



UMEÅ UNIVERSITY

Household risk strategies during a pandemic - experiences from the 1918 influenza pandemic

Lars-Fredrik Andersson and Liselotte Eriksson

CEDAR Working Papers 2020:3
Centre for Demographic and Ageing Research

Household risk strategies during a pandemic - experiences from the 1918 influenza pandemic

Lars-Fredrik Andersson

Unit of Economic History and Centre for Demographic and Ageing Research,
Umeå University

Liselotte Eriksson

Umeå Center for Gender Studies UCGS and Centre for Demographic and
Ageing Research, Umeå University

Abstract

The corona crisis has during the year 2020 put large pressure on the economy. Only time can tell whether the corona crisis will have permanent effects on corporate and household behaviour and how it will affect society at large. This article examines historical experiences of how households managed the financial consequences of the rising mortality during the 1918 influenza pandemic. We find that the pandemic led to an immediate and major increase in primarily industrial life insurance policies on small sums designed for blue-collar workers. The increase in new policies did however not have a lasting effect. When the pandemic had faded over, the number of policies had dropped to below pre-pandemic conditions. This historical experience underlines that there are limits to the extent to which even a major shock, such as a pandemic, can lead to the kinds of behavioural change on which recent policies have been predicated.

CEDAR working papers 2020:3

This work is licensed under a [Creative Commons Attribution 4.0 license](https://creativecommons.org/licenses/by/4.0/).



Views or opinions expressed in working papers are attributable to the authors and do not necessarily reflect those of Umeå University.

© Lars-Fredrik Andersson and Liselotte Eriksson

Household risk strategies during a pandemic- experiences from the 1918 influenza pandemic

*Lars-Fredrik Andersson, Associate Professor of Economic History, Unit of Economic History and Centre for Demographic and Ageing Research, Umeå University, lars-fredrik.andersson@umu.se

Liselotte Eriksson, Associate Professor of Economic History Umeå Center for Gender Studies UCGS and Centre for Demographic and Ageing Research, Umeå University, liselotte.eriksson@umu.se

*Corresponding author

Abstract

The corona crisis has during the year 2020 put large pressure on the economy. Only time can tell whether the corona crisis will have permanent effects on corporate and household behaviour and how it will affect society at large. This article examines historical experiences of how households managed the financial consequences of the rising mortality during the 1918 influenza pandemic. We find that the pandemic led to an immediate and major increase in primarily industrial life insurance policies on small sums designed for blue-collar workers. The increase in new policies did however not have a lasting effect. When the pandemic had faded over, the number of policies had dropped to below pre-pandemic conditions. This historical experience underlines that there are limits to the extent to which even a major shock, such as a pandemic, can lead to the kinds of behavioural change on which recent policies have been predicated.

Introduction

In Spring 2020, the COVID-19 disease caused high mortality rates and put large pressure on the economy by society lock-downs. Directives such as social distancing and travel restrictions have led to changes in consumption behaviour of households, with rising unemployment rates, also in sectors previously characterized by high labour demand, as a result. In Sweden, changes in perceived risk has, among other things, led to a change in insurance behaviour and increased demand for e.g. unemployment insurance among groups that previously have not prioritized insurance. Questions have been raised whether this changed behaviour of individuals and households will be permanent or not. Will the corona crisis have an enduring effect or not on people's risk strategies?

This paper seeks to put the current situation in an historical perspective by investigating household insurance behaviour during the 1918 global influenza pandemic, and whether new risk strategies had an enduring effect also after the pandemic had faded over. For this purpose, we put our attention to neutral Sweden at the time when the influenza pandemic was transmitted around the world to isolate the effects of the spread of the influenza pandemic on household risk strategies.

Historians and economic historians have scrutinized different aspects of the influenza, such as witness accounts (Arnold, 2018), global perspectives and the effect of the influenza on world events (Spinney, 2017) and explaining different mortality patterns (Barry, 2004; Brown, 2018; Kolata, 2000; Almond, 2006; Clay et al, 2018; Bengtsson et al, 2018). Previous Swedish research on the 1918 pandemic has investigated how politics and demography affected the impact on the pandemic in a Swedish context (Åman, 1990). More recent research shows that the pandemic contributed to increased poverty expenditure, reduced capital income, but unaffected wages (Karlsson et al., 2014). Demographic research further

shows how the pandemic not only had short- but also long-term effects on longevity (Helgertz and Bengtsson, 2019). Despite the contribution by previous research in illuminating different aspect of the pandemic, few studies have focused on how households responded to the increased risk and the costs related to the premature death of a family member or/and breadwinner following the influenza outbreak.

Assuring for the financial consequences of especially the breadwinner's premature death became a growing industry in Sweden already in the second half of the nineteenth century. At the time of the 1918 influenza pandemic, life insurance had evolved to become one of the most diffused financial vehicles to protect for the unexpected loss of wage labour income, insuring close to 1 million households by 1918 (Andersson et al, 2010). The Swedish insurance industry refers to the period of the pandemic as the worst the industry had ever encountered due to the increase in claims. Today, when it comes to grading catastrophic risks; pandemics arising from influenza are still claimed to be the most substantial threat to the life insurance industry due to their ability to cause a major increase in claims (Huynh et al, 2013). Despite this, research is lacking when it comes to studies on the impact of the pandemic on the supply and demand of life insurance.

In this article we investigate how the 1918 pandemic affected the financial aspects of households' risk strategies by examining life insurance savings based on the following three questions; (i) Did the number of life insurance policies increase during the pandemic? (ii) Did the composition of life insurance policies change during the epidemic? (iii) If the pandemic affected life insurance savings, were the effects permanent or temporary? As households' insurance behaviour was dependent on the business practices adopted by the industry, we additionally ask; did the life insurers impose new restrictions, new tariffs or other new business practices to influence household insurance behaviour during the pandemic?

In addressing these issues, we start out with a brief account of the 1918 pandemic in Sweden. Section II and III outlines the development in life insurance business before, and, in

responses of the pandemic. Household responses are outlined in section IV, and analysed in section V and VI. Section VII concludes.

