https://www.history.com/topics/middle-ages/pandemics-timeline>

<sup>4</sup> Pandemics, 2020. “Pandemics past and present” : <https://www.pandemics.education/history>

in most of the cases the death came two days after the first indication of symptoms of the flu. The third wave occurred in the winter of the 1919 and in July of the same year had run its course. The singularity of the last two waves is the mortality age pattern, the majority of the death from the Spanish Influenza came from the group age between 20 and 40 years old. It is really important to understand afterward the economic consequences of this pandemic<sup>5</sup>.

Another pandemic that is important to mention is the HIV (human immunodeficiency virus), it is a current pandemic, and remains one of the largest pandemics in the world. It is the same virus that can lead to the AIDS (acquired immunodeficiency syndrome). It is a virus that attacks the immune system, specifically CD4 cells (or T cells). The earliest case according to researchers was found from a human blood sample in the Democratic Republic of Congo. The most common form of the virus spread from the chimpanzees to human during “bush meat trading”, while hunting chimpanzees, hunters have come in contact with animal blood, the researchers said that this happened before the 1931. At the beginning the people believed that only a certain group of people could be affected from the virus, the groups were called as the “Four-H club”: haemophiliacs (who received contaminated blood transfusions), homosexual men (because they reported an high rate of disease), heroin users (even people that used drugs via injection) people of Haitian origin, due to the fact that many cases of AIDS were reported in Haiti<sup>6</sup>. After some studies was found that even females can be infected through sex and even that the virus could be transmitted through breast milk and birth (because of vaginal fluid). The HIV arrived in United states around 1970 but it did not come to the public attention until 1980. The lethality of this virus come from the destruction of the CD4 cells. The HIV destroys so many CD4 cells that the body cannot fight infections and diseases, it may lead to the most severe form of an HIV infection: acquired immunodeficiency syndrome, or AIDS. A person with AIDS is very vulnerable to cancer and to life-threatening infections, such as pneumonia. In these years progresses have been made: the first HIV test, a blood test, it was licensed in 1985 by Food and Drug Administration (FDA); in 1987 arrived antiretroviral medication for HIV, azidothymidine (AZT), used to prevent the virus from multiplying, in order to give to the immune system the possibility to recover and defend from the infections and HIV-related cancers. Although a great deal of progress has been made in research into HIV testing and treatment, the virus is still present and in the last year (2017) 940,000 people died from AIDS<sup>7</sup>, the total death toll in 2019 is around 25-35 million<sup>8</sup>.

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<sup>5</sup> Britannica, 2020. “The influenza pandemic of 1918” : <https://www.britannica.com/event/influenza-pandemic-of-1918-1919>

<sup>6</sup> Healthline, 2018. “The History of HIV and AIDS in the United States” : <https://www.healthline.com/health/hiv-aids/history>

<sup>7</sup> History, 2017. “History of AIDS” : <https://www.history.com/topics/1980s/history-of-aids>

<sup>8</sup> Pandemics, 2020. “Pandemics past and present” : <https://www.pandemics.education/history>

The last pandemic in the human being is the one that we are still living, it is the SARS-CoV-2 also called COVID-19. It is a coronavirus and the coronaviruses are a big group of viruses, some of them cause cold, The first identified coronavirus in the human was in 1965 later that decade, researchers found a group of similar human and animal viruses and named them after their crown-like appearance<sup>9</sup>, this type of coronavirus (COVID-19) cause respiratory illness. This new coronavirus spread through droplets released into the air when an infected person coughs or sneezes. Some experts sad that the virus originated form bats, as the Middle East Respiratory Syndrome (MERS). According to the investigations the infection from animals to humans occurred in the fish market in Wuhan. In fact, although health officials are still investigating the source of the first infection, some hypothesis thought that may be linked to a seafood market in Wuhan because people that visited that place in December developed pneumonia caused by the virus. The virus appeared for the first time in Wuhan in the December of 2019<sup>10</sup>. The fish market of Wuhan is place in which the customers buy fresh meat and fish and animals are killed in the spot, there are sold even wild or banned species like cobras. Crowded conditions can let viruses from different animals' swap genes and the virus can change so many times that may start to infect and spread among people as in this case. In the moment that the experts discovered that the bats have not been sold in during the theoretical period of infection (December 2019) they started to suspect that the pangolins were the animals that passed the virus to humans. They are sold the illegal markets of China and the coronaviruses that affect pangolins are similar to the SARS-CoV-2.

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<sup>9</sup> WebMD, 2020. "Coronavirus history and evolution" <https://www.webmd.com/lung/coronavirus-history>

<sup>10</sup>Hopkins medicine, 2020. "What is Coronavirus?"<https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus>

## 1.2 Spanish flu's features and peculiarities

The influenza especially in Italy but even for most of the people is a seasonal illness causing fever and general malaise and with few days you may be recovered, but in the history the influenza was more severe and lethal, the most lethal influenza was the so called “Spanish flu”. The influenza pandemic was the most severe pandemic in the recent history causing more than 50 million deaths worldwide and 600,000 deaths in Italy, the Spanish flu caused more deaths than the two World wars put together. Applying the flu death rates from the Great Influenza Epidemic to current population levels (about 7.5 billion worldwide in 2020) generates staggering mortality numbers, a death rate of 2% corresponds in 2020 to 150 million worldwide deaths.. Human influenzas are divided into two groups, A and B. Influenza A have key strains, which can be distinguished by spikelike features known as antigens. Where started the pandemic is still a debated issue, but it is indisputable that the Spanish flu was an Influenza A virus known as H1N1 virus with genes of avian origin. Studies suggest that the high lethality is because the virus crossed into people as an animal virus without human genes that the human immune systems were expecting.<sup>11</sup> It was one of the most contagious virus in the history, with 500 million people infected, almost one third of the world population. The peculiarity of this pandemic was the high mortality in the group age between 20-40 years, in fact the unique feature of this virus was the high mortality among healthy people, this is still an unexplained point that continue “to trouble immunologist and virologist”<sup>12</sup>. This mortality age was common worldwide (Shanks 2012, Chowel 2011) and there are four theories which try to explain this phenomenon: the first support the idea that the high share of young people who died due to the epidemic imply that older people had acquired protective immunity from an earlier influenza (Francis 1953, Luk 2001, Mamelund 2011, Palese 2004), this theory may explain the relatively low mortality rate among the older people, but does not explain the high mortality rate of the young adults (Morens 2007, Ma 2011). It has been advanced the idea of the “honey-moon period” that occurs among the younger people (age between 4 and 14 years) that protects them from morbidity and mortality<sup>13</sup>, but still fail in explaining the mortality rate of the individuals over 14 years old. Another hypothesis suggests that the high mortality rate among young adults may be attributable

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<sup>11</sup> National Geographic Science: <https://www.nationalgeographic.com/science/health-and-human-body/human-diseases/influenza/>

<sup>12</sup> Alain Gagnon, Matthew S. Miller, Stacey A. Hallman, Robert Bourbeau, D. Ann Herring, David JD. Earn, and Joaquín Madrenas, 2013. “Age-Specific Mortality During the 1918 Influenza Pandemic: Unravelling the Mystery of High Young Adult Mortality”, Paul Digard editor.

<sup>13</sup>Ahmed R., Oldstone Michael B A & Palese P., 2007. “Protective immunity and susceptibility to infectious diseases: lessons from the 1918 influenza pandemic”, Nature Immunology 8 pp. 1188–1193



to the consequences of the tuberculosis which was concomitant with the Spanish flu<sup>14</sup>, because the former disease killed a high share of young male adults<sup>15</sup>, but for this reason this theory cannot be extended for the female victims, even if in some parts of the world the female population died more than the male one<sup>16</sup>. The third theory believes that the high mortality of young adults may be due to “an overactive immune response (i.e., cytokine storm) at the height of immunocompetency”<sup>17</sup>, this was scientifically proved by Kobasa that artificially infected monkeys with the reconstructed 1918 influenza and attributed its lethality to an “aberrant innate immune” response<sup>18</sup>, but it fails to explain: “the unique age-specific trend of mortality observed during the 1918 Influenza pandemic, and does not account for other factors likely important in determining outcome, chiefly, pre-exposure to earlier strains of influenza virus (immunological memory)”<sup>19</sup>. The last hypothesis is focused on the dysregulation of T-cell considered the main cause of the virus lethality<sup>20</sup>. This theory based on historical records suggest that “individuals exposed at least once to the (presumably) A/H3Nx 1889–90 pandemic (the Russian flu 1889-90) strain were likely to have dysregulated cellular immune responses to infections with the A/H1N1 strain during the 1918 outbreak”<sup>21</sup>, this effect might explain the age pattern of mortality. In conclusion we can suggest that the Russian flu may have played a role in the particular mortality rate of the influenza pandemic 1918 and the immune system response of the younger people may have caused a more probable death.

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<sup>14</sup>Noymer A., Garenne M., 2000. “The 1918 influenza epidemic's effects on sex differentials in mortality in the United States”, *Population and Development Review* Volume 26 Issue 3 26: 565–581.

<sup>15</sup> Winter, Jay, and Jean-Louis Robert, 1997. “Capital cities at war: Paris, London, Berlin, 1914–1919”, Cambridge: Cambridge University Press.

<sup>16</sup> Sawchuk LA (2009) Brief communication: Rethinking the impact of the 1918 influenza pandemic on sex differentials in mortality. *American Journal of Physical Anthropology* Volume 139 Issue 4 pp. 584–590.

<sup>17</sup> Yueh-Ming Loo, Gale M., 2007. “Influenza: fatal immunity and the 1918 virus”, *Nature* 445 pp. 267–268

<sup>18</sup> Kobasa Darwyn, Steven M Jones, Kyoko Shinya, John C Kash, John Copps, Hideki Ebihara, Yasuko Hatta, Jin Hyun Kim, Peter Halfmann, Masato Hatta, Friederike Feldmann, Judie B Alimonti, Lisa Fernando, Yan Li, Michael G Katze, Heinz Feldmann, Yoshihiro Kawaoka, 2007. “Aberrant innate immune response in lethal infection of macaques with the 1918 influenza virus”, *Nature* 445 pp. 319–323.

<sup>19</sup> Alain Gagnon, Matthew S. Miller, Stacey A. Hallman, Robert Bourbeau, D. Ann Herring, David JD. Earn, and Joaquín Madrenas, 2013. “Age-Specific Mortality During the 1918 Influenza Pandemic: Unravelling the Mystery of High Young Adult Mortality”, Paul Digard editor.

<sup>20</sup>Shanks G. D., Brundage John F., 2012. “Pathogenic responses among young adults during the 1918 influenza pandemic”, *Emerging Infectious Disease*, Center for Disease Control and Prevention (CDC), Volume 18 pp. 201–207.

<sup>21</sup> Alain Gagnon, Matthew S. Miller, Stacey A. Hallman, Robert Bourbeau, D. Ann Herring, David JD. Earn, and Joaquín Madrenas, 2013. “Age-Specific Mortality During the 1918 Influenza Pandemic: Unravelling the Mystery of High Young Adult Mortality”, Paul Digard editor.

The main issue during the pandemic was the difficulties faced to find a vaccine to protect against the virus because it was particularly hard to isolate the properties that made it so lethal. Neither an antibiotic was found to fight against the infections associated with the influenza; as a matter of fact the only solutions to control the virus infection were limited to non-pharmaceutical interventions such as isolation, quarantine, personal hygiene, and limitations of public gatherings, but were applied unevenly. The high level of infections cannot be explained by the globalization and high level of mobility as in the case of COVID-19, in the case of the influenza pandemic the World War One was the main source of infection. The World War One was the perfect episode to help the spread of the virus, overcrowding and frequent troop movements increased exponentially the infections. Although, Jay Winter, one of the most important demographers writing on the World War One, believed that the link between the war and the virus does not exist at all: “The pandemic was not connected to the war, its impact did not relate to consequences of the conflict, such as malnutrition, overcrowding or anxiety for the fate of their loved ones. It is possible that troops movements accelerated the spread of the infection, which however started out independent of war”<sup>22</sup>. Indeed most of the studies ( Ewald 1994, Erkoreka 2009, Humpries 2013, Opdyke 2014) argue that the war is not considered the primary cause of the influenza pandemic, the war is deemed to be only a driver for the global spread of the virus in a world that is not so much connected as today. The military age (between 20 and 40 years) was the group age more hit by the virus with the highest death toll because of the vulnerability of healthy people. In the thesis will be shown the evidence of high mortality rate in the military camps and trenches.

An epidemic is a disease outbreak that affects a large number of people, more than what is normally expected in a particular region, community, or population, instead a pandemic occurs when an epidemic spread across multiple nations or continents<sup>23</sup>.

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<sup>22</sup> Winter J., 2007. “L’influenza spagnola, In, La prima guerra mondiale,” a cura di Audoin-Rouzeau S., Becker J.-J. pp 283-288, Einaudi, Torino.

<sup>23</sup> National Geographic Encyclopedia: <https://www.nationalgeographic.org/encyclopedia/pandemic/>

## Chapter 2 The Italian economy before the Spanish flu

### 2.1 The post-unification period

The Italian economic history starts only in 1861 the year of the unification of Italy. To analyze the economic effects of the Spanish flu in Italy is important to describe the Italian economy in the end of the XIX century (the period after the unification of Italy) and in the beginning of the XX century (the period before the Spanish flu outbreak). In the XIX century Italy was trying to deal with the challenges of that time as all the other European countries: how to industrialize, how to become, or remain, militarily competitive, and how to bear with the challenges of globalization; Italy comparing with the other European countries was poor, capital-scarce and even backward in terms of industrialization. Until 1861 Italy was fragmented into several kingdoms, but in the 17 March of the 1861 Italy became a united country. Some history studies see the nation-state unification of the mid-Nineteenth century in Europe as a response to the challenges of globalization. There was an external and an internal challenge: how could political societies be strong enough to compete with existing and well-established nations (Great Britain); and how could they overcome internal divisions (Sardinia Kingdom and Kingdom of Naples). During the 1860s there was the creation of the German empire, the almost simultaneous unification of Italy and the much bloodier American civil war. "In each case, a more industrialized north defeated a rural and perhaps more romantic south."<sup>24</sup>

Italian as well as German businessmen, thinkers, but also politicians found the need to economically and socially catch-up with the new economic and military power represented by the Great Britain. Italy had included territories with the highest per capita income in the world between 1300 and 1600, but since then lived a significant decline, associated with absolute stagnation<sup>25</sup>. In that period the Italian economy was poor compared to the other European countries, the purchasing power of an Italian was more or less an half of the purchasing power of an English and the GDP per capita was more or less equal to the current average of the forty-two "richest" African countries (Maddison 2001)<sup>26</sup>. Not only the GDP is the only measure which describes the backwardness of the Italian economy, the life expectancy in Italy was 30 years, below the actual life expectancy of the less developed countries; even the infant mortality was really high, almost the 75% of the Italian children did not reach their first birthday. The income distribution was very unequal, the

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<sup>24</sup> Harold James and Kevin O'Rourke, 2011. *Italy and the First Age of Globalization, 1861-1940*. Quaderni di Storia Economica (Economic History Working Papers), Banca d'Italia.

