



The impact of the 1918 Spanish flu epidemic on economic performance in Sweden

An investigation into the consequences of an extraordinary mortality shock[☆]



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ABSTRACT

We study the impact of the 1918 influenza pandemic on short- and medium-term economic performance in Sweden. The pandemic was one of the severest and deadliest pandemics in human history, but it has hitherto received only scant attention in the economic literature – despite representing an unparalleled labour supply shock. In this paper, we exploit seemingly exogenous variation in incidence rates between Swedish regions to estimate the impact of the pandemic. The pandemic led to a significant increase in poorhouse rates. There is also evidence that capital returns were negatively affected by the pandemic. However, contrary to predictions, we find no discernible effect on earnings.

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1. Introduction

In 1918 the world is hit by the Spanish flu. Estimates suggest that 500 million individuals worldwide were infected by the virus, and that 50–100 million people died in the aftermath of an infection between 1918 and 1920 (Johnson and Mueller, 2002). Unlike when customary strains of influenza circulate the world, the majority of

the victims of the Spanish flu were healthy young people in the age interval 15–40 – not frail patients, nor children or elderly.

While much has been written about the medical causes of the Spanish flu, the origins of the virus and its connection to more recent pandemics, such as the 2006 bird flu (see e.g. Tumpey et al., 2005; Bos et al., 2011), limited attention has been given to the societal and economic effects of the epidemic.¹ What are the economic consequences following from such a health shock affecting mainly the population of working age within a very short time window?

Studying the effects of the Spanish flu can give insights into the effects that future pandemics may have on economic outcomes

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¹ A growing literature tests the Fetal Origins hypothesis, analysing the consequences of *in utero* exposure on individual later-life outcomes, focusing in particular on the effects of the Spanish flu (cf. Almond and Mazumder, 2005; Maccini and Yang, 2009; Nelson, 2010). These studies suggest there are negative long-term health and wage effects from prenatal exposure to the influenza, but do not give insights on short- and medium-term aggregate effects.

and be helpful in establishing appropriate policy responses. The influenza appeared during a very short time, which facilitates the identification of the economic effects and serves as a useful test of the effects of a health shock on economic outcomes. Thus, given the heightened awareness of economic issues associated with pandemics (see e.g. Bell and Gersbach, 2009), it seems timely and relevant to acquire knowledge of consequences of an event such as the Spanish flu.

The influenza pandemic represents a large labour supply shock. Due to its force and randomness, the 1918 flu wave therefore also provides an interesting case for evaluating the macroeconomic consequences of a negative shock to labour supply.

Using administrative data from Swedish regions, we employ an extension of the standard difference-in-differences (DID) estimator to exploit the differing flu mortality rates across Swedish regions. Focusing on Swedish regions has several advantages. First, the variation in flu mortality is high across counties. Almost one percent of the Swedish population died from the Spanish flu, but there were important regional differences (Åman, 1990). For instance some counties experienced more than twice the flu mortality rate of others. We use this variation to examine the impact of the pandemic on earnings, capital returns and poorhouse rates, defined as the share of the population living in public poorhouses.

Second, many key economic and health indicators are available from Swedish administrative datasets and they are consistently collected across regions and time, allowing for precise estimates.² Hence, the data allow us to estimate the effects of the influenza on a number of economic outcomes while carefully checking key methodological assumptions.

Third, Sweden did not take part in World War I, during which the flu pandemic started. This reduces the risk of confounding effects of the pandemic with disturbances related to the war (cf. Ichino and Winter-Ebmer, 2004; Glick and Taylor, 2009; Kesternich et al., 2013). Obviously, Sweden was affected by the war in many ways. However, in a non-belligerent country there are no other major shocks to mortality coinciding with the disease. Finally, Sweden is a unitary state and a very homogeneous country and thus there is little need to worry about internal cultural differences or asymmetric responses in regional institutions (cf. Tabellini, 2010; Acemoglu et al., 2003).