The 1918 pandemic and providing for dependents

Almost exactly 100 years ago, people in Sweden and around the world began to see the end of a flu that was significantly more deadly than Covid-19. In only 4 months, the 1918 pandemic had spread across the world, harvesting an estimated 50-100 million lives (Arnold, 2018). In Sweden, more than 37,000 people died. The age-profile of mortality during the pandemic was W-shaped – i.e. it claimed masses of deaths among the very young, young adults, and the very old. The greatest increase in mortality (excess mortality) was concentrated among young adults between 20 and 40 years of age (Åman, 1990).

The origin of the 1918 pandemic is unclear, but researchers agree that the disease spread effectively throughout the world through troop movements at the end of the First World War (Arnold 2018). The censorship of the war meant that reports on the progress of the 1918 pandemic were delayed and initially there were both reassuring and alarming media reports on the influenza mortality. In July 1918, the influenza began to spread in the southern parts of Sweden and in only a few weeks the disease was found in many areas. During the summer, newspapers had been able to report on each individual death, but in the fall, only figures were presented. In her dissertation, Margareta Åman (1990) further shows that the media reporting on 1918 pandemic disappeared in reporting on other political events related to the First World War, such as food shortage and riots. The period was also characterized by demands for universal suffrage and a threat of socialist revolution. This, and a general lack of readiness for a pandemic such as the 1918 influenza, meant that measures to reduce the spread of infection was not put in place until reaching high mortality figures. Only then was the access to public institutions such as schools, cinemas and restaurants restricted. In the fall, more specifically in October and November, the disaster peaked in Sweden and in other parts of the world (Arnold, 2018; Åman, 1990). It is believed that the virus reached all major populations of the world within 10 months; however, this

pattern was not general among all countries. For example, Australia postponed the outbreak until early 1919 and experienced one single although longer wave of infection (Johnson and Mueller, 2002).

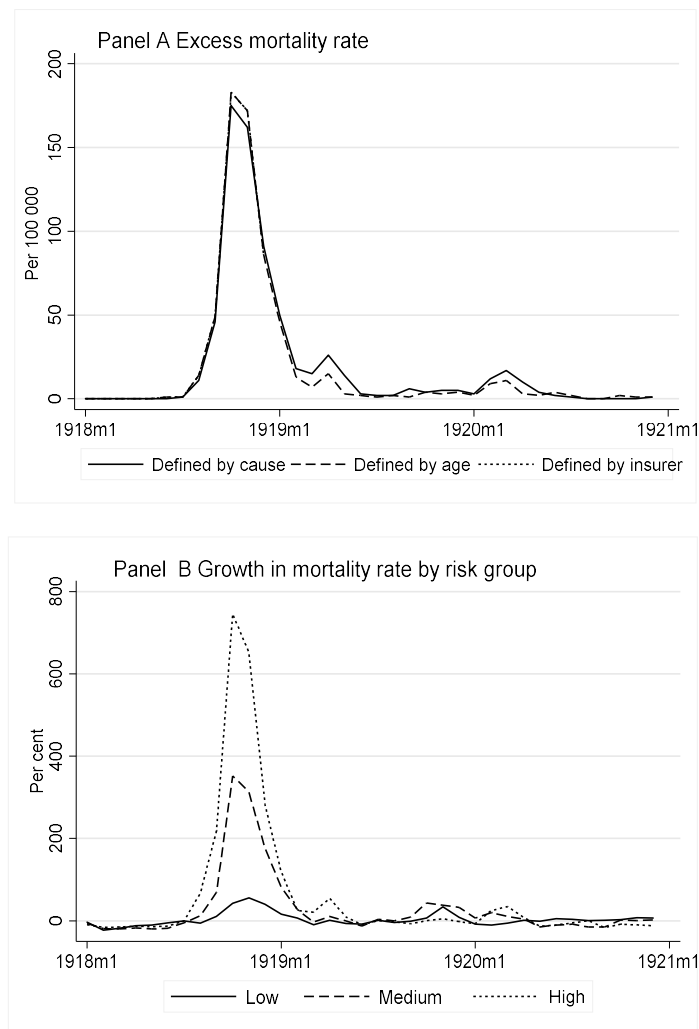
Witness accounts describe the 1918 influenza as more terrifying than the First World War, as the course of death meant that individuals in their prime age died within only a few days (Arnold, 2018; Åman, 1990). The 1918 pandemic implied severe consequences for many families. The increase in mortality rate was especially high in the age span between 20 and 40 years of age, a time in life when many had started a family and had small children to support. According to the aggregated excess mortality figure, the pandemic caused (1918-1920) an estimated excess mortality of 37,537 deceased or 6.4 death per 1000 inhabitants (Åman, 1990). Defined by age, more than 20,000 individuals in that age span (20-40) deceased during the influenza between 1918 and 1921. Many of them (80%) died during the peak in the fall of 1918 (Statistiska Centralbyrån [SCB], 1923). However, many rural areas of Sweden were undeveloped and lacked proper communication, therefore, the spread of the virus travelled relatively slow and the pandemic threatened the Swedish population into the 1920's. One of the last outbreaks also became one of the most severe. In 1920, a municipality in northernmost of Sweden (Arjeplog) was hit by the pandemic and 3 percent of the population lost their lives, indicating that the pandemic still was a real threat (Åman, 1990).

Figure 1 shows excess mortality defined by age, cause and insurer from January 1918 to December 1920. For the entire population the monthly figure of deceased (in the influenza) peaked at 183 dead per 100,000 inhabitants in October 1918 (SCB, 1923). Present day figures on deceased in COVID-19 shows a total, accumulated, figure of 60 dead per 100,000 by September 2020 in Sweden (Roser et al, 2020).

The risk exposure for the 1918 Pandemic H1N1 virus differed substantially by age. For age groups most risk exposed (15 to 45), the growth in monthly mortality rate peaked at 700%

(compared to pre-pandemic mortality rate). For younger individuals (2-15) and middle aged (45-50), the increase in mortality rate peaked at some 370%. Among the older, seemingly standing a better chance of avoiding infection, mortality rate went up by 50% compared to the monthly pre pandemic mortality rate (SCB, 1922; SCB 1923). Recent demographic research on mortality pattern in the Swedish context shows fairly similar figures for men and women (on average), but relatively higher excess mortality rate among low-skilled male manual workers; especially compared to (least affected) farmers (Bengtsson et. al., 2018).