<sup>25</sup> Maddison A., 2010. *Historical Statistics*.

<sup>26</sup> Toniolo G., 2013. Ch.1: "la crescita economica italiana, 1861-2011" of the "L'Italia E L'economia Mondiale Dall'unità A Oggi", Marisilio Editori.

Gini index was equal to 0.5 and 40% of the Italian population was close or below the level of absolute poverty.

At the end of the 19th century the first globalization was already underway, triggered by the abolition of corn laws. During these years Italy has been growing at an average annual rate of about half of Great Britain which represented in that period the first economy in the world; the other European countries as France and Germany grew at a relative good rate. It can be inferred, therefore, that the Italian economy, even in the years following unification, did not manage to ride the wave of the first globalization and at the same time did not grow as much as the other European countries.

There are several reasons that explain the underdevelopment of the Italian economy, the infrastructural ecosystem was rather backward, only after the construction of the secondary lines connecting the larger cities with the smaller ones the cost of transport began to decrease (Fenoaltea 2007)<sup>27</sup>. The creation of an educated human capital has been a slow process in Italy. Compulsory primary education was introduced immediately after unification but was not implemented and adequately monitored by local institutions. So at the beginning of the 20th century the central government took over the task of ensuring primary education, the literacy rate grew: literacy in the population between 15 and 19 years old grew from 27% in 1861 to 62% in 1901 (Vecchi 2011, p. 425). Also the institutions are accomplices of the backwardness of the Italian economy, only in 1882 Italy introduced a new code of commercial law, before it was in force a civil code of French tradition that directly from the code of the Kingdom of Sardinia with small changes. The introduction of the Italian lira was slow, only in 1894 the last large quantities of Neapolitan coins were changed into lira (De Mattia 1959). The integration of financial markets did not take place until the early 1880s (Toniolo, Conte, Vecchi 2003). All these problems mentioned above are the cause of the Italy's failure of the economic convergence with the other European countries.

Even in terms of monetary policy Italy started to be united; in this period (end of nineteenth century) the world major countries adopted the gold standard. In 1862 was adopted a bimetallic gold and silver standard on the French pattern. In 1865 Italy joined in the Latin Monetary Union, managed by Napoleon III, it looked to move in the direction of a pure gold standard. In 1866, at the outbreak of the last of the wars of unification with Austria, the issue banks suspended convertibility in the so-called "corso forzoso"; and by 1868, the currency had depreciated by 12 percent. It was only in 1883 that convertibility was resumed. The presence of Italy in the gold standard was seesawing and brief; the periods of formal adherence to all the rules of the gold standard were: 1862-1866, 1883, and 1924-1932 when exchange control were introduced<sup>28</sup>.

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<sup>27</sup> Toniolo G., 2013. Ch.1: "la crescita economica italiana, 1861-2011" of the "L'Italia E L'economia Mondiale Dall'unità A Oggi", Marisilio Editori.

<sup>28</sup> Harold James and Kevin O'Rourke, 2011. Italy and the First Age of Globalization, 1861-1940. Quaderni di Storia Economica (Economic History Working Papers), Banca d'Italia.

At the end of the XIX century, between 1870-1880, the Italian single market started to develop in something definite; a bank law in 1874 created an organized financial system that attracted foreign capital. During these years there was an increase in investment and economic growth. A financial crisis in the 1890s interrupted all this progress, the crisis was triggered by a real estate bubble. It all started when the Italian lira became convertible into gold, and the banks could access to foreign loans at a relatively low interest rate. Then several banks began to lend money especially in the construction sector at low interest rate to risky borrower. The inflow of foreign capital in 1880 started to decrease, hence started the credit crunch from the most exposed banks, they reduced the credit lines especially in the construction sector. The outflow of foreign capital made it difficult for the banks to maintain the gold reserve established by the law. The result was the failure of some small banks, Between 1892 and 1893 most Italian commercial banks were illiquid or solvent, the gold convertibility was not available since 1887, and in 1893 was made a bank reform that created the Bank of Italy and suspended the lira convertibility into gold. The politics in Italy was weak and divided and this let the crisis drag on for long time. Three banks of emission were merged, and the two biggest commercial banks were liquidated to create a better managed institutions; the creation of the bank of Italy hence a modern central bank and the reform of the banking system helped the financial recovery of Italy.

Although the post-unitary period of Italy is characterized by a low GDP growth (compared to the other European countries), other socioeconomic variables have been improved and converged with other European countries such as: France and United Kingdom. Recent studies (Vecchi 2011) show that the life expectancy increased from 29 years to 38 years (as in France) and infant mortality decreased from 223‰ to 189‰ (in line with France and Great Britain). The income distribution did not change, but the consumption became less unequal (Rossi, Toniolo, Vecchi 2001) and the share of population living in condition of absolute poverty fell from 44% to 35% (Vecchi 2011). This is important to highlight because even though Italy did not grow as the other neighboring states did, the first generation of Italians experienced an increase in well-being that reached a level equal to that of the other more advanced states.

## 2.2 The Italy's convergence: "The Giollittian Age"

At the beginning of the XX century Europe was at the height of its development, after the conflict between France and Germany in 1870 there had not been no more wars within the continent that guaranteed an extended period of peace. The European countries were focused on colonial wars and on the exploitation of the colonies for economic interests helping the industries by providing cheap commodities for the European industries. As we seen, Italy was economically behind, and the industry development was almost nil. In the June of 1900 political elections have been made, that set forth the defeat of the Peollux government, in the following month the King Umberto I was assassinate by an anarchist Gaetano Bresci, he was substituted by Vittorio Emanuele III that favored the return of a constitutional government led by Giuseppe Saracco, Giuseppe Zanardelli, and Giovanni Giolitti, the latter was the most frequent holder of the office of Prime Minister between 1903 and 1914. Until the financial crisis in the late of the 1890s the Italian economy was really behind the other European countries in terms of industrial development. In the beginning of the XX century Italy experienced an economic take-off caused by the industrial development of the country. In 1870 the Italy's GDP per capita was equal to 45% of the Great Britain, in 1890 it decreased arriving at the 38%, in 1913 it reached a level equal to 54% due to a fast economic growth experienced started from the end of 1890s. For the first time Italy reduced the economic gap with the most advanced country of that period (Toniolo 1990). This period is called the "Giollittian Age" that is the period when Giovanni Giollitti was the Italian prime minister.

The Italian GDP per capita between 1897 and 1913 increase 1.6% per annum and the GDP increased by 2.4% per year in the same period. Even the productivity lived a period of rapid growth: in the service sector increased by 2.2% and in the industrial sector by 2.5% (O'Rourke et al. 2011). In some industrial sectors the production increased at a double-digit rate and some Italian firms acquired a competitive advantage in sectors crucial for the second industrial revolution such as Fiat (automobile), Ansaldo (shipbuilding) and Pirelli (tires). During the take-off period, between 1896 and 1907, Italy was thus progressively becoming an industrial economic power. On the eve of the First World War, the degree of industrialization of the country was quite good: the export of finished industrial products reached 20% of the value of total exports, more than ten times more than at the beginning of the 1890s. The type of industry growth in Italy was particular, as Zamagni (1978) describes it was dominated by financial capital and state support (customs protectionism, public orders) with a propensity for a monopolistic market. The Giolittian policy favored industrialization, but only where modern industry had already developed with its own forces, i.e. in the north-western area of the country (industrial triangle) which, according to the 1911 census, out of a population that was 27% of the

national population, had 58% of the employed in manufacturing with more than ten workers<sup>29</sup>. The industrialization of Italy was evident even because the first official labour unions were born, for the workers with the “Confederazione generale del lavoro” (1906) and even for the industrial owners with “Confindustria” (1910). Cotton milling remained the largest industry, but for military reasons in 1914 Italy had established a large, protected steel industry, together with extensive shipbuilding yards in Liguria. Big modern metalworking plants opened or expanded in Piombino, Terni, Brescia, Milan, and Genoa. Moreover in 1905 the railways were nationalized, and this increased demand for rolling stock and engines. Hydroelectricity from the Alps provided cheap, renewable energy for the factories of the northwestern “industrial triangle” (Lombardy, Liguria and Piedmont)<sup>30</sup>.

A major new industry was developed, the automobile production, the Fiat was founded in Turin in 1899 by Giovanni Agnelli and soon became one of Europe’s largest producers and exporters of automobiles, It also made buses, trucks, airplanes, and military vehicles. Lancia was founded in Turin in 1906, and the company that became Alfa Romeo opened in Milan in 1910. This period was stimulated the born of high technological firms: Olivetti was founded in 1908 in Ivrea, that in a short time became Europe’s leading producer of typewriters and office machines. The presence of the state was evident, it’s finances were healthy during this period, and the balance of payments was helped by remittances from the millions of emigrants elsewhere in Europe and in the Americas.

The dominant sector in the Italian economy was still the agricultural sector, it provided in 1911 almost the 60% of the jobs. Even this sector lived an “economic boom” during the “Giollittian Age”, partly because of state-subsidized land reclamation and irrigation schemes (particularly in the Po valley) and partly because of the high tariffs on grain imports to protect the Italian landlords against the cheap English wheat<sup>31</sup> (see in the “*Italy and the first globalization*”), which gave a big incentive to produce more food on suitable land, in fact the production of the wheat increase by one third. The increase in the production of the agricultural sector was stimulated even by a network of rural banks that provided farmers with much-needed cheap credit. The same occurred in the sugar beet production, another heavily protected sector, which stimulated a new refining industry in central Italy. The Socialists and Catholics were helpful by founding cooperatives in northern and central Italy to help provide seeds and machinery and to market produce.

Studies show that this rapid growth is explained only by one fifth for economic cycle, the rest is due to trend change. In fact, institution were crucial to sustain this growth, after the financial crisis of 1890s the government enacted exchange, fiscal and monetary policy to help and sustain the long term growth of the

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<sup>29</sup> Zamagni V., 1978 “Industrializzazione e squilibri regionali in Italia. Bilancio dell’età giolittiana”, Il Mulino, Bologna.

<sup>30</sup> Encyclopedia Britannica

<sup>31</sup> O’Rourke K., 1994. “Late Nineteenth-Century Anglo-American Factor-Price Convergence: were Heckscher and Ohlin Right?”, Cambridge University Press

country. The Italy's public account improved, the ratio debt/GDP decreased, and this attracted investments from abroad. The trust was particularly high, the spread between the interest rate on Italian bonds and French and English bonds made a sharp decrease, the gold convertibility of the Italian lira was never officially reintroduced, but the monetary authorities acted as if it existed, by keeping the exchange rate at the gold parity, sometimes even above (Cesarano, Cifarelli, Toniolo 2012).

However, the Italian economic growth was heavily concentrated in the north, the south backwardness was evident, the income there was less than half that in the north. The economic gap in the 50 years between 1861 and 1911 the South-North per capita GDP ratio declined by 13 points from 93% to 80%. The southern economy was arguably linked more closely to northern Europe and South America (to which it exported wine, olive oil, fruit, and labor) than to northern Italy. South was very badly hit by the tariff war with France. Moreover, "the positivist school of anthropology, promoted a widely held view that southerners were more criminal than northerners and even racially degenerate, an argument that lent ethnic overtones to the debate on southern backwardness" (Encyclopedia Britannica). The poverty in southern Italy triggered the mass emigration from Sicily and the southern mainland, which averaged more than 500,000 people per year from about 1901 onward and rose to 900,000 in 1913, mainly to North and South America<sup>32</sup> (the Italian emigration will be discussed in the *"Italy and the first globalization"*).

In 1897 was laid down the first law to help economically the Italy's poorest region, Sardinia, with cheaper credit and funds for irrigation and reforestation, this thanks to the Sardinia's leading politician, Francesco Cocco Ortu, which was minister of agriculture. Later laws were extended to other regions to provide similar or greater benefits, in 1906 the laws were laid down for the entire south. But In practice, the legislation had little impact, because World War I interrupted any progress. However, it was the first time that funds derived from taxes paid by the prosperous north were used by the government to stimulate economic activity in the south, or at least to win votes for government supporters. In fact, the negative side of this period was the missed economic catch up of the south, the Giolitti's policy in the south was less accommodating, often resorted to old-style repression in the face of protest, as in 1903 and 1904. This behavior was heavily criticized by the socialist Gaetano Salvemini that accused the government of corruption and of doing nothing to help the south; he published in 1909 and later collected as "Il ministro della mala vita" ("The Ministry of Evil") to accuse him to be in complicit with the organized crime in the South of Italy.

It was a prosperous period even in terms of health, during the Giolittian Age there was a sharp decline illness rate. This is because the quality of the infrastructures improved that triggered the sharp fall in epidemics cases: water supplies and sewerage decreased cholera epidemics even if these still occurred at times, as at Barletta in 1910–12. Malaria, a major scourge of the rural south, declined sharply as quinine became widely

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<sup>32</sup> Encyclopedia Britannica



available after 1900. Pellagra, a vitamin-deficiency disease endemic among the northern peasantry, rapidly declined as diets improved.

Although Italy with this economic jump became an industrialized country and increase its GDP, comparing to the other countries the Peninsula was still behind. The lack of convergence among the Italian regions was evident and the government did not make so much effort to reduce the gap. This economic divergence will be taken into account in the analysis of the economic effects.

## 2.3 Italy and the first globalization

In the second half of the Nineteenth century the Sardinia kingdom (Piedmont) adopted tariff reforms which greatly liberalized trade policy in the Kingdom (between 1851 and 1859).<sup>33</sup> This was consistent both with the liberal philosophy of Cavour, and with the free trade philosophy of the time, which culminated with the signing of the Cobden-Chevalier Treaty between France and Britain in 1860. The liberal Piedmont's policy, as well as existing Piedmont's trade and navigation treaties, were extended to the new Kingdom without any modification. The open trade policy was followed in 1863 a new trade treaty with France, as a result of which Italy became a member of the nascent "European network of treaties" based on the "most favored nation" clause (as in the Cobden-Chevalier Treaty). As a result, the Italian economy was surprisingly open, with the second lowest level of tariffs in Europe, the average tariffs on manufactured goods arrived to 8/10 percent (see Table n.1 in the Appendix).