Our empirical results suggest that the pandemic led to a decrease in capital returns and that the population of poorhouses increased due to the Spanish flu. Surprisingly, we do not observe an increase in earnings. In the discussion of this paper, we make an attempt at explaining the mechanisms that led to these findings.

2. The Spanish flu pandemic: facts, theory and empirical evidence

The first official reports on the 1918 flu came from Spain; hence its popular name.³ Upon reaching the European continent, the spread of the pandemic was accelerated by increased troop movement due to the war (Patterson and Pyle, 1991). Among researchers in medical history there is consensus that the disease ran its course in three to four waves. The first wave was in the spring of 1918, with

the disease returning in the fall of the same year and again in 1919. The last wave occurred mainly in Scandinavia and some islands in the South Atlantic.

An interesting feature of the second wave of the pandemic is that it took the world by complete surprise. The first wave of the pandemic had such a low mortality rate that experts doubted whether it was influenza at all. For example, in the summer of 1918, Little et al. (1918) conclude

we wish to point out that although this epidemic has been called influenza for the want of a better name, yet in our opinion it cannot properly be considered such for the following reasons:

- 1 *The clinical course, though similar to that of influenza, is of very short duration, and there is, so far as we have observed, an absence of relapses, recurrence, or complications [...]*

This is but one example of how medical experts were confused by the *mildness* (!) of the influenza during the first wave, and consequently reluctant to accept it as such. In addition, as the spread of the virus halted in the late summer of 1918, many observers concluded that the epidemic had disappeared (Barry, 2005). Contemporary accounts by Swedish doctors also suggest that the first wave was very mild and that there were conflicting views of whether the disease was an influenza or a new type of pneumonia (Petrén, 1918a,b).

This is in stark contrast to the second wave of the Spanish flu with exceptionally high mortality rates. During a normal influenza epidemic, approximately 0.1% of all infected individuals perish. In comparison to this case fatality rate, the second and most severe wave of the epidemic in the fall of 1918 was 5–20 times more deadly. The main reason why the Spanish flu was so extraordinarily aggressive is that the virus not only attacked the bronchus, but also the lungs, leading to many people dying from pneumonia (Morens and Fauci, 2007). The incubation time and the time between infection and death was very short. According to Taubenberger and Morens (2006), most deaths occurred 6–11 days after the outbreak, but there is evidence that some deaths occurred as early as 2 days after infection (Åman, 1990). What furthermore characterizes the disease is the unusually heavy toll among young adults. It is estimated that around half of the death toll was paid by individuals between 15 and 40 (Simonsen et al., 1998). Unlike other (influenza) diseases, which typically exhibit a U-shape in the mortality distribution over age groups, the Spanish flu had a W-shaped distribution over age.

2.1. Theoretical perspectives

From a purely economic point of view, we may think of the Spanish flu pandemic as a labour supply shock to the economy, which on the other hand leaves physical capital intact. In order to generate hypotheses on the economic consequences of the pandemic, we briefly review how such a labour supply would affect the economy. Since we cannot observe GDP at a regional level, we focus on the returns to capital and labour. Moreover, being concerned with distributional effects of the flu we also consider poverty.

In the context of growth theory, it is relevant to consider predictions concerning the immediate response to the pandemic as well as the medium term response during the transition back to a steady state. We follow the example of Boucekkin et al. (2008) and shortly discuss the predictions from a standard neoclassical growth model. In the neoclassical one-sector model, deriving the short- and medium-term impact of a pandemic is relatively straightforward. The immediate impact of a negative human capital shock is that the ratio between physical and human capital is moved above its

² It is well known that a death caused by influenza was sometimes reported as pneumonia mortality in death records. However, the correlation between influenza and pneumonia mortality at the regional level in Sweden transpires to be weak. We interpret this as an indication of the quality of the data and that the detailed instructions sent from national authorities to health personnel on how to verify the cause of death (see e.g. Statistics Sweden 1911) served its purpose and that the correct disease was, in fact, recorded.

³ The reason why the first report came from Spain likely relate to the fact that the country did not take part in World War I and had an uncensored media.

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