Figure 1. Excess mortality and growth in mortality rate during the 1918 pandemic.



Source: Statistiska Centralbyrån (SCB) 1922; SCB, 1923; SCB, 1924; SCB, 1925; Gjallarhornet, 1919.

Note: Excess mortality is defined as the above pre-pandemic (1917) monthly mortality rate per 100 000 inhabitants. The cause defined include excess mortality in influenza and respiratory diseases. The estimate equal in total 39,910 deceased. The age defined included the excess mortality from previous years including the age group with 15% higher excess mortality rate. The estimate equal in total 37,384 deceased. The company defined include 17 life insurance companies reporting specifically on mortality by causes during the pandemic. The figures show the average per 100 000 policy holder excess mortality due to the pandemic in 1918. The growth in mortality rate is the monthly mortality rate per 100 000 divided by same month in 1917. The 'low' risk group is all age-classes below 100% increase at maximum, the 'medium' below 500%, and the 'high' above 500%.

At the beginning of the 20th century, the absence of a breadwinner could have drastic consequences for dependents in the absence of social protection networks. Moreover, a sudden death for any family member incurred a cost in terms of funeral expenses to assure the deceased a proper funeral (Eriksson, 2010). Turning to the community for poor-relief, was further perceived as stigmatizing (Junestav, 2004). This implied that life insurance became one of the most important financial services, not least for working-class households in the growing cities during the time. In terms of the working population, it was even more common to purchase life insurance than to be a member in a sickness insurance fund (Sociala meddeladen, 1919; Försäkringsinspektionen, 1919). In 1917, close to one million life insurance policies were in force in Sweden.

The dominance of life insurance as a form of savings in the early 1900s, indicates that the working population considered it more essential to insure against the economic consequences of premature death than against illness. Given that the mortality risk increased especially in younger, productive ages, as a result of the 1918 influenza, one could expect a stronger demand for life insurance. Since the death of especially a breadwinner caused social and economic vulnerability for dependents, higher mortality risk created stronger incentives to insure.

The argument goes back to the life-cycle hypothesis, holding that individuals seek to smooth out the consumption over their life time, to make sure that the standard of living is reasonably levelled out during different stages of life (Attanasio, 1999). For dependents provided by breadwinners, life insurance serves as a protection for levelling out the standard of living reasonably also in the event of a breadwinner's premature death. In that regard, life insurance is demanded by the dependents for realizing a steady income flow during the course of life despite the breadwinner's demise. In line with Lewis (1989) argument that life insurance should be viewed from the perspective of the beneficiaries, where life insurance is purchased to maximize the dependents utility, we consider dependent's increased financial vulnerability during the pandemic as an incentive to insure.

An additional incentive to insure would emerge if the actuarial pricing of risk remained unchanged at the same time as the risk of premature death increased during the pandemic. Unless the insurers adjust the pricing of risk, the immediate effect of the increased mortality rate would not only lower the cost for entry in relation to perceived risk, but also reduce the bonus/dividends for incumbents/owners as returns on investments would be needed to cover for excess mortality. Considering the distribution of costs and risk, most beneficial would be the entering of male breadwinners, aged 20 to 35, and occupied in low-skilled manual work (See Bengtsson et al, 2018). If priced for the average risk of pre-pandemic tariffs, the entry of a young individual would allow a substantial redistribution from accumulated savings of the incumbents, i.e. accumulated reserves are being used to cover for new entries. Hence, the under-pricing of excess mortality risk as such, would create an incentive to insure especially among the young adults.

The development of life insurance

In Sweden, life insurance developed in the second half of the nineteenth century as a middle/upper-financial protection vehicle for dependents in the event of a breadwinner's premature death. The first domestic life insurance company, *Skandia*, was established in 1855. *Skandia* was a stock company which underwrote both fire and life insurance to high actuarial standards at the time. Behind the commercial initiative was a growing concern for a

state-owned entry at the market as seen in Denmark at the time. *Skandia* was followed by other joint-stock companies which supplied life insurance policies sufficient to protect the standards of living of more affluent households than ordinary working-class families. (Bergander 1967, p. 302). All policies were issued with a medical examination and quarterly or annual payments, not always suitable for the working classes who were paid weekly.

At the turn of the twentieth century, the market for life insurance underwent massive changes. The industrialization process changed the social and economic structures for insuring. The growing wage working classes occupied in the manufacturing and service sectors, demanded a broader and more inclusive financial protection. As a late comer, Sweden was largely influenced by the financial development already underway among forerunners. Life insurance companies whose aim was to insure the working classes, so called industrial life insurance companies, first emerged in Britain (*Prudential*) and the United States of America (*Prudential Friendly Society*) in the second half of the nineteenth century. Industrial life insurance companies issued smaller policies than ordinary life insurance companies, without medical examination and with premiums payable weekly, collected at the policy holder's place of resident by a life insurance agent. This system facilitated both the purchase of insurance and the premium payment for groups living also in rural areas (Eriksson, 2010).

A massive growth in the supply of domestic industrial life insurers took off in the first decades of the twentieth century. The first Swedish life insurance company that successfully insured the wage-working class was *Trygg* (Safe), established 1899, followed by three other companies, *De Förenade* (The United) in 1902, *Framtiden* (The Future) in 1911 and *Folket* (The People) in 1914. The Swedish industrial life insurance, modelled its canvassing organisation on the British forerunner, *Prudential*.

By the time of the influenza pandemic in 1918, the life insurance business was based on the underwriting of 22 companies, of which 5 were industrial life insurers. Accounts on the

insurance stock shows that industrial life kept 56 per cent of all policies in force, but only 27 per cent of the amount (value) of sum insured (Försäkringsinspektionen, 1920). One of the reasons for the large stock of policies (in numbers) was the many small policies demanded by the growing wage working class (Andersson *et al*, 2010). Another was the business practices.