Notwithstanding, the manufacturers in several industries, especially in the South (which had been heavily protected under the kingdom of Naples) lost as a result of this unexpected shift to free trade policies, and it was predictable that they would seek to compensation matters. For this reason, in 1870 was set up a commission of inquiry into Italian manufacturing, on the grounds that the 1863 trade treaty with France would soon be up for renegotiation. This created the opportunity for industrialist in textiles and heavy sector, with the latter supported by the military, to demand protection, and the result was the adoption of a tariff in May 1878 in the textile and heavy industry as well as the agricultural sector with the adoption of tariff on wheat, this raise of protective barriers are considered as the end of free trade in Italy.

Even if the Italian economy was moving toward a more protectionist policies, tariffs were reduced as a result of trade treaties being signed, as in the case of the France trade treaty in 1881. However this was not sufficient for industrialists, another manufacturing commission was set up and led to the adoption of a far more protective tariff in 1887, which imposed high duties on textiles, and especially iron and steel products, which were crucial sectors for the military industry.

The tariff on yarn arrived to 27% (Toniolo 1990), but with a tariff of just 7% on cloth (no effective protection on weaving); engineering paid very high tariffs on iron and steel, without being compensated with high tariffs for its own output. Wheat tariffs were also dramatically increased, amounting to the equivalent of 25% ad valorem in 1885 (Coppa 1970, Federico 1998). Wheat tariffs were raised again in 1888, and again in 1894; in 1913 the Italian wheat tariffs were almost equivalent to a 40% ad valorem tariff (see Table n.2 in the Appendix). Then, a series of trade treaties helped to lower the rates of Italian protection, favoring agricultural exports at the expense of protection for industry. The Italian protectionist policy of these years

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<sup>33</sup>Toniolo G., 1990. "An Economic History of Liberal Italy, 1850-1918", London-New York Routledge.

was subject of debate among economists; some authors argue that grain tariffs helped smooth the disruption associated with the influx of cheap cereals from the frontiers, thus lowering adjustment costs, while tariffs on iron and steel helped establish Italian heavy industries which otherwise would never have been established, and which were crucial for industrialization in the long run. On the other side other economists believe that the structure of the protection was irrational; Gerschenkron argued that the government intervention could be beneficial in a backward economy like Italy, only if the Italian policy would have promoted industries which were not coal-intensive, such as engineering because of Italian coal reserves scarcity<sup>34</sup>.

Instead the policy adopted by the Italian government was irrational, as we saw the tariff favored the iron and steel industries, which were heavy consumers of coal and due to the lack of this commodity these industries resulted uncompetitive and put engineering in disadvantaged position (Toniolo 1977). Even the protectionist policy adopted by Italy indirectly damaged the economy because protected an old sector, “with a moderate rate of modern technological progress and accordingly relatively limited possibilities in a backward country on the European continent” (Gerschenkron 1962) and failed to protect the chemical industry a promising industry with “innovational possibilities and well suited to the conditions of the country” (Gerschenkron 1962). Another economist, Fenoaltea criticized the government intervention, specifically in the agricultural sector, grain tariffs increased nominal wages, since the real grain wage was exogenously given as a result of migration flows, and these higher nominal wages reduced employment in manufacturing, with the surplus labor emigrating<sup>35</sup>.

Although the industrial development in Italy was belated, the industrial revolution in Italy was more egalitarian compared to the other European countries: the life expectancy increased arriving to 45 years, the income inequality and absolute poverty decreased, but it is not found yet the driver of the factors that caused these egalitarian results (Toniolo 2011).

This egalitarian effect may be explained by the first globalization. The ratio of unskilled urban wage and agricultural land returns ( $w/r$ ) started to converge (O'Rourke and Williamson 1999 ch.7)<sup>36</sup>. The Old World economies (Italy) started with a lower wage compared to the New World because the former economies were labor abundant and as the factor price equalization theorem of Heckscher and Ohlin predicts, the ratio  $w/r$  started to converge, the European wage rise and caught-up the wages of the

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<sup>34</sup> Gerschenkron A., 1962. “Economic Backwardness in Historical Perspective: A Book of Essays”, Cambridge MA: Harvard University Press.

<sup>35</sup> Fenoaltea S., 1993. “Politica doganale, sviluppo industriale, emigrazione: verso una riconsiderazione del dazio sul grano,” *Rivista di storia economica*, 10, pp. 65-77.

<sup>36</sup> Findalay R. and O'Rourke K., 2007. “Power and Plenty”, Princeton University Press, Princeton.

New World (O'Rourke and Williamson 1999)<sup>37</sup> Therefore there was an income improvement for the poor unskilled workers relative to the rich landlords in Europe. Declining transport costs led to formerly sheltered sectors becoming exposed to international competition for the first time such as: grain, olive oil, citrus fruits, all were important sectors for the Italian economy. Market integration also made it more difficult for peripheral economies to industrialize (south of Italy) because they were bearing with low cost competition from the expanding industrial core. In those parts of the world where local populations were deprived of the ability to determine their own trade policies, the Nineteenth century was a period of deindustrialization, a dangerous phenomenon at a time of increasingly industrialized warfare.

In fact the, the Italian result was different: the decrease in transportation cost and the price convergence especially in the grain and wheat after the abolition of the corn laws in 1846 put under pressure the agricultural sector in Italy that as a response decided to adopt a protectionist policy, therefore this was a decision taken to favor the landowners, even if the protectionism was an Italian peculiarity.

Although the first globalization led to a price convergence among the European economies, the openness of the economy may not cause the egalitarian effect in Italy. The migration was a factor that helped the price convergence. The poorest economies in Europe especially in Italy that had the highest emigration rates. In the 1880s the Italian emigrants to the New world (U.S.A.) were equal to 300,000, the decade after 600,000 and during the 1900s the number of Italians migrated to US were more than two million<sup>38</sup>. Starting from the 1920s the emigration started to decrease due to the immigration act of 1924 also called the Johnson Reed act, which put a limitation on the number of allowed immigrants. In 1917 an earlier act was laid down, it implemented a test for the immigrants over 16 years old to demonstrate basic reading comprehension that surely reduced the human capital flow especially from Italy, because the Italian immigrants were mostly poor and illiterate<sup>39</sup>. Although the United States government tried to reduce the number of immigrants, the total amount of Italians that had come to the United States during the 1920s was equal to 4 million “representing more than 10% of the nation’s foreign-born. population”<sup>40</sup>. The migration factor was a crucial driver for the price convergence process: it helped primarily the convergences of real wages, mass migration after 1870 had augmented the 1910 New World labor force by 49% and explains about 70 percent of the real wage convergence in the late nineteenth century Atlantic economy(Williamson, 1996; Taylor and Williamson, 1997; O'Rourke and Williamson, 1998, ch.8)<sup>3</sup>. As it is shown the trade openness in Italy may

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<sup>37</sup> Williamson Jeffrey G., 1998. “Globalization, Labor Markets and Policy Backlash in the Past”, Journal of Economic Perspective.

<sup>38</sup><https://www.loc.gov/teachers/classroommaterials/presentationsandactivities/presentations/immigration/italian3.html>

<sup>39</sup><https://history.state.gov/milestones/1921-1936/immigration-act>

<sup>40</sup><https://www.loc.gov/teachers/classroommaterials/presentationsandactivities/presentations/immigration/italian3.html>

not increase the wage relative to the rents, but great migration of the Italians was a phenomenon which may explain the egalitarian effect during this period.

In general, the first globalization increased the wage relative to rents and hence increased the income of workers. The real purchasing power of workers increased thanks to international trade; through imports the consumption goods were sold at a lower price. For the Italian case, there is still not a solid explanation (Toniolo 2013).

The change in the Italian politics situation may be responsible for the egalitarian effect. In the 1891 with the publication of the “*Rerum Novarum*” by Pope Leone XIII the catholics took a politic position, the Catholics were part of the government in 1913 with the “*Patto Gentiloni*” this agreement established the male universal suffrage even for the illiterate only for the ones over 30 years old, this is really important because for the first time were included even the peasants into the electoral body, which was almost tripled (over 24% of the Italian population)<sup>41</sup>. In the 1892 there was the foundation of socialist Italian party, and increased the participation of workers in the labour unions, Giolitti made an ally with Filippo Turati . During the “*Giolittian Age*” the government were more open toward catholic and socialist political propositions that led to social reforms (Gentile 1977). These reforms could boost the Italian economy during that period.

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<sup>41</sup>Carocci G.,1961. “*Giolitti e l'età Giolittiana*”, Einaudi, Torino

## Chapter 3: The Spanish Flu in Italy

### 3.1 The spread and mortality

The Spanish flu was one of the deadliest pandemics in the history and Italy was one the most severely affected countries. Current estimates suggest that about 0.6 million out of 36 million people died similar to the number of military deaths in WWI, at an estimated mortality rate of 1.2%, below the world average but substantially above the mortality rates of other developed countries (Barro 2020). To make a comparison, in Germany, the mortality rate equal to 0.8%, in the U.S. and the U.K. it was 0.5%, and in France it was 0.7%. The influenza and the World War One reduced a population of 36 million by about 1.2 million between 1915 and 1918.

There were two waves of the influenza between May 1918 and the beginning of 1919. The first wave in 1918 was relatively mild, instead the second wave was severe (see Figure n.1). The first cases were reported in late August and by mid-September the influenza had spread to all parts of Italy. The peak was reached between the beginning of October and it ended around the end of November, but with some cases still being registered in January and early February of 1919.

The influenza spread throughout the country very quickly, provides a deep investigation of the pandemic, he reported that the number of deaths peaked in mid-October with only around a couple of weeks lag between its spread to the different regions of the country, for example in Naples the daily deaths peaked on October 7 with 256 cases and in Rome the peak was reached in October 19 with 226 deaths.

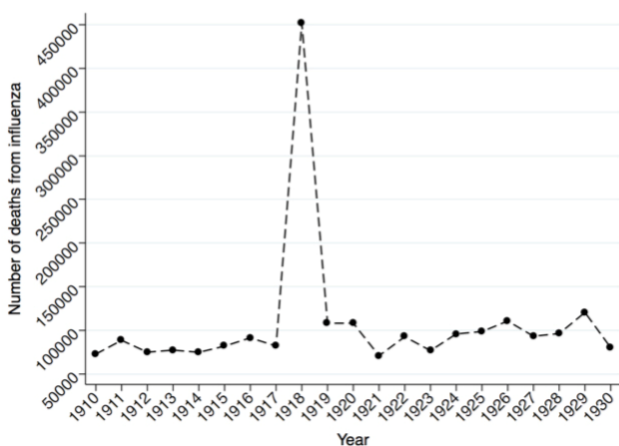


Figure n.1 Number of deaths from Influenza over time (ISTAT 1958). It is evident that the wave of 1918 was the most severe (the count includes the number of victims for flu and pneumonia).

The spread in Italy is explained by several factors. First the influenza and its spread was concomitant with the First World War and more specifically with the last attack of the Italian Kingdom to the Austrian-Hungarian Empire. This attack was made in late October, that coincide with peak of mortality in Italy. The severity of the epidemic is due to of several reasons, but the main factor was that most of the people in Italy was living in precarious condition, the standard of living was very low for most of the population; the hygienic conditions were inadequate to avoid the spread of the virus, for example, one-fourth of the population had access to running water and the wealthy people lived in houses with private toilets or access to sewer lines and cohabitation of entire families in the same room was very frequent that led to overcrowding and made impossible to respect the social distancing.

Another relevant factor was the policies taken the government; the public authorities produced ineffective non-pharmaceutical interventions, because of lack of coordination and the interventions were implemented too late. Some support the idea that the late involvement of the Italian government was intentional, because it did not want to further demoralize the Italian population which during that period was fighting in the World War One, in fact, in the parliament speeches is found only one request of social distancing in the late November of 1918<sup>42</sup>. Moreover, at end September and early October 1918 when the epidemics was near its peak, large gatherings continued for religious or political reasons<sup>43</sup>. This may explain the difference in mortality rate of Italy compared to the other European countries, because them implemented social distancing and quarantine measures quickly and moreover were effective policies.

Healthcare is another reason since most of the healthcare personnel (doctors and medical) had been employed to support the military, and hospitals existed only in large cities not smaller towns and rural areas. Even the information provided was problematic the news from the press was limited due to the initial censorship in place to ensure that the enemy did not receive news about the real proportion of the epidemic. The mortality rate was highest among the young (20 to 40-year olds) as the other country, but the peculiarity of the Italian case is for its excess mortality of young women. An explanation was provided by Pinnelli and Mancini (1998), their theory is based by the fact that the contagion depended on the frequency of contact and girls were more likely to be infected because of their higher exposure to the flu based on their care of the elderly and sick.

The variation of mortality was significant even across regions, the mortality rate exceeded the 1.5% in regions such as Campania and Apulia instead in others regions such as Veneto it was substantially less than 1% (see Figure n.2 and table n.3 in the *Appendix*). This variation reflects the difference between North and South in terms of resources, human capital and infrastructure within the country. Therefore, when analyzing

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<sup>42</sup> Francesco Rota, 21st of November 1918 - [https://storia.camera.it/regno/lavori/PDF/RI\\_LEG24/unica/17306.pdf](https://storia.camera.it/regno/lavori/PDF/RI_LEG24/unica/17306.pdf)).

<sup>43</sup> Tognotti E., 2015. La "spagnola" in Italia. Storia dell'influenza che fece temere la fine del mondo (1918-1919), FrancoAngeli.

and assessing the economic effects of the pandemic, it is important to take into account pre-existing gap and between the southern and northern Italy their initial conditions.