The collection of weekly premiums and selling of policies demanded a comprehensive agent organisation. The agents worked on commission and made a profit on every sale and on the collection of premiums. The growth of Swedish life insurance, as measured by the number of policies sold, increased rapidly with the establishment of industrial life insurance companies at the turn of the twentieth century and *Trygg* became the largest insurance company both in terms of number of policies issued and sums assured. As a contrast to ordinary life insurance companies, women became as frequent policyholders as men (Eriksson, 2014).

Life insurers had to consider the issue of information asymmetry. In industrial life insurance, that practised without formal medical examinations, there was a risk that unhealthy individuals, by having a shorter life expectancy than healthy individuals, was more likely to insure. To mitigate the risk of adverse selection, industrial insurers commonly put up till two years waiting period on suicide and chronic diseases in the policy contract to avoid adverse selection (Eriksson, 2011). By underwriting standardized contracts, policies could be widely diffused and in reach also for the less well-to-do households.

The industrial life insurance, initially became criticised. Many workers had small and fluctuating incomes that made it hard to maintain premium payments in times of economic hardship which led to high policy lapse rates (voluntary cancel a policy before terminated contract). The administration surrounding the canvassing system also invoked higher administrative costs in relation to ordinary life insurance, leading to a more costly insurance (Adams *et al.*, 2018). However, since previous attempts made by ordinary life insurance companies to reach the working classes had failed, representatives of the insurance industry

viewed the costs related to industrial life insurance as inevitable and as a condition for insuring the working population. Hence, the choice was between a cheap insurance that few would buy, and an expensive insurance that would be widely diffused (Försäkringsföreningens tidskrift 1911, p. 114).

Against this backdrop, the 1918 influenza pandemic imposed a number of conflicting targets. On the one hand, insurers for obvious reasons had less incentives to underwrite excess risks above actuarial fair prices. To counteract the negative financial consequences of excess mortality during the pandemic, life insurers could respond by charging a higher price to compensate for excessive mortality during the pandemic, or, more easily, impose quantitative restrictions. Either by restricting entry as such, or by limiting benefits to new policy holders using measures as waiting time, exception for specific death causes *etc.* On the other hand, one could argue that life insurers might perceive the lost due to excess mortality during pandemic as acceptable if a permanent increase in life insurance savings followed the pandemic. For industrial insurers, with a large stock of potential new policy holders among the many uninsured blue-collar workers, a short term lost could, potentially provide a long-term return with a larger stock of insured.

To address the commercial aspects faced by the industry during the pandemic, the following section will trace the responses from the insurance companies during pandemic. In focus is the potential changes in business practices, such as the imposing of new restrictions, new tariffs or other measures to influence the purchases of insurance during the pandemic.

The life insurance industry during the pandemic

In 1919 *Svenska Försäkringsföreningen* (FFT) [The Swedish Insurance Association] presented the experiences regarding the effect of the pandemic so far. One of the chapters in their annual journal was called: "Some data on the ravages by the influence pandemic among the life insured in Sweden" (FFT 1919, p 30-40). The chapter started out by describing the pandemic as "[...] the most strenuous and severe strain the life insurance industry had ever encountered" (FFT 1919, p 30). The journal reported that the death rates among the insured in the largest life insurance company *Trygg* revealed a five-time increase in October 1918

compared to October the previous year. The industry's own calculations gave at hand that the loss due to deaths in the pandemic during one-third of the year 1918, constituted the profit of an ordinarily year's operation. *Svenska Försäkringsföreningen* assessed that if the worst was over, when it came to mortality due to the pandemic, the life insurance industry would be capable to handle the loss. At this point in time it should be noted that business representative recognised that the pandemic was far from over. *Svenska Försäkringsföreningen* predicted the forthcoming year to be strenuous as well. It was noticed that the pandemic came in waves, it was therefore difficult to assess if influenza outbreaks had come to an end.

The age specific mortality was also discussed. A Danish study showed that the excess mortality declined with age and was practically zero at 60 and above. The investigation further showed that the highest death rates were among the age group 20-29, hence, "[...] the pandemic harvested lives among the group that usually were viewed as a good risk" (FFT 1919, p 32). Although this picture had been verified by other observations, the industry still argued that more information was needed to really verify these accounts.

It was noted that the welcoming of the seemingly endless stream of new policyholders might be hazardous from an economic point of view. Still, *Svenska Försäkringsföreningen* commended the life insurance industry's inclusive policy although the best option considered, from a strict business interest, would have been to wait out the pandemic before issuing new policies. With that in mind the *Svenska Försäkringsföreningen* wrote: "Thankfully, our life insurance companies have focused not only on the next couple of years; their goal is to fulfil the justified demands of the insured and the public's demand for insurance" (FFT 1919, p 39). To tackle the high mortality among policyholders, *Svenska Försäkringsföreningen* instead recommended the life insurance companies to largely reduce or totally cancel the dividends and bonus to the owners and the policyholders. The largest insurer, the industrial life insurance company *Trygg*, entirely cancelled dividends. *Trygg* was financially most severely affected by the excess mortality, but at the same time also the company that issued most new life insurance policies (Gjallarhornet, 1919).

On basis of the rather limited data on new policies issued available at the time, contemporaries perceived that the industrial life insurance companies benefited the most from the increase in insurance demand. In response to this perception, the insurance trade magazine, *Gjallarhornet*, put high expectations on the potentially signalling effect of the pandemic. It was thought that the pandemic could open people's eyes to the benefit of life insurance and that the effect would be post pandemic persistent (*Gjallarhornet*, 1918/19).

In another insurance business journal, *Gjallarhornet*, the insurance industry used the 1918 pandemic as a banner in the propaganda for life insurance also after 1919, by /... / "a rapidly increasing mortality strongly increased the demand for life insurance" *Gjallarhornet* (1920, p. 1). The pandemic became a great motivation for purchasing life insurance and in *Gjallarhornet* (1919), the 1918 pandemic was portrayed as a reason for taking life insurance, but also as an important mean of agitation for agents. Industrial life insurance companies also marketed their business by informing newspaper readers of how many who had received compensation as a result of deaths during the pandemic (*Göteborgsposten*, 1922, no. 22, February 4).

In a wider perspective, we find how the Swedish life insurance industry faced similar cause of event as abroad. Also, on the US life insurance market, the increase in demand was noted by the industry and the pandemic was employed as a motivation for purchasing life insurance. In a more systematic survey on the developments, Tarbell (1919) provide an estimated increase of policies issued equal to 79 per cent in first six months of 1919, relative to the first six months of 1918. Bell (1997) shows how the insurers faced an increase in claims experiences close to 60 per cent between 1917 and 1918 (*Prudential* 57.3 per cent; *Kansas City Life* 56.8 per cent). However, old (unrealistic high) mortality tables protected solvency, but many companies still cancelled dividends and only a few insurers failed. Tarbell (1919) reports that three of 31 Connecticut insurers raised premiums in 1919, and an additional seven reduced dividends. 12 out of 32 fraternal societies raised premium rates or

levied a special influenza assessment. Most U.S. commercial insurers held rates constant or increased them slightly in 1919 and 1920.

In the Swedish life insurance industry, the excess mortality during the pandemic did not result in any restrictions on benefits schemes, although there were cases reported where almost newly issued insurance policies were due for (death) benefit payment. While the pandemic was expected to lead to a deterioration in the financial position of the life companies in the short term, *Svenska Försäkringsföreningen* hoped it would be offset by the longer-term positive effects of corporate responsibility.

However, although the life insurance industry both in Sweden and in the U.S. regarded the pandemic as a driver for life insurance demand, it was argued that it probably was not the only reason for the increase in new policies. In the US, Tarbell (1919) put forward three explanatory factors for the increase in demand for life insurance; (i) General economic prosperity, (ii) The Influenza and (iii) Government insurance for sailors and soldiers. In relation to the drivers put forward in the US, we observe in the case of Sweden, based on wage data from Socialstyrelsen (1919, 1920, 1921, 1922), deflated by consumer price index (SCB, 2020), that the most rapid real (annual) wage growth materialized in the years 1919 (16.3 per cent), followed by high growth in 1920 (11.5 per cent) and 1921 (13.5 per cent). Higher real wages among blue-collar workers made life insurance purchase more affordable. In the US, in areas most affected by the pandemic, manufacturing real wages rose as a response to shortage in labour supply (Garrett, 2009). A previous study on Sweden has however not shown any associations between real wage growth and the pandemic (Karlsson *et al*, 2014).

In both the Swedish and the US insurance industry, the type of policies that increased the most in both Sweden and in the US were small industrial policies. This was viewed as problematic since industrial life insurance policyholders tended to laps their policies in times of economic hardship. The question raised was whether the economic prosperity and

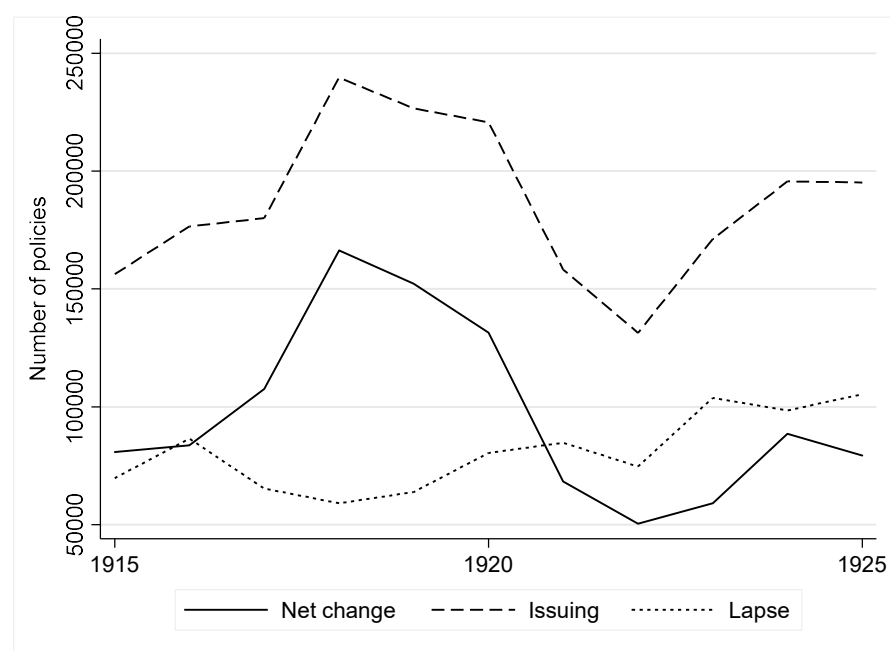
experiences from a deadly pandemic would result in a permanent higher level of demand for insurance or whether the increase only would be temporary.

To provide an overview of insurance demand during the pandemic, the following section will provide a descriptive account of the developments on the life insurance market during the pandemic. In the subsequent sections, the impact of the pandemic on life insurance savings will be examined.

Insurance demand during the pandemic

During the time of the influenza, individuals started to demand life insurance to a considerable higher degree than the years before the pandemic. This was true in Sweden but also elsewhere, such as in the US (Spinney, 2017). Although many households came to experience premature deaths of a breadwinner, the terminated insurances policies were largely offset by the number of new life insurance policies issued. In the years 1918 and 1919, over 200,000 new life insurance policies were purchased each year, which contributed to an increase in the number of insurance policies by 65 percent compared to the previous two years. However, during the years to come, policyholders came to voluntarily cancel their policies before terminated contract (lapse). Together with a slower growth in policies issued, the net growth in the stock of policies went low. During the 1920s crisis, the net increase in the stock of life insurance policies went down to 50,000 per year only. After the crisis, in the years between 1923 and 1925, the net increase went up to an average of 90,000 policies per year. The figure was somewhat lower than the net growth of the policy stock immediately before the pandemic.