## 3.2 World War One and the Influenza

Some researchers believe that the Influenza pandemic was a direct consequence of the war, and the world conflict was an incubator of the virus<sup>44</sup>. The spread of the virus was heavily helped by the Great War, there is evidence that it played a central role in the proliferation of the virus (Crosby, 1989, Winter 2010, Tognotti 2015). Several historical sources report the presence of the Spanish flu in the military camps and trenches that confirm the role of the war and hence the soldiers in the spread of the influenza. The war front in Italy were within the national territory and it was impossible to avoid the gathering between civilians and soldiers. The virus touched its peak during the August of 1918 just before the end of the war between Italy and the Austrian-Hungarian empire<sup>45</sup>. The relocation of soldiers and their come back in the respectively hometowns<sup>46</sup> are the reasons of the contagion from military camps to cities or from soldiers to civilians (Tognotti 2015). The first episode in military camp has been reported in Parma during the August of 1918, the health inspector associated this outbreak with the soldiers on leave from the north of Italy (war front). During that week (August 19 – August 25) 77 people died because of the flu, 37 of whom were soldiers according to a local newspaper, but they may be conservative number<sup>47</sup>. In the Honor Roll of World War I Dead” (“Albo dei Caduti Italiani della Grande Guerra”) is reported that in August 1918, in Parma, 95 soldiers died because of a disease, 90 of them between August 16 and 31. This episode alert the military authorities to intervene in order to limit the propagation of the influenza, but the results were unsuccessful.

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<sup>44</sup> Oxford J.S., Lambkin R., Sefton A., Daniels R., Elliot A., Brown R., Gill D., 2005. “A hypothesis: the conjunction of soldiers, gas, pigs, ducks, geese and horses in northern France during the Great War provided the conditions for the emergence of the “Spanish” influenza pandemic of 1918-1919”. *Vaccine*. Volume 23, Issue 7, 940-945

<sup>45</sup> On 3 November 1918, signed by the commander of the Austro-Hungarian Army, the General Weber Von Webenau, and General Pietro Badoglio, Marshal General of the Kingdom of Italy, sanctioned the end of World War I for Italy.

<sup>46</sup> The soldiers could ask a permission to come back to their hometowns for several reasons such as illness or work (most of times to work in the agricultural sector when was needed), but under the command of General Cadorna the number of permissions was reduced consistently. When General Armando Diaz became Commander in Chief, at the end of 1917, the policy changed in order to increase the morale of troops after the Caporetto disaster.

<sup>47</sup> Galletta S. and Giommoni T., 2020. “The Effect of the 1918 Influenza Pandemic on Income Inequality: Evidence from Italy”, university of Bergamo and ETH Zurich, COVID Economics, CEPR press.

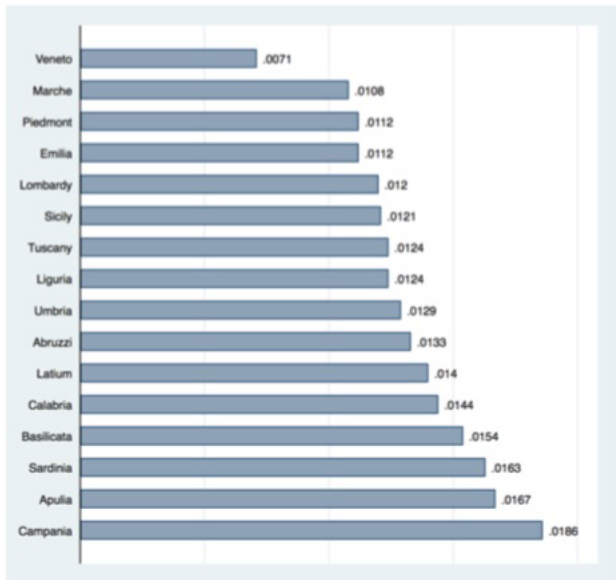


Figure n.2: mortality rate of Spanish flu across regions

The first intervention reported date back to the beginning of September of 1918, implemented by the minister of the war. The measure implemented consisted in strict medical controls of soldiers returning to the front after a period of leave (Cutolo 2020)<sup>48</sup>. After this intervention some military commands tried to stop or at least limit the number of soldier that decided to go on leave, but lack of coordination among the military units and the complaints raised by soldiers nipped in the bud all the national limitations on going on leave. The soldiers were able to leave and come back to their hometowns even for illness reasons, indeed the civilians were worried to contract the virus from soldiers (Capodarca 1991, Cutolo 2020). All this information is important to point out to a causal link between infected soldiers and civilians. Figure 3 shows the death's causes of Italian soldiers during the World War One, it is evident that during the peak of the Spanish flu (August-December 1918), the soldiers on leave due to illness died because of influenza and not for a simply disease. The total number of victims (black dashed-dotted line) shows a positive trend in the years between 1915-1918 and the peak was touched in 1918, with around 160,000 casualties, before a sharp decrease in 1919 and 1920. Is important to highlight that Italy entered in the World War One on May 24 1915 and the conflict ended on November 11 1918, but a small number of casualties (only 5%) is attributed to the years 1919 and 1920: these are soldiers died after the end of the war for war-related reasons, 88% of whom due to illness, showing that the death caused by the Spanish flu protracted even the subsequent years after the war. The number of victims due to illness (grey shaded line) shows a different pattern, it was low until 1917 thereafter it sharply increased in 1918 by almost 350% comparing to the previous year, with

<sup>48</sup> Cutolo, 2020. L'"influenza spagnola del 1918-1919. La dimensione globale, il quadro nazionale e un caso locale." I.S.R.Pt Editore.

around 113,000 victims, that coincide to the peak period of the influenza pandemic. In 1918 more than two-thirds of the war cause of death were due to illness and, as discussed before, this peak is mostly due to the diffusion of the Spanish Flu in the trenches. The last curve, the grey solid line, is really important because it shows the deaths due to illness in the soldiers' hometowns; we can see there is a significant increase between 1917 and 1918 with an increase of around 160% arriving to 8,500 in 1918.

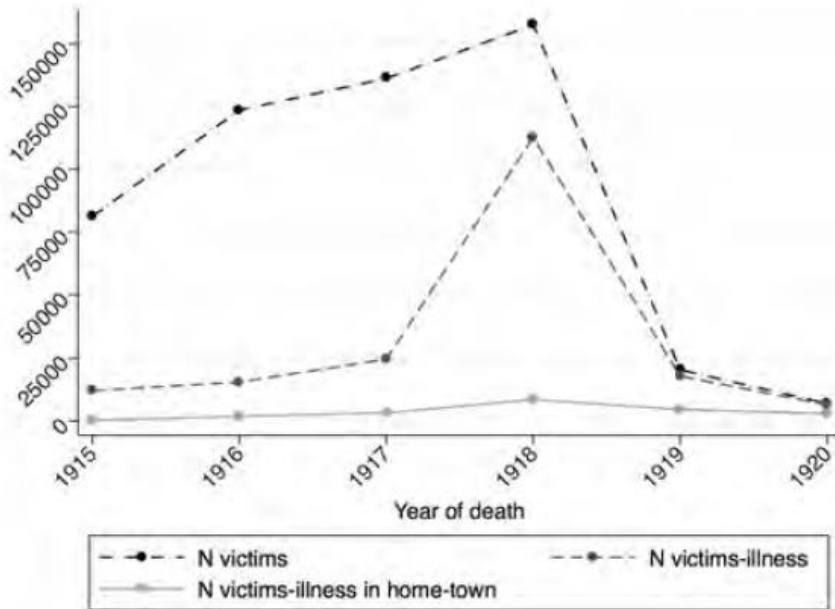


Figure n.3: Italian victims in World War One according to “Albo dei Caduti Italiani della Grande Guerra” (Galletta et al. 2020)

An interesting point to analyze is the relationship between the death caused by the Spanish flu and the deaths caused by the WWI. Figure n.4 shows the soldiers who passed away outside their hometown, it is useful to understand the relationship between the number of deaths due to influenza and the total number of military victims in the trenches or military camps. We can see that in this regression the sign of the relationship is negative, hence this shows that the regions with more victims are less affected by the pandemic. This correlation will be useful to understand the economic effects in Italy and the impact difference at the regional level.

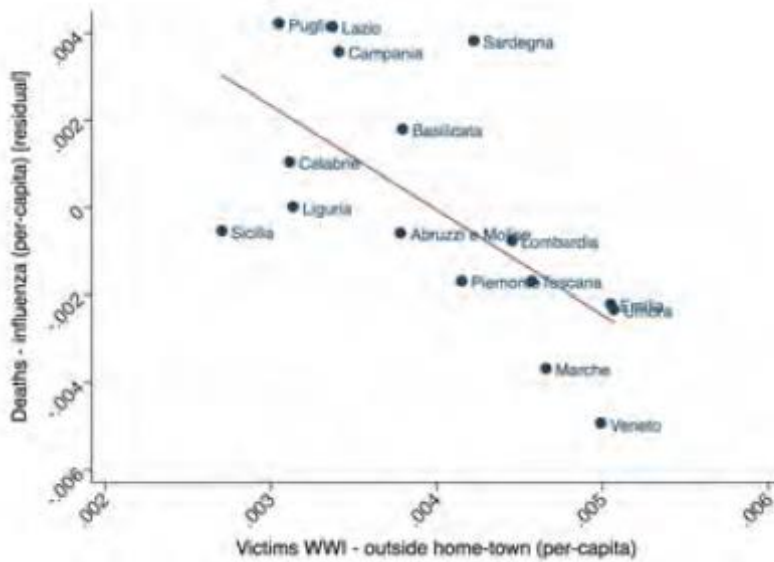


Figure n.4: Correlation between the number of military victims outside their hometown and the number of victims for influenza for Italian regions in 1918.

Therefore, it is evident that the Spanish flu had a harsh impact on Italy, the government intervention was almost useless because of wrong timing and lack of coordination among the Italian state and military bodies. The spread was heavily helped by the troops' movements and by the soldiers who came back due to illness that made easier the contagion from soldiers to civilians. The death rate varied among the Italian regions, and this could be significant on the analysis of the economic consequences caused by the Influenza pandemic.

## Chapter 4: The Spanish flu's economic effects

### 4.1 The economic consequences of pandemics

The economic study on pandemics is a field which in the recent years is becoming interesting, it starts from the “Black Death”<sup>49</sup> (Alfani and Ammanati 2017) that impressively found that this pandemic in state of Florence helped to decrease the wealth inequality; another study of Alfani et al. (2019) analyzed the effects of the 1629-30 epidemic found that cities more severely affected by the plague experienced a lower economic growth, suggesting that it had: “a fundamental role in triggering the process of relative decline of the Italian economies”<sup>50</sup>. As we have seen the pandemics lead to different effects, in one hand it has recessionary effects and in other hand may give rise to an economic growth in the following period after the pandemic. For the same country (USA) Brainerd and Siegler (2003) showed that the Spanish flu was positively correlated to subsequent economic growth and Correia et al. (2020) found that more exposed areas experienced a sharp and persistent decline in economic activity. They found that influenza epidemic led to an 18% reduction in state manufacturing output for states with a level of exposure around the mean. By using the variation in the degree and intensity of non- pharmaceutical interventions (quarantine and social distancing), found that cities that intervened earlier and more aggressively performed no worse, and if anything, grew faster after the epidemic<sup>51</sup>. Although in an interview of this year about the economic impact of the 1918 pandemic, John Cassidy argue that in the U.S. the economic impact was relatively mild: “The had a big negative impact on retail sales, but, according to the available statistics, the over-all economy didn't fall into a recession. There was eventually a slump, in 1920-21, but Eichengreen and other economic historians have typically attributed it to the Federal Reserve raising interest rates to head off inflation”<sup>52</sup>. Other interesting case that may help to understand the economic effects of the virus in Italy, is the case of north Europe, more specifically, Sweden and Denmark. They were two countries which were neutral during the WWI which reduces the risk to commingle the effects of the pandemic with the misleading deaths and other consequences of the war. Both countries had negative consequences on their economies because of the

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<sup>49</sup> The papers on the economic study on pandemics are sorted according to the chronology of events (i.e. from the “Black Death” to the Spanish flu).

<sup>50</sup> Alfani G. and Percoco M., 2019. “Plague and long-term development: the lasting effects of the 1629–30 epidemic on the Italian cities”, *The Economic History Review*, 72, 4, pp. 1175–1201.

<sup>51</sup> Correia S., Luck S. and Verner E., 2020. “Pandemics depress the economy, public health interventions do not: Evidence from the 1918 flu”, *Public Health Interventions*.

<sup>52</sup> Carrillo M. and Jappelli T., 2020. “Pandemics and Local Economic Growth: Evidence from the Great Influenza in Italy”, (CSEF (Center for Studies in Economics and Finance))

influenza, Karlsson et al (2014) showed that the Spanish flu had a negative impact on the capital income and increased the poverty rate (measured as the number of people living in poorhouses). Moller Dahl et al (2020) found that the more severely affected Danish municipalities experienced a decreased in income in the short run with a full recovery after a couple of years, indicating a V-shape recession caused by the pandemic. In the same report a V-shape was found even on unemployment rate which during the peak of virus was high but in 2-3 months declined. It is important to highlight that Denmark had one of the lowest mortality rates in the world equal to 0.3% against the world average of 2% (Barro et. al 2020), therefore will be hard to compare the Denmark case with the Italian one.

Overall, the Spanish flu was negative for all the countries hit by the virus, Barro et al. (2020) provided an assessment of the economic effect of the great influenza in a country and the result showed that with a mean level of death rate (2%) the real per capita GDP is estimated to decline by 6% with a greater magnitude in consumption and asset prices.

The long run consequences are found in the studies of Almond (2006) for U.S. and Percoco (2016) for Italy; the former found that the subsequent American generations (people born after the pandemic) received lower education, had lower income and had an higher rate of physical disabilities. The Italian birth cohorts experienced a reduction of schooling equal to 0.3-0.4 years comparing with the other cohorts<sup>53</sup>. This decrease in schooling is important to take into account because may lead to a direct effect on productivity and hence in the economy. The influenza pandemic impacted even on trust, Le Moglie et al. (2020) found that the Spanish flu caused long term consequences on individuals' social trust. In our economic system, most economic interactions involve reliance on trust (financial and non-financial transactions, labor relations, investment decisions etc.), as the economy Nobel prize Kenneth Arrow said: "Virtually every commercial transaction involves an element of trust, certainly any transaction conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence" suggesting that a decrease in trust lead to negative consequences on the economy.

The pandemic hit the Italian economy in the last year of WWI (1918), it was a period of considerable economic expansion, particularly for the firms involved in war production which was stimulated by large government expenditures. Malanima and Zamagni wrote that "public spending rose dramatically and was mostly financed with debt; particularly foreign debt"<sup>54</sup>. The most supported approach among the economist, is the empirical one in which the variations in flu mortality rates across countries, regions or cities are used

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<sup>53</sup> Percoco M., 2016. "Health shocks and human capital accumulation: the case of Spanish flu in Italian regions, *Regional studies*, 50(9), pp. 1496-1508

<sup>54</sup> Malanima P. and Zamagni V., 2010. "150 years of the Italian economy, 1861–20102", *Journal of Modern Italian Studies* Volume 15 pp. 1–20.

to measure the effect of the pandemic on various outcomes (GDP or GDP components, wages, poverty rates and human capital levels) in the years (or decades in some studies) after 1918. The years following the World War One were not so prosperous, the recession from 1919 to 1921 led to a large fall in per capita GDP in 1919 equal to -19% and a cumulative decline of approximately 30% over the three years. The Great War did not have a negative impact only on the economy, at the end of the first world conflict, the political stability was lost, and the country relations became violently conflicting.