Figure 2. Developments of life policies in force, by net change, issuing and lapse in Sweden, 1915–25

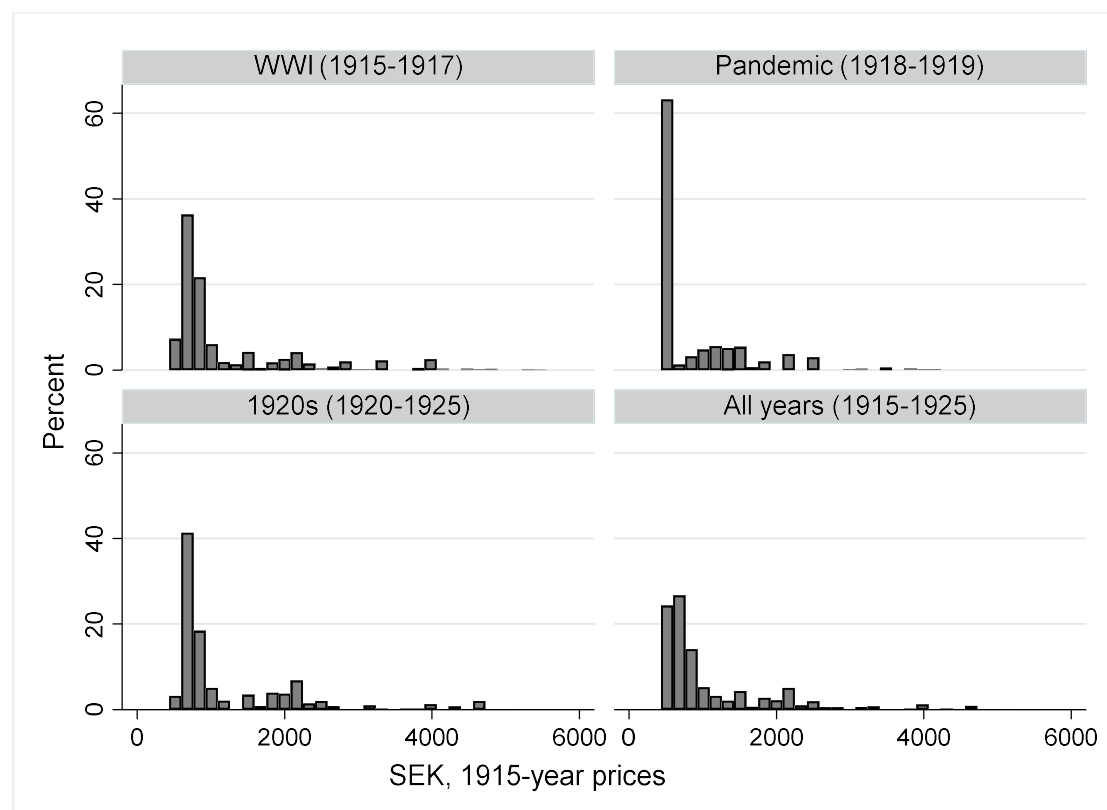


Source: Försäkringsinspektionen, 1917–27.

Note: Net change includes all issued and terminated policies, i.e. lapsed and claimed.

The growth in the volume of policies came with a substantial shift in the structure of policies issued. During the pandemic, the demand was for fairly small policies. Close to 60% of all new policies issued between 1918 and 1919 had an insurance sum no more than 600 SEK in the 1915-year price level. In the years preceding the pandemic (1915-1917) only 10% of the policies was equally small, and in the subsequent years (1920-1925) only 7% was at an equal small size. Normalized by the average wage income of blue-collar workers, 60% of the new policies issued during the pandemic was at half the average wage income level, while only 10% was equally small before and even less so after the pandemic (Socialstyrelsen, 1919-1926; Försäkringsinspektionen; SCB, 2020).

Figure 3. Real life insurance sum at new policies issued (1915-year price level) during World War I, 1918 pandemic and the first half of the 1920s.



Source; Försäkringsinspektionen, 1917–27; SCB (2020).

In difference to the Anglo-Saxon experiences, most industrial life policies in Sweden included a savings component (pension plan). A benchmark from 1914 shows that 87% of all issued industrial life policies included a savings component in Sweden (Andersson and Eriksson, 1915). During the pandemic less of a pension plan seem to have been behind the demand for life insurance, while more was attributed to cover the immediate cost of a premature death. In that regard, policies issued during the pandemic became more similar to industrial life in the Anglo-Saxon context. Life insurance was to cover for funeral expenses and to provide dependents in the short term.

The growth in demand of the smallest policies reflected a shift towards the less protected working-class households. Previous studies on the demand structure among working-class household shows that both insurance coverage and spending vary substantially by income in the Swedish context (Andersson et al., 2010). An estimate by Andersson and Eriksson (1915) shows that life insurance spending increased by 4 SEK for every 100 SEK in income increase among urban working-class households in 1913/14. Descriptives from the same cost-of-living survey (CLS), shows that the insurance coverage was 80 per cent in highest income decile (p90), but only 55 per cent in the lowest income decile (p10) (Socialstyrelsen, 1921). Yet, as the CLS reflect working-class households rather well-off, there are reasons to believe in an even lower insurance protection in the lower end of the income distribution for the entire population of blue-collar workers. According to the wage statistics, the adult (>18 years of age) male annual wage of all blue-collar workers was similar to lowest male wage income decile in the cost-of-living survey (Socialstyrelsen, 1921; Socialstyrelsen, 1919).

To meet the demand at the lower end of the wage distribution, the premium payment had to be affordable also for the less well-to-do households. When looking at the demand structure during the pandemic, we find that most policies demanded (60%) was offered at a premium of no more than 20 SEK annually. Compared with the blue-collar workers wage level during the pandemic, it shows that most policies were affordable at less than an 2 per cent expenditure share of an adult male worker's income on average – a share lower (-.4%) than reported in the CLS (Socialstyrelsen, 1921). The demand structure by premium size shows that at the lowest decile (p10) in the distribution of policies in descending order by size, the expenditure share would equal 1.25 per cent of the average blue-collar worker's annual wage. A two per cent expenditure share at the lowest percentile of premium spending would equal an annual wage income 40 percent lower than the average adult male workers' annual income. The small premiums would make insurance affordable at not more than 2per cent expenditure share for the average female wage income earner. (Försäkringsinspektionen, 1920, 1921; Socialstyrelsen, 1919, 1920 1921)

The diffusion of life insurers towards the lower tail of the income distribution was an attractive target for expanding the stock of policy holders for commercial reasons, since many were previously uninsured. For the longer term, as previously mentioned, there were however reasons to question how persistent the sudden shift in the structure of policy holders would be, with regard to the high lapse rate, common among industrial life insurance policyholders (Adams et al., 2020).

To examine more systematically the impact of the 1918 pandemic in the short term – on new policies – and on the persistency in the longer term – on lapsed policies – the following section will outline our empirical strategy to examine household responses to the pandemic.

Modelling household responses to the pandemic

The descriptive statistics in previous section give indications that the 1918 pandemic contributed to an increased purchase of life insurance in the short term. Although the growth in policies is seemingly related to the pandemic, there are at the same time a number of other events that may, or not have, affected the life insurance industry during the turbulent years between 1915 and 1925. The business community recognized the pandemic as a banner, but not as the sole driver for the issuing of new policies. It was noted that Swedish workers had experienced a growth in real-wages during 1919-1921 and in the US, a boosting economy and homecoming soldiers were viewed as additional reasons for increased demand for insurance. Even less, we can use descriptives only to tell on the potential long-term effects of the pandemic.

In an overview of the developments at the insurance market between 1914 and 1923 Karin Kock (1924) argues that the large ups-and-downs in the life insurance market in nominal terms had to do with the price movements. After deflating with the cost of living index, she shows that the new purchases in terms of real insurance sum was no higher during the influenza years of 1918, than before (1914 as reference year) or after (1923 as reference year) the pandemic. Thus, if the 1918 pandemic had no impact on real life insurance

spending as Kock argues on the aggregate, there are reasons to expect a shift in insurance demand reflected, in the structure of policies issued and lapsed, if any response of the pandemic among households was at hand.

In order to more closely examine the impact of the 1918 pandemic on these aspects, we have carried out a multivariate analysis based on the changes in the stock of life insurance policies gathered from *Försäkringsinspektionen* (fi) [Swedish Insurance Agency] annual reports for the years 1915 to 1925. Their statistical reports include both the purchase of new/issued policies and the voluntary termination of existing policies (lapse) in number and nominal terms by insurance company for each year. To avoid internalizing the price movements rather than actual changes in the insurance stock, or using deflated series, we focus on the number of issued and lapsed policies. To capture the potential shift in insurance demand, we estimate the impact of the difference in issuing and lapsed policies respectively between industrial life and ordinary life during the pandemic.

We expect the strongest impact of the pandemic on the issuing of policies in 1918 and 1919, when the mortality rate at an annual basis almost doubled. We have therefore assigned the years 1918 and 1919 as a pandemic intervention period for the issuing of new policies. For the lapse of policies, we believe that the small subsequent outbreaks after 1919 and 1920 would have played down lapse rate, and that the pandemic effect on lapse was delayed until the perceived risk was normalized. To examine the effect on the lapse rate when the perceived risk associated with influenza outbreak faded over, we have waited until the economy recovered between 1923 and 1925 to estimate the impact of the pandemic on the lapse rate. We have therefore assigned the years 1923 to 1925 as a treatment period for the lapse of policies.

The impact of the pandemic in regard to policies issued and policies lapsed is expected to occur in the industrial life insurance, but less so in ordinary life insurance. There are two main reasons. Firstly, the pandemic is expected to impact less on the issuing and lapse of

larger policies with a significant savings component for the policy holder, than on policies that mitigates the immediate cost of a premature death. Secondly, the insurance coverage before the pandemic was high in the upper- and middle classes and also among more wealthy working-class families, but low among less well-to-do working-class households. Any major change in number of policies would take place in the lower tail of the income distribution, i.e. policies offered by industrial life insurance. Therefore, we have assigned the industrial life as treatment group. As aforementioned, industrial life insurance companies had a far-reaching agent network with aggressive sales methods and weekly/monthly premium payments and no medical examination, further making that line of business more responsive to the pandemic.

The model used to estimate the impact of the pandemic on issuing and lapse rate between ordinary and life insurance is based on a difference-in-difference (DID) design. This is a quasi-experimental design that makes use of longitudinal data from a treatment and a control group to obtain an appropriate counterfactual, to estimate a causal effect (Angrist and Pischke, 2008). It is commonly used to estimate an effect of e.g. government intervention programs, by comparing the outcome over time between a group enrolled in a program with a group that is not. In our case, we use the pandemic as an intervention and industrial life as a treatment group. Beyond capturing a potential structural shift in the issuing and lapse rate, the design helps controlling for other external factors that may affect life insurance demand more generally during the period, such as wage developments, unemployment, interest rates, inflation, etc.

To capture the impact of the pandemic on the life insurance market, we have applied the following DID-model, where; the outcome Y_{ct} in company c and year t is regressed on company and year fixed effects (μ_c and λ_t), a dummy for industry life (I_c) is interacted with year fixed effects, separate controls for pre-pandemic changes in outcome variable in 1915-1917 ($Y_{c,pre}$) that are interacted with year fixed effects that are each interacted with a liner time trend and an indicator for 1918/19, and an error term.

$$Y_{ct} = \beta_{1t} I_c \cdot \lambda_t + \gamma_t Y_{c,pre} \cdot \lambda_t \cdot t \cdot I_{18-19} + X_t + \mu_c + \lambda_t + \varepsilon_{ct} \quad (1)$$

Equation (1) includes controls for baseline issuing/lapse in 1915-1917 (separately) interacted with year fixed effects. These controls allow for difference for pre-pandemic company developments. The vector X_t includes economic controls (real wage and real interest). Each variable is interacted with a linear time trend and a dummy variable for treatment.

The estimation is based on the identification assumption that the impact of excess mortality in 1918/19 would have been similar across companies in the absence of any difference in terms of lines (industrial/ordinary) of insurance. In practice these assumptions should hold after allowing for differences in issuing/lapse rate related to baseline company characteristics and pre-pandemic rates of issuing/lapse rate.