It is important to reviewing the economic effect of the pandemic because the significant economic shocks that characterized the immediate post-war period induces even some concern on the areas more exposed to the pandemic which may simultaneously be more exposed to other adverse economic shocks, given their low levels of health and education that suggest a relationship between income inequality which may increase the magnitude of the negative economic effect of the Spanish flu (see Chapter 4.4) The lack of regional convergence in economic growth between Northern and Southern regions might plausibly explain the effect of the pandemic on regional growth trajectories. In evaluating the economic consequences of the Spanish flu, it is useful to distinguish between short-run effects, long-run effects because of the reduced productivity and human capital. In fact, Garrett (2008) concludes that most of the evidence indicates that the effects were in the short run, hitting differentially firms and households. According to Garrett (2009), the most significant effect of the pandemics was the decrease in manufacturing labor supply, and the increase in wage growth (due to the decrease in labor supply) in U.S. states and cities by 2 to 3 percentage points for a 10% change in per capita mortality. This difference in the economic effects between short and long run will be important in the analysis of the influenza's economic impact in Italy.

## 4.2 The Solow growth model

The Solow growth model is a macroeconomic model of the theory of economic growth, it is designed to show how saving, population growth and the technological progress affect the level of an economy's output and its growth overtime. This model explains how growth in capital stock, growth in labor force and technological development interact in the economy. It is important to consider the assumption of this model. The production function is assumed to have constant return to scale (considering a positive number  $z$  increasing both capital and labor multiplying by  $z$ , the output will increase by  $Y^*z$ ). The demand for goods in the Solow model comes from consumption and investment, and each year people save a fraction of their income and the rest they consume it; the fraction of income saved is devoted for the investments.

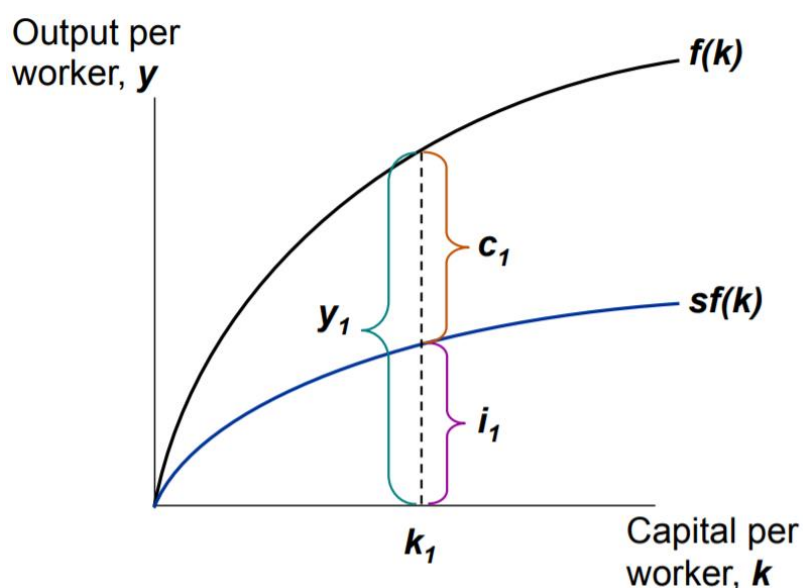


Figure n. 5:  $f(k)$  is the production function,  $sf(k)$  is the function representing the portion of output saved to invest,  $y$  is the output,  $c$  is consumption,  $i$  stands for investment and  $k$  is capital per worker.

In this model the capital stock is a key determinant of the economy's output, but it can change over time and these changes can lead to economic growth. There are two variables or forces which influence the capital stock: investment and depreciation. Investment ( $sf(k)$ ) must be considered as expenditure on new plant and equipment and if it increases the capital stock increase as well. Depreciation ( $\delta$ ) is the wearing out of old capital because of aging and use and causes the capital stock to fall. Therefore, the change in capital will be equal to  $\Delta k = sf(k) - \delta k$  (change in capital equal to investment in term of the portion of output saved minus the capital depreciated called the "law of capital accumulation"). The greater is the capital stock, the greater the amount of investment and output. There is only one capital stock for each country at which the amount of investment equals the amount of depreciation, in other words in a point at which the change in capital is equal to zero ( $\Delta k = 0$ ). If an economy is at this level of capital stock, it will not change because the two



forces that influence the capital just balance, that is when the level of capital is “steady” over time. Hence this level of capital is called “steady state level of capital” ( $k^*$ ).

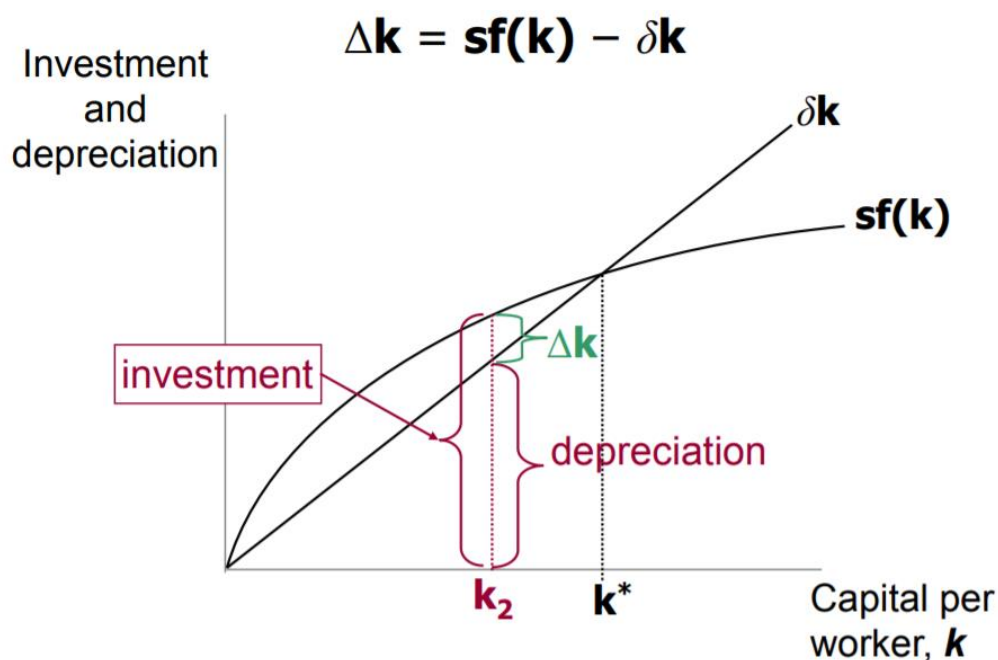


Figure n.6: Change in capital stock in the Solow growth model. The economy moves toward the steady state level of capital only if the level of investment is greater than the depreciation rate.

So far, we have explained the general features of the Solow model, but now it is important to clarify the growth implication of this model. Given that output per-capita is constant along the steady state level of capital, its growth rate will be zero, paradoxically, in this growth model there is no growth in per capita output in the long run, but this does not imply that capital accumulation has no effect on growth. For instance, a change in the saving rate shifts the steady state depending on the sign of the change of the saving rate. Supposing that in a country the saving rate increases, there will be more investments on capital shifting up the curve  $sf(k)$  moving the steady state to the right (increasing it) which leads to a higher level of output, there is a temporary positive effect on its growth rate when the economy moves from the old equilibrium to the new equilibrium (see Figure n. 7 and Figure n.8). It is important to have in mind that by a decrease in the saving rate happens the opposite.

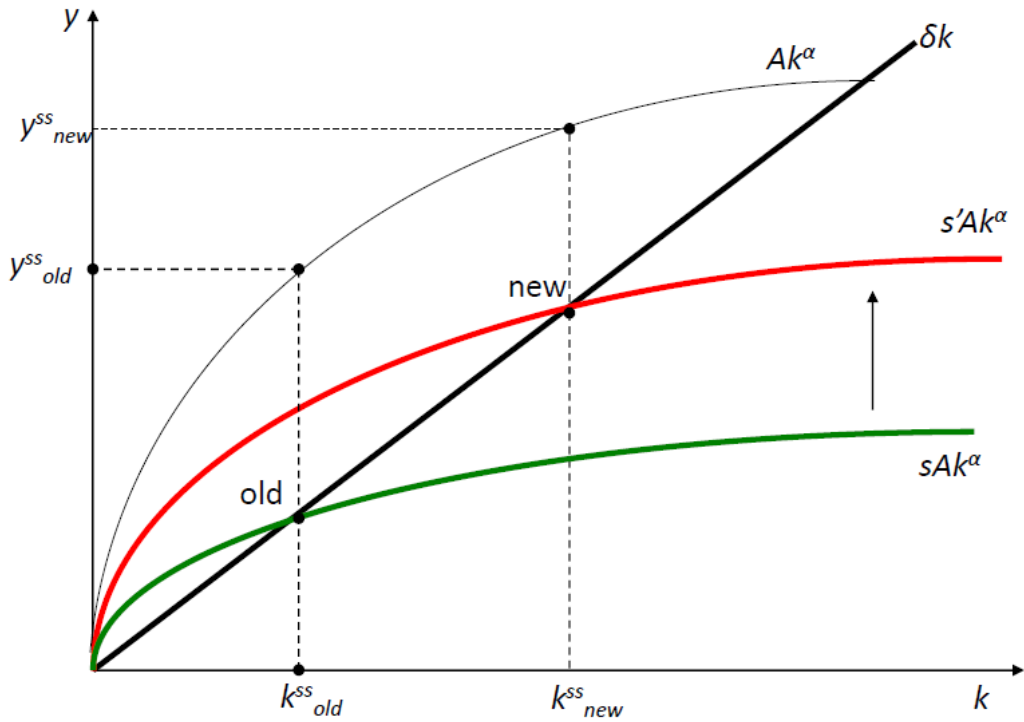


Figure n.7: an increase in saving rate increase the level of capital due to more investment (shift the curve from the green to the red one), this lead to an higher steady state level of capital and an higher level of output.

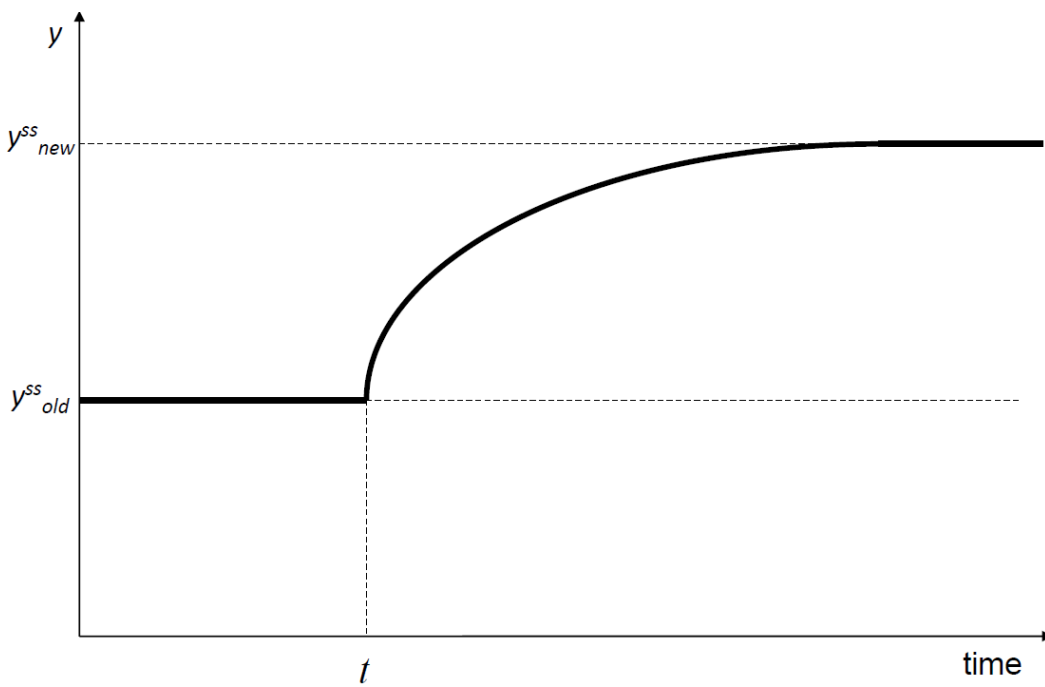


Figure n.8: this graph represents the transitional growth of output showing that by an increase in saving rate lead to a temporary growth of output (from old y to new y).

This model is useful because it can analyze the impact in an economy due to a change in the population growth which for this study is needed because the main explanation of the negative economic effects on the

Italian economy is caused by the Spanish flu's deaths that led to a decrease in population growth. To do it, population growth must be introduced in the model ( $n$ ) that changes depending on the ratio between new level of labor force divided by old labor force ( $L_t/L_{t-1}$ ). The law of capital accumulation ( $\Delta k = sf(k) - \delta k$ ) change because the population growth is negative for capital, a positive  $n$  means that there are more workers for the same quantity of capital hence to have the same level of capital per worker ( $k$ ) the saving rate must increase until the steady state is reached, so the law of capital accumulation become:  $\Delta k = sf(k) - (\delta+n)k$  (see that the population growth is summed with the depreciation because the two variable have the same effect on capital). For instance, a increase in population growth (see Figure n.9) decrease the per-worker capital stock more quickly and so lowers the steady-state level of output per worker, suggesting that a country in which population is growing rapidly (high  $n$ ) could maintain a constant level of capital per worker only by investing a large fraction of its output in building new capital, in other word by increasing the saving rate ( $s$ ). As the increase in the saving rate the population growth may decrease (as happened during the outbreak of the Spanish flu).

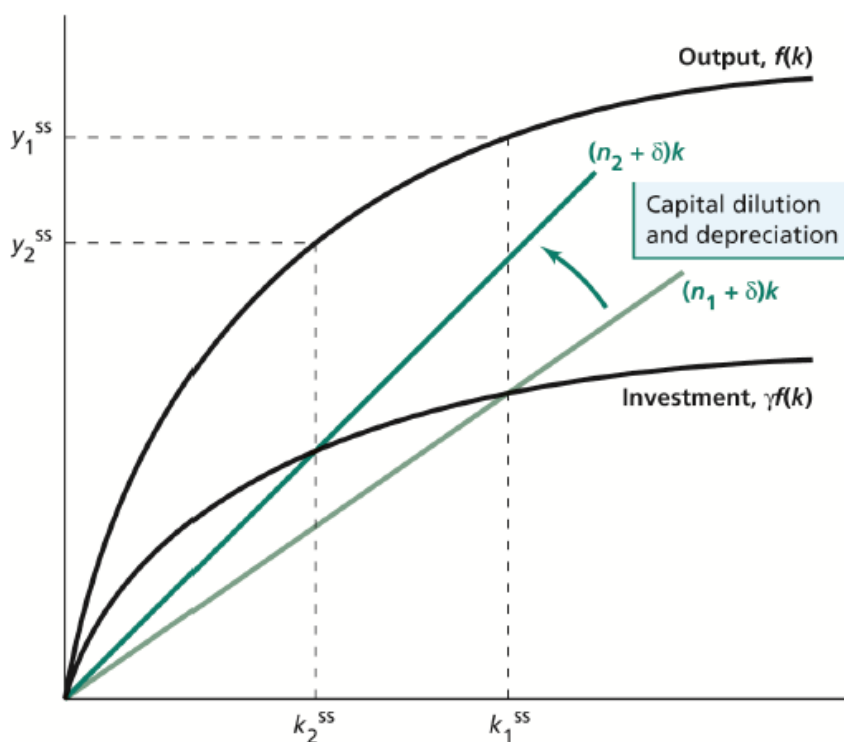


Figure n.9: the graph shows the effect of an increase in population growth causing a capital dilution (decrease) moving backward the steady state level of capital hence decreasing even the level of output per worker.

In the next chapter we will analyze how saving rate and population growth are related with the Spanish flu and the economic effects that they led in the years during and after the outbreak of the virus.

### 4.3 The Spanish flu macroeconomic shocks

In the Chapter 4.2 we have showed that the Solow growth model is useful to analyze the impact of the pandemic in Italy because the influenza caused the destruction of the labor force or in economic terms, a labor supply shock. This model is considered a reliable tool to gauge the economic effects of the Spanish flu on the Italian economy because of the disequilibrium of the level of capital per capita, caused by the effect of the pandemic on human capital due to the copious amount of death. As we saw in the first chapter the Spanish flu was particularly lethal for the group age of the people between 20 and 40 years old, therefore after the pandemic the labor force lived a sharp fall, and the ratio of capital and land to labor increases. In the Solow growth model, the scarcity of labor causes an increase in the wage rate and a reduction in the returns to capital and land, that induce to investment and capital accumulation to decrease. Hence the demand for investment decrease and the economy enters in a recession with negative income per capita growth. The recessionary effect might have a greater magnitude if the pandemic also affects the saving rate triggered by an income effect due to the income loss from the consumers exposed to the pandemic. Moreover, as we have seen during the COVID-19 the non-pharmaceutical intervention and social measures made to reduce the spread of the disease cause loss of confidence and increased uncertainty seriously disrupt economic activity, reducing output and income in the short run. The recession could have long run consequences because human capital (labor supply)

decrease sharply during and after the virus, hence reducing labor productivity especially in higher human capital-intensive sectors such as manufacturing that as we have seen in the chapter about the “Giolittian age”, this sector was a cornerstone of the Italian economy relaunch. Then in the long run, the capital-labor ratio recovers, wages to come back to equilibrium fall, and the economy converges to the initial steady state. For human capital we have to consider it even in terms of health and education, because the reduction in saving may decrease the investment on health and especially on education. Therefore, another economic effect which we have to take into account is the fall in investment on education in a country that needed to converge in this “sector”.

In the Chapter 4.2 we have explained the features of the Solow model in order to use for the analysis of the macroeconomic shocks experienced by the Italian economy. The two effects that will be analyzed are: 1) the decrease in population growth caused by the labor supply shock because of the high influenza mortality of the group age 20-40 years (see Chapter 1.2); 2) for the second effect will be analyzed either an increase and a decrease in saving rate because in one side the fear of an economic loss induce people to save more, but in the other side the people may save less due to the income loss caused by the economic recession.

We have seen which are the effects after a change in the population growth and saving rate individually, but now they will be analyzed together. The first case is the effect of a decrease in population growth and an increase in saving rate, we can see in Figure n.10 the result of these effects. The decrease in population

growth (increase in mortality due to the Spanish flu) lead to an increase in capital per worker because there are less workers for the same amount of capital. The other effect is due to change in behavior by the consumers, the pandemic creates a climate of economic fear leading to an increase in the saving rate (the consumer feel more secure because the savings can help to avoid possible economic problems), this lead to an increase in investments i.e. an increase in the capital per worker. These two effects combined increase the steady state level of capital achieving a gretaer income per worker.

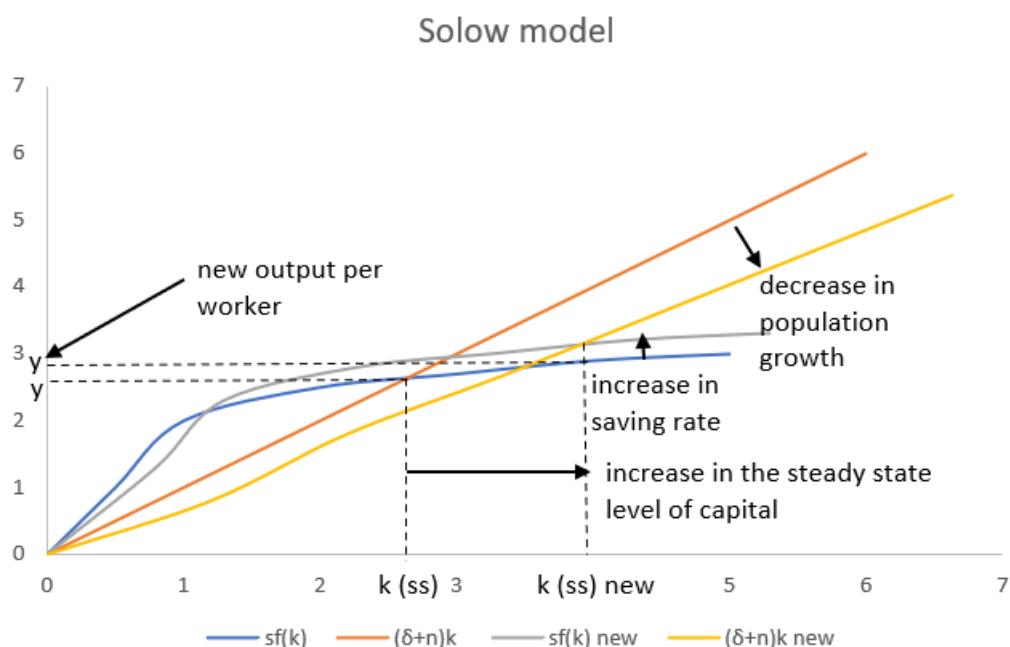


Figure n.10: effect of an increase in saving rate and a decrease in population growth in the Solow model

The other case study the effect of a decrease in both population growth and saving rate. The assumption behind the decrease in saving rate is the income lost by the Italian population because of the economic recession experienced by the country during and after the outbreak of the Spanish flu. This change has the opposite effect of a decrease in population growth because if people save less there are less investment to replicate the capital stock and hence this decreases the amount of capital per worker in the economy. In the Figure n.11 there is the graph representing in theory what is the final result of these two changes, in this case we assume that the decrease in population growth is not enough to avoid the decrease in steady state level of capital due to the decrease in the saving rate leading the economy to produce a lower level of output per worker.

### Solow model

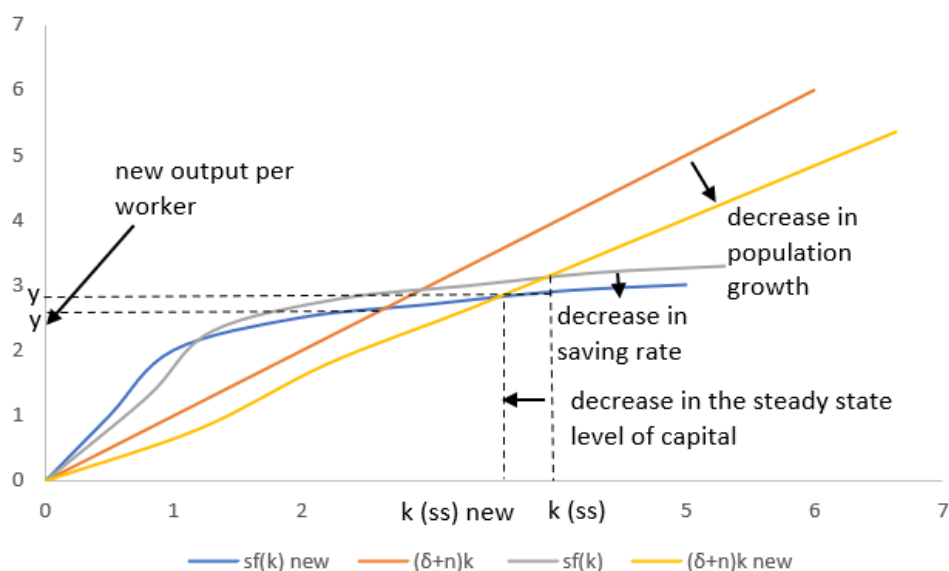


Figure n.11: effect of a decrease in saving rate and a decrease in population growth in the Solow model

The two results found in the Solow model are different in one hand we have an increase in steady state level of capital and income per worker which can be considered a positive adverse effect of the pandemic. In other hand we have a decrease in steady state level of capital and hence a decrease in output per worker that is a negative economic effect. The question is which is the result to take into account for the Spanish flu in Italy. The first result is based on the assumption that people saved more during the pandemic outbreak to avoid possible economic problems, but we have not evidence that people was aware of the gravity of the problem and may be they continue to save the same quantity as before, the other point is that Italy was relatively poor and this can suggest that people could not save. Another aspect to take into account is the decrease in population growth which in the Solow model lead to an increase in capital per worker, but as shown in this thesis the Influenza mortality was rather high, this may indicate that the decrease in the labor force was too high leading to a point in which the economy has too much capital for too workers. Therefore, in this case the Italian economy is inefficient and the income per worker decrease (the production decreases due to the shock in labor supply). For these reasons the second result (see Figure n.10) may be the one to consider in the analysis of the economic effects of the Influenza pandemic in Italy; the decrease in population growth and saving rate led to a temporary recession and then the economy recovered but it achieved a lower steady state level of capital and output per worker, this evidence can be found in the leads-lags analysis of Carillo et al. (2020) depicted in the Figure n.13.

The adverse effects of the Spanish flu affected even the economic growth of the country, the impact of the pandemic on GDP growth from the Spanish flu is overall negative, the evidence is showed by the regression analysis of Carillo et al. (2020). The Figure n.12 shows that in the subsequent years after the pandemic, the

GDP growth rate was lower in the most affected regions. In the period between 1919 and 1924 the GDP per capita growth rate was negative explaining the recession in the post-war period. The regions that exhibit a mortality rate above the average such as Campania and Latium had lower than average growth, for instance by while regions with a limited flu mortality such as Veneto and Emilia exhibit milder recessions.

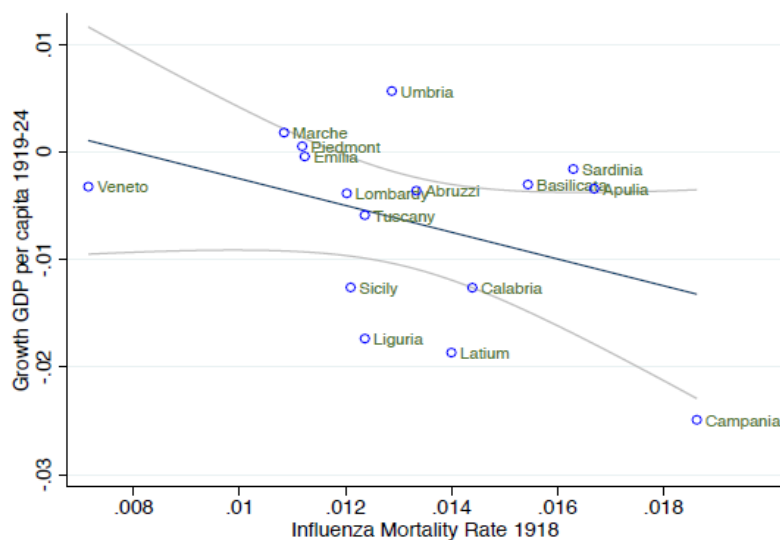


Figure n.12: Influenza mortality rate in 1918 and subsequent GDP growth in 1919-1924

To infer whether the Spanish flu caused a negative short-term or long-term economic impact on the GDP growth may be useful to analyze the economic growth of Italy before and after the outbreak of the virus. Figure n.13 depict the estimated coefficients from a regression of growth in real GDP per capita in Italy on influenza mortality in 1918 with ten years of lags and ten years of leads. We can see that until the 5<sup>th</sup> year of lead (until 1913) the GDP growth curve is flat; but starting from the 1918 (the year of the Spanish flu peak) the Italian economic growth experienced a sharp fall leading to a very negative rate (see the 1<sup>st</sup> year of lag 1919). This regression is important because not only shows the negative relationship between flu mortality and economic growth but even suggest that the impact of the pandemic is limited in the short run because after four years from the outbreak in 1922 (4<sup>th</sup> year of lag) the negative effect seems to vanish, even if the GDP growth did not make a jump (V shape recession) which means that the GDP did not come back at their previous levels.

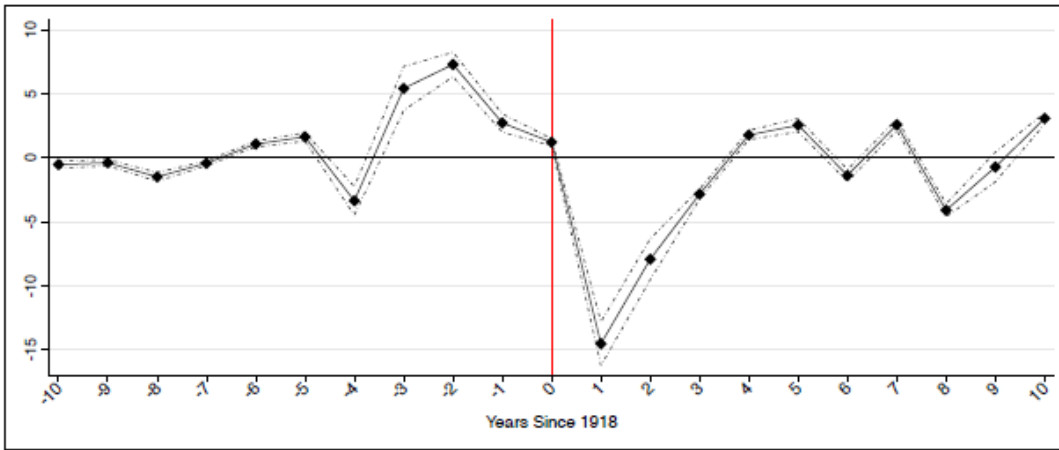


Figure n.13: *Influenza ad Economic Growth (Leads-Lags Analysis)* The figure shows that the estimated link between influenza mortality and economic growth dissipated within four years from the event.

Therefore, to analyze more deeply the economic effect of the pandemic we must explore the short-term impact of the Spanish flu i.e. during the period from 1919 to 1924. In table n.4 are analyzed more specifically the correlation between the influenza mortality and the GDP growth, the dependent variable is the GDP growth and the variable of interest is the influenza mortality lagged from one to four years. In the column 1, the GDP growth is regressed on influenza mortality; the coefficient is -12.9 and it is statistically different from zero at the 1 percent level, which shows that an increase in the influenza mortality equal to the average of 1918 (0.132) is associated with an average reduction of 13% growth in real GDP per capita, which is almost half of the overall GDP decline in 1919-22<sup>55</sup>. This result is useful to infer about the different economic effects across the Italian regions, because as we have seen in the previous chapters the Spanish flu's death rate was higher in the Southern regions such as Campania, Apulia and Sardinia of about 1.5% comparing to the Northern regions such as Piedmont and Veneto of about 1% which is associated with a reduction in GDP growth of 6.5. These findings are similar to the results of Barro et al. (2020) which a found in a cross-country setting, a reduction equal to 6%. In column 3 is taken into account the pre-existing differences in the level of economic activity, Carrillo et al. (2020) control for real per capita GDP in 1919, which is the initial year of the sample employed; this additional control has almost no effect on our coefficient of interest, which remains almost unchanged in magnitude and statistical significance. Another interesting result is that the coefficients of the lagged influenza variables are negative and statistically significant up to the third lag, suggesting that the negative economic effect of the pandemic on economic growth lasted “only” for three years. This finding implies that the adverse effect of the Italian pandemic on

<sup>55</sup> Carrillo M. and Jappelli T., 2020. “Pandemics and Local Economic Growth: Evidence from the Great Influenza in Italy”, CSEF (Center for the Studies on Economics and Finance), Working paper No. 568.



regional economic growth is transitory, which is consistent with the findings for the Spanish flu's economic effects in 1918 across Danish municipalities (Moller Dahl et al., 2020).

After the analysis of the short-run effects is important to focus the study even on the long-run effects of the pandemic. Before this analysis is important to remind that after the World War One, Italy had an economy industrial underdeveloped (see Chapter n.2), in fact in the data found by Carillo et al. (2020)<sup>56</sup> more than half of the labor force was employed in agriculture, it was still one of the most important sectors for the Italian economy and in fact during the first globalization the government protected this sector with a protectionist policy (see Chapter 2.3). Recent studies have shown that over the 1920s and 1930s human capital accumulation and industrialization were important to understand long-run development patterns across areas of the country (Carillo, 2018). Therefore, is possible that the Spanish flu affected the transition of the labor force towards the manufacturing sector, in turn influencing long-term economic development. The long-run adverse effects of the influenza pandemic are depicted in the Table n.5, the data used for this regression is a regional data set with indicators of human capital (health and education) and manufacturing employment<sup>57</sup>. In column 1 the regression explores the relationship between the manufacturing labor force and the influenza pandemic by employing as an outcome the share of the labor force employed in manufacturing and controlling for its level in 1911 and for a linear trend. The estimated coefficient is statistically indistinguishable from zero, consistent with the hypothesis of the potentially limited long-run effects of the pandemic. In columns 2 and 3 two indexes of human capital and living standards, the Human Development Index (HDI) and its improved version (IHDI) as outcomes. These indexes are based on three indicators of living standards: education, life expectancy, and income per capita. This analysis is made to find evidence of the relationship between the influenza epidemic and these indexes; the regression suggest evidence of a significant relationship, pointing to the potentially limited persistent effect of the pandemic on human capital and living standards across regions. In this study is explored whether mortality associated with the pandemic has persistently reduced population in the areas more exposed, potentially preventing population from returning to its initial trajectory. In the column 4, we relate influenza mortality to the log of population. The estimated coefficient is negative but not statistically different from zero, hence this does not support the hypothesis of a persistent effect of the influenza on the regional composition of the population.

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<sup>56</sup> This data is referred to the share of labor force employed in manufacturing from Daniele and Malanima (2014).

<sup>57</sup> These data are found in the papers of Daniele and Malanima (2014) and Felice (2007).

## 4.4 The Influenza pandemic on income inequality

Until now we have analyzed the economic effects in terms of GDP, productivity, labor supply and economic growth. The last chapter of this section will regard the economic impact of the Spanish flu on income distribution with the objective to show that the pandemic increase income inequality proved by an increase in the Gini coefficient. To show this economic effect is important to explain what Gini coefficient is and how is measured. This coefficient is a measure of the income distribution of across a population developed by the Italian statistician Corrado Gini in 1912, the coefficient ranges from 0 (or 0%) to 1 (or 100%), with 0 representing perfect equality and 1 representing perfect inequality. It is measured and graphically represented through the Lorenz curve which shows income distribution by plotting the population percentile by income on the horizontal axis and cumulative income on the vertical axis. The Gini coefficient is gauged by calculating the area below the line of perfect equality (by definition is 0.5) minus the area below the Lorenz curve, and then this is divided by the area below the line of perfect equality (see Figure n.14).

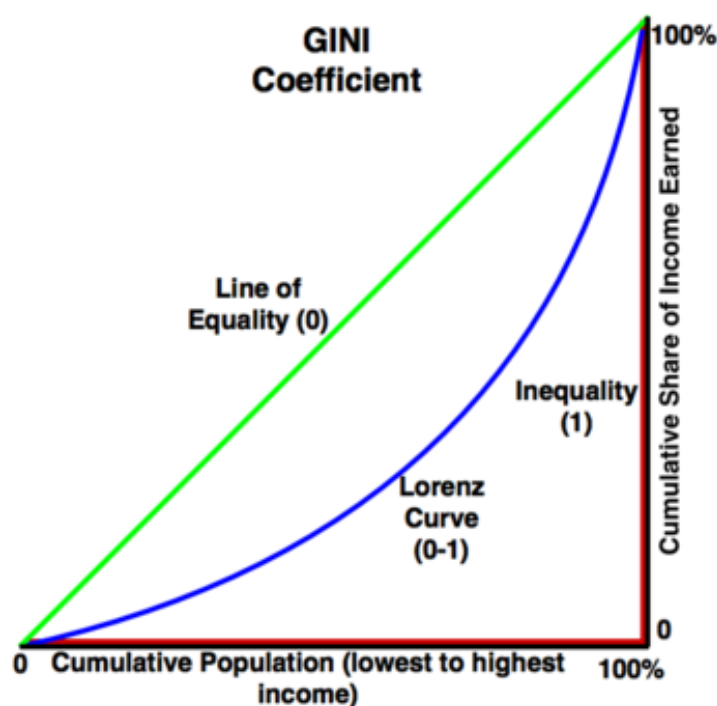


Figure n.14: Gini coefficient and Lorenz curve. The green line represents the perfect income distribution (perfect equality), the blue line is the Lorenz curve and the red line is the curve that stand for the perfect inequality (in terms of income distribution).

To support the idea in which the income inequality hardly affect the mortality rate and the exposure on the virus, we took the regression analysis provided by Carillo et al. (2020), it shows that in the regions which before the war had lower level of incomes and a lower share of employment in manufacturing, the flu mortality was higher (see Table 2). Another regional difference is due to World War One death rate, the

Spanish flu was more lethal in the regions that more suffered by the war (with an higher war death rate). For instance, Veneto which was the region with the lower level of influenza mortality rate was the region with the highest WWI death rates (see Figure n.2, Figure n.4 and Figure n.15)<sup>58</sup>. In Table n.6 (see in the Appendix) we can see that the flu mortality is negatively correlated with labor force indicators (health and education)

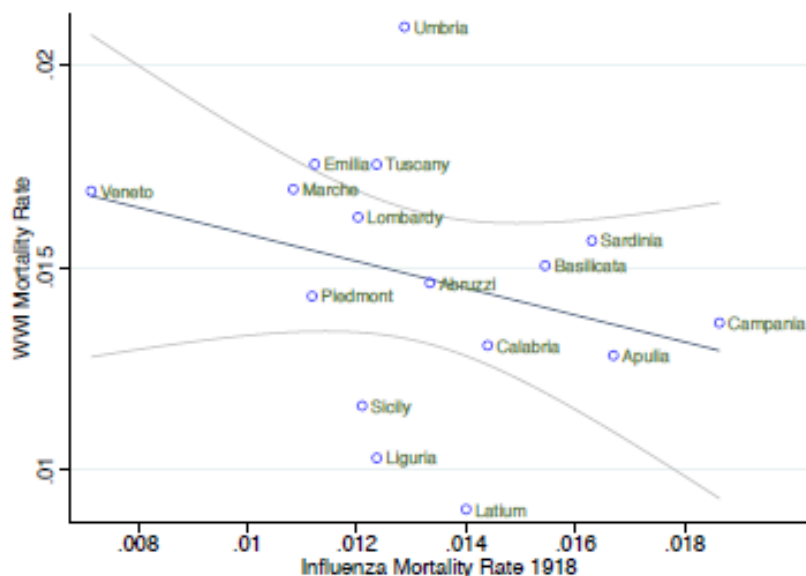


Figure n.15 Influenza mortality rate and WWI mortality rate

The evidence of the increase in income inequality in Italy because of the Spanish flu is showed by a regression analysis made by Galletta et al. (2020). The main dependent variable in this analysis is naturally the income inequality at the municipality level in order to understand the different effect among the Italian region in terms of income distribution. The data used to measure the income held by the population is the income declaration reports published by the Italian Ministry of Finance in 1924 for the main tax on income, it includes individual income data of taxpayers with income from commercial, industrial, or other professional activities. These data were issued by the Italian tax authority after the promulgation of a law in 1922 (Decreto Reale 16 dicembre 1922 n.1631) and contain information about taxable income. These income data used in the regression includes almost 2,000 municipalities across Italy. The Gini index measured using these data was equal to 0.45 (quite high), the fraction of income held by the top 20% taxpayers had a mean of 0.53 and the bottom 20% taxpayers with a mean equal to 0.05, and by analyzing the Figure n.16 we can see that the income distribution of the top 20% has a normal distribution (bell

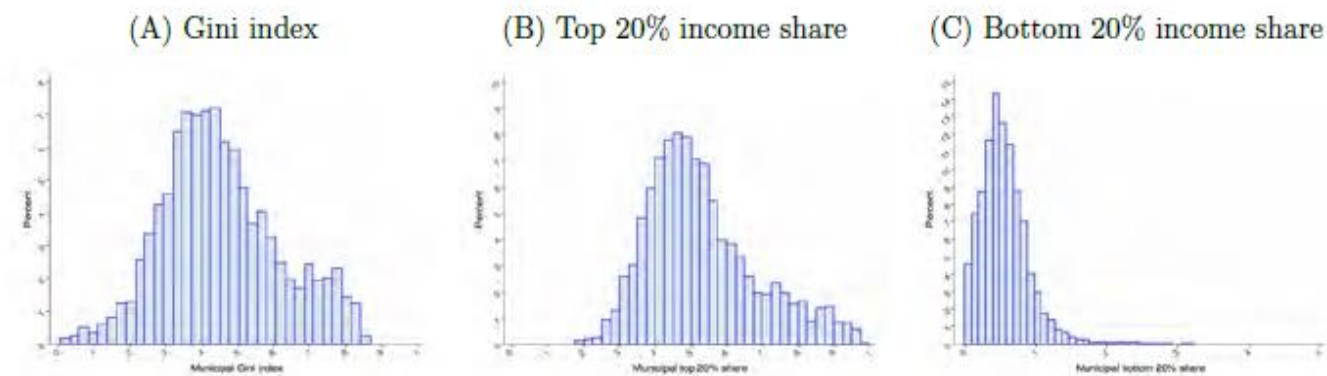
<sup>58</sup> Carrillo M. and Jappelli T., 2020. “Pandemics and Local Economic Growth: Evidence from the Great Influenza in Italy”, CSEF (Center for the Studies on Economics and Finance), Working paper No. 568.

shaped) instead the bottom 20% has a long right tail (skewed to the right). We can find an explanation by the North-South difference due to the industrial development in the North, but the income inequality was found even in the same province different municipalities showed large variation on income.

There are several additional variables; the data about the death casualties are found from the document: “Cause di morte: 1887-1955” for the period from 1915 to 1919 at the regional level from the publication issued by the national statistical office (ISTAT). Another variable concerning the deaths, is the monthly excess mortality, this data is gathered national-level for the period 1915-1920 from Mortara (1925), this variable represents the ratio between the number of deaths in each month and the average number of deaths in the same month for the triennium 1911-1913. Another important variable regard the soldiers died during the war, because it is important to avoid the problem to be confused with the economic consequences due to the World War One, the document used is the “Albo dei Caduti Italiani della Grande Guerra”, a publication that according to the General Fulvio Zugaro, head of the Royal Army’s Statistics Office and chief scientific advisor of the operation contains the information on soldiers who: “a) died in combat or due to war injuries, b) went missing due to war related causes, c) died or went missing in captivity (except deserters), d) died to illness related to war service, e) died of an accidental cause related to war service, and f) died for suicide whose cause was related to war service”<sup>59</sup> (Zugaro, 1926). This dataset contains one of the most important information in this analysis, which is how the soldiers died, that in our case are the soldiers who died for illness (Spanish flu). The main explanatory variable of this study will be the number of soldiers who come back due to illness to their hometown and died there during the peak of the pandemic (August–December 1918) which represents the local severity of influenza. Then, other data are added regarding municipal characteristics: a) municipal population size using the decennial census; b) the administrative importance of the municipality (whether the municipality is a capital of province); c) the geographic features (whether the city is in a plain region, hill region or mountain region and whether it is on the coast or not); d) municipality population density equal to the ratio between city population (in 1911) and city area; e) the municipal budget containing the information about total expenditure, total surplus, and several categories of spending such as police and sanitation/hygiene services, justice and security, and education. These municipalities characteristics are useful to help to understand the potential differences among municipalities characterized by different inflows of ill soldiers which is the explanatory variable of this study.

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<sup>59</sup> Galletta S. and Giommoni T., 2020. “The Effect of the 1918 Influenza Pandemic on Income Inequality: Evidence from Italy”, university of Bergamo and ETH Zurich, COVID Economics, CEPR press.



*Figure n.16: Graph A represent the Gini index of Italian municipalities, Graph B depict the income distribution of the top 20% taxpayers, Graph C represent the income distribution of the bottom 20% taxpayers.*

The analysis is depicted in the Table n.7 (see in the Appendix) and the result are remarkably interesting. The panel A analyze the impact of the Spanish flu on the Gini index (calculated using the tax declaration of 1924), the results indicate that the municipalities hit more severely by the epidemics had higher levels of income inequality five years later, as measured by the Gini index. In column 1 (A) the Gini coefficient is calculated without adding any variable, from column 2 to column 4 the variables are added. These columns show that by an increase by one standard deviation of the explanatory variable (soldiers came back to their hometowns) the Gini index increases by between 2% and 2.7%. This demonstrate that the influenza pandemic increased income inequality in Italy. In Panel B and C is analyzed which part of the income distribution is more affected by the influenza pandemic in order to understand the magnitude of the effect on income inequality between rich (top 20%) and poor (bottom 20%). The estimates show that in the cities in which the epidemic was more severe, (1) the fraction of resources held by the top 20% is higher, though the effect is not statistically significant, and (2) the share of resources detained by the bottom 20% significantly decreases. The latter effect is large, with an increase in one standard deviation in the treatment reduces the income share of the bottom 20% by 0.2%. These findings show that the increase in income inequality in the Italian municipalities is mostly driven by a significant impoverishment of the poor groups and a weak increase in the income of the rich. We have seen that the Spanish flu did not lead only to a negative effect on GDP and labor supply, but even on income distribution generating a decrease on income owned by the poor group of Italian population.

## Conclusion

The Spanish flu was a virus with an impressive mortality among the young people and Italy was one of the most hit countries in the world.

The limited interventions to limit the spread of the pandemic and with the poor health infrastructures that characterized many parts of the country after WWI, make the Italian case of the Great Influenza an important study on the economic consequences of pandemics in societies in which lockdown policies cannot be implemented, or where the health care system is unable to protect citizens.

We have seen by studying the economic history of this country that Italy before the outbreak of the Spanish flu was a country economically fragmented due to the government policy that highly favored the industrial development in the North. In fact, on average the South population was poorer respect to the North one; this made harder for the poor to respect the non-pharmaceutical intervention such as social distancing and therefore facilitated the contagion. The regions with higher WWI mortality experienced a lower influenza mortality (e.g. Veneto). The regions in the South had more deaths caused by the Spanish flu that as shown by the regression analysis led to more negative economic effects due to the negative correlation between influenza mortality and GDP growth.

The error to not include the war as a source of the negative economic consequences after 1918 is avoided because it was found evidence of adverse economic effect caused by the Great Influenza even in countries that were neutral during the World War One such as Sweden and Denmark (Moller Dahl et al. 2020, Karlsson et al. 2014). The war is considered a factor that increased the mortality rate in that period, but there is evidence that in 1918 (the year of the Influenza pandemic's peak) the mortality rate increased dramatically (see Figure n.3).

In the analysis of the economic consequences caused by the Spanish flu was found evidence that in terms of the GDP growth the impact was negative leading to a sharp fall after one year from the outbreak but the recessionary effect was limited in the short run because it lasted four years then the Italian economy started to recovery. For the long run effects the analysis did not lead to impressive results, the regional population composition did not change although the influenza mortality varied across regions, but the Influenza is responsible for a long run effect on human capital and living standards across regions due to the impact of the pandemic on health and education (Percoco 2016).

There is evidence that the pandemic led to income distribution changes causing an increase in income inequality in the country, this effect was mostly driven by a reduction of the resources of the poor strata of the population.

However, these numbers likely represent the worst-case scenario today, particularly because public-health care, screening and quarantine procedures are more advanced than they were in 1918-1920. But in the other hand other factors, such as greater international travel, which is now being substantially curtailed, and it

works in the opposite direction. The finding of this thesis can be used to try to foster the economic effect in the next years, but we must have in mind that the economy in the 1918 was different. In the next years we may experience a V-shape recession as in 1918 with the Spanish flu (see figure n.12) or a U-shape recession i.e. with a longer time to see the economy recovered. The economic loss is caused by the lockdown measures adopted by the country (even Italy) that showed the tradeoff between the decision to force the temporary closure of some firms or let the virus spread without control. The question remains if the economic effects will be limited in the short-term or they will be lasting effects. With the evidence of this study we may infer that the economy can recover quickly (2-3 years) as with the Spanish flu or even faster due to the fact the part of the production of the economies continued thanks to the remote working (smartworking). With the Solow model we have seen that the steady state level of capital may increase or decreasing depending on the change in saving rate; for the case of Spanish flu we have assumed that the income loss led to a decrease of the savings simply because people could not save (see Figure n. 11). For the case of SARS-CoV-2 this income loss may be avoided by the help of the government subsidies and smartworking, therefore assuming that the saving rate increase the steady state level of capital should increase (see Figure n.10), but this increase can be stimulated only by an increase in the investment. This increase in investment represents the key for a faster recovery leading the economy to experience a recession only in the short run (V-shape recession).

Nowadays most of the jobs can be done even from a house with the smartworking thanks to the new digital technologies, but this argument can only be applied to the high-skilled workers. Low-skilled jobs such as: grocery store clerks, nannies mostly cannot be done remotely, and most of them could be dismissed due to the non-pharmaceutical interventions adopted by most of the countries in the world. This actual pandemic hit more severely the low-skilled jobs, recent studies shows that more jobs were lost in the US in March (2020) than over the entire Great Recession of 2008-09<sup>60</sup>, with workers with less than college education taking the largest hit. The global job loss is estimated to be over 200 million, with 40% of the global workforce employed in sectors that face high risk of displacement and with limited access to health services and social protection which can be considered as the sectors of the low-skilled workers (International Labor Organization 2020). These workers may struggle even after the economy start to recover. The income inequality may increase the magnitude of the economic impact of a pandemic and could have a correlation with the other pandemics (Alfani et al. 2017, Alfani et al 2019, Galletta et al. 2020).

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<sup>60</sup> Coibion, O, Y Gorodnichenko and M Weber, 2020. "Labour markets during the Covid-19 crisis: A preliminary view, NBER Working Paper No. 27017.

An ancient Roman philosopher Marco Tullio Cicerone described the history as: “*Historia vero testis temporum, lux veritatis, vita memoriae, magistra vitae, nuntia vetustatis*” which means that the history is true witness of the times, light of truth, life of memory, teacher of life, messenger of antiquity; for this reasons is important to study and understand the history of this virus and the economic effects generated by it to create an economy that withstand future pandemics. It is evident that the pandemics are cyclical, therefore it is certain that in the future the human being will face other pandemics, the problem is that our economic system is not ready to bear the issues that a virus creates. In this year, the world was hit by another virus, similar to the Spanish flu, and our economy was found unprepared to face this kind of episodes. The study of the Influenza pandemic in Italy was made in order to try to analyse more deeply the economic effects caused by a pandemic to understand what will happen in the next years after the outbreak of the SARS-CoV-2. We have to understand and learn from this historic episode, because it is evident that in 100 years (the Spanish flu in 1918 and the COVID-19 in 2020) any health infrastructure, the economy and in general our society did not prepare enough to prevent the negative consequence that the pandemics lead. The world is extremely connected and globalized and a problem like a pandemic certainly will recur, hence this should induce the policy makers to build an economy ready to face the next pandemics that will come.



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## Appendix

Table n.1 import tariffs on manufactured goods between 1875-1914 (O'Rourke et al. 2013). In the first four columns (starting from the left) the tariffs are expressed in percentage terms, the last two columns contain the rank of the import tariffs from the lowest to the highest one.

Paese	1875 (percentuale)	1913 (1) (percentuale)	1913 (2) (percentuale)	1914 (percentuale)	1913 (3) (posizione)	1913 (4) (posizione)
Belgio	9-10	9	9	10	11	11
Danimarca	15-20	14	n.d.	18	16	14
Francia	12-15	20	21	22	12	12
Germania	4-6	13	13	17	6	3
Italia	8-10	18	20	18	15	17
Norvegia	2-4	n.d.	n.d.	12	8	8
Paesi Bassi	3-5	4	n.d.	3	1	1
Portogallo	20-25	n.d.	n.d.	n.d.	14	13
Regno Unito	0	0	0	n.d.	4	5
Spagna	15-20	41	34	42	18	18
Svezia	3-5	20	25	23	5	6
Svizzera	4-6	9	8	7	3	7



Table n.2 import tariff on wheat in 1913 (O'Rourke et al. 2013). The first column "Paese" means country, the second column reports the tariffs in percentage terms and the last two columns contain the rank of the country in terms of tariff, 1 = lowest and 18 = highest.

Paese	Grano 1913 (percentuale)	1913 (1) (posizione)	1913 (2) (posizione)
Belgio	0	8	7
Danimarca	0	1	1
Francia	38	10	12
Germania	36	6	6
Italia	40	12	16
Norvegia	4	16	13
Portogallo	proibitiva	18	18
Spagna	43	14	17
Svezia	28	7	8
Svizzera	2	17	14
Olanda	0	3	3
Regno Unito	0	4	2

Notes: the table was taken from the paper "La prima globalizzazione e i suoi contraccolpi" of O'Rourke et al. 2013 and it is in Italian. For this reason, below it is written the translation of each country:

Belgio = Belgium; Danimarca = Denmark; Francia = France; Germania = Germany; Italia = Italy; Norvegia = Norway; Portogallo = Portugal; Spagna = Spain; Svezia = Sweden; Svizzera = Switzerland; Olanda = Netherlands; Regno Unito = United Kingdom.

Table n.3: Number of total deaths by regions (Carillo et al. 2020)

Region	Flu Mortality	Flu Mortality
	in 1918	in 1919
Abruzzi	20165	3939
Apulia	36639	6208
Basilicata	7505	1903
Calabria	21963	4866
Campania	57789	13766
Emilia	31587	8498
Latium	24791	4083
Liguria	14924	4963
Lombardy	58780	13868
Marche	12410	3073
Piedmont	39078	12407
Sardinia	14147	3556
Sicily	46111	8855
Tuscany	33009	7743
Umbria	7904	2129
Veneto	26699	8527
Total	453501	108384

Table n.4 Short term effect of the Spanish influenza showing the evidence of the relationship between Influenza Mortality and Growth in GDP per capita in the period 1919-1924

	(1)	(2)	(3)	(4)
Dependent Variable: Growth GDP per capita 1919-24				
Influenza 1918 - 1 year lag	-12.927*** [0.740]	-9.692*** [2.798]	-9.675*** [2.644]	-10.677*** [2.948]
Influenza 1918 - 2 years lag				-7.502** [2.608]
Influenza 1918 - 3 years lag				-1.644** [0.636]
Influenza 1918 - 4 years lag				-0.552 [0.520]
WWI Death Rate		-3.072 [2.430]	-3.112 [2.314]	-3.224*** [0.721]
Observations	96	96	96	96
R-squared	0.604	0.609	0.615	0.885
Initial GDP pc	No	No	Yes	Yes
WWI Death Rate Lags	No	No	No	Yes

Table n.5: long-term effects of the pandemic on: Influenza, human Capital, and industrialization

VARIABLES	(1)	(2)	(3)	(4)
	Manuf. L.F. 1911-1921	Human Dev. Index 1911-1938	I. Human Dev. Index 1911-1938	Ln Population 1911-1931
Influenza 1918	-0.838 [0.658]	-0.628 [1.885]	-2.328 [2.988]	-8.424 [6.810]
Observations	32	32	32	48
R-squared	0.967	0.929	0.937	0.992
Initial level	Yes	Yes	Yes	Yes
WWI Death Rate	Yes	Yes	Yes	Yes
Linear Trend	Yes	Yes	Yes	Yes

Table n.6: Flu mortality and pre-war income and employment levels (Carillo et al. 2020)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variables:					
	Ln GDP pc Avg 1910-14	Ln GDP pc 1913	% Manuf. L.F. 1911	WWI Death Rate	Literacy 1911	HDI 1911
Flu Mortality 1918	-6.482 [14.833]	-7.753 [14.461]	-4.069 [4.177]	-0.332** [0.119]	-40.349*** [10.701]	-36.143*** [8.647]
Observations	16	16	16	16	16	16
R-squared	0.007	0.010	0.030	0.091	0.336	0.382

Notes: Observations are at the region-year level. Robust standard errors are reported in brackets. \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, \* indicates significance at the 10% level.

Table n.7: Impact of World War One victims on Gini index. Notes: for the data used see the Chapter 4.4 on the Influenza pandemic on income inequality.

	(1)	(2)	(3)	(4)
<i>Panel A: Municipal Gini index (log)</i>				
Victims WWI - illness (hometown)	0.027*** (0.010)	0.021** (0.009)	0.021** (0.009)	0.020** (0.008)
<i>N</i>	1804	1804	1804	1804
<i>R</i> <sup>2</sup>	0.004	0.225	0.276	0.279
<i>Panel B: Income share of top 20%</i>				
Victims WWI - illness (hometown)	0.006 (0.004)	0.003 (0.004)	0.004 (0.004)	0.003 (0.004)
<i>N</i>	1774	1774	1774	1774
<i>R</i> <sup>2</sup>	0.001	0.152	0.222	0.225
<i>Panel C: Income share of bottom 20%</i>				
Victims WWI - illness (hometown)	-0.002** (0.001)	-0.002* (0.001)	-0.002* (0.001)	-0.002** (0.001)
<i>N</i>	1774	1774	1774	1774
<i>R</i> <sup>2</sup>	0.004	0.199	0.258	0.262
Province FE	No	Yes	No	No
Geography FE	No	Yes	Yes	Yes
N contributors quartile FE	No	Yes	Yes	Yes
District FE	No	No	Yes	Yes
Municipal controls	No	No	No	Yes