The impact of the pandemic on household risk strategies

The company data from *Försäkringsinspektionen* show that the issuing of new policies, measured as the average number of life insurance policies per company, amounted to 7,900 per year before and after the pandemic (1915-1917 and 1920-1925). During the pandemic years (1918 and 1919), the number of issued insurance policies equalled 10,400 per year. Using a simple OLS regression on the same company data, with only a dummy for the pandemic years, it shows a significant coefficient equal to 2600 policies. The figure reflects largely the face value difference between pandemic and non-pandemic years, but cannot be taken as an estimated effect, as a number of external factors, such as the major fluctuations in wages, unemployment, interest rates, and consumer prices, could be behind the major ups-and-downs in issuing of policies.

To isolate the effect of the pandemic on the issuing of policies, we move to the regression model outlined in equation 1, where we essentially estimate the difference in response between the industrial and ordinary insurance during the pandemic. The estimated model shows a significant increase in the issuing of new industrial life policies. The coefficient

equals an increase by 5,200 policies per company in favour of industrial life insurance during the pandemic. As shown in table 1 (Panel ii) basically the same estimate arises when adding controls for economic fluctuations at the period ([+] real wage***, [-] real interest*).

It should be noted that the separate dummy for the pandemic years, mentioned above, turns insignificant in the DID-model. It underlines that the impact of the 1918 pandemic on issuing of new policies reflect a shift in the demand for life insurance, which presumably emerged when uninsured wage-workers signed up for insurance protection in response to excess mortality. For the rather well situated middle and upper classes, the demand of life insurance was largely already met as shown by the insurance coverage before the pandemic mentioned in the previous section. On basis of the findings, we argue that the pandemic did not increase demand of life insurance *per se*, but the demand increased for the uninsured workers at the lower tail of the income distribution affording only an industrial insurance policy to protect for the immediate financial consequences of premature death.

Table 1 . The impact of the 1918 pandemic on issued and lapsed policies.

Panel A Dependent variable: (Issuing of policies)	(I)	(II)
I (Year = 1918-19) x Industry life	5239.9*** (1250.0)	5247.7*** (1218.3)
Observations	247	247
R-squared	0.1083	0.1151
Panel B Dependent variable: (Lapse of policies)	(III)	(IV)
I (Year = 1923-25) x Industry life	5140.5*** (677.6)	5118.6*** (669.9)
Observations	247	247
R-squared	0.2635	0.2694
Company and year fixed effects	Yes	Yes
1915, 1916, 1917 issuing X year	Yes	Yes
Economic controls		Yes

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level.

Note; The coefficient estimate in panel A represent the interaction effect of industry life (treatment group) and the pandemic years 1918-19 (treatment period) on the issuing of policies. The coefficient estimate in panel B

regress the interaction effect of industry life (treatment group) and post pandemic years 1923-23 (treatment period) on the lapse of policies. Economic controls include real wage growth and real interest rate. Source; Försäkringsinspektionen, 1917-1927; Socialstyrelsen, 1919, 1921, 1922, 1924, 1925, 1926; Waldenström, 2014; SCB, 2020.

Given that the substantial leap in the number of policies issued was driven by a previously uninsured, less well-to-do group of policyholders, we would expect an increased risk of lapses a few years later when the perceived risk of premature death vanished. Previous findings in the literature put forward economic hardship as an explanatory for lapse rate, as loss of income temporary, in e.g. the event of unemployment, make insurance less affordable (Adams et al., 2020). With that in mind, one could on the one hand expect that the lapse rate would increase with the economic crises in the early 1920's and turn low with the later economic recovery. On the other hand, one could expect that perceived risk associated with the pandemic postponed the lapse response until the situation normalized after the crises.

The number of policies lapsed based on the company data from *Försäkringsinspektionen* show an average lapse rate close to 3,300 per year (per company) in the period 1915 to 1922. During the 1920's crises, the lapse rate went up slightly (3,500). When the good times returned after the crises, we see however, a substantial increase in lapse rate. Between the years 1923 and 1925 the number of lapsed policies equalled 4700 per year. When running a simple OLS using only a dummy for the post pandemic years (1923-1925), it shows a significant coefficient equal to 1800 lapsed policies.

In order to isolate the effect on how the increase in the new industrial policies issued during the pandemic years impacted on lapses in the post pandemic years, we have applied the DID regression model outlined in equation 1, with lapse rate as dependent. In difference to the DID-model on issuing of policies, we use the post-pandemic years (1923-25) as treatment period, interacted with the industrial life (treatment group). Although there are difficulties

in completely separate the effect of the 1920s crises and relaxed risk perception after the last pandemic outbreak in 1920, we believe that estimating the impact when the economy recovers gives a clearer and more robust test for the postponement argument.

When examining the lapse behaviour in terms of difference between industrial life and ordinary life in the post pandemic period (1923-1925), we find a large and significant impact; the interacted coefficient estimate shows a lapse rate equal to 5100 policies. As shown in table 1, panel B, the estimate change only slightly when adding economic controls ([-] real wage, [+] real interest**).

Similar to the finding on policies issued mentioned above, the separate dummy for the post pandemic effect turns insignificant when added to the DID-model, which further underlines how the pandemic impacted on the structure of demand for life insurance. For many less well-to-do households, life insurance became a necessity during the pandemic to mitigate financially the immediate loss associated with premature death. When actual and perceived excess mortality declined, the demand for mitigating these risks financially also declined. The small policies offered less of a savings component (pension plan) and were therefore of less interest to keep for old age.

When comparing the estimated coefficient of issuing of new policies during the year of the pandemic with the coefficient of lapsed policies in the post pandemic years (see table 1, panel A and B), it turns out to be fairly similar. In effect, the results show that the impact of the 1918 pandemic on the issuing of new policies was largely offset by an increase in lapses when the perceived risk of influenza infection went back to the pre-pandemic situation and the economy recovered.

Concluding remarks

In managing the financial consequences of the 1918 influenza pandemic, households' risk strategies changed drastically. Our DID analyses show a significant shift in the structure of life insurance demand during the pandemic. The shift was driven by a surge for industrial life insurance policies on small sums, offered primarily to low-paid workers. The many small policies issued during the pandemic, met the need to cover the immediate, short term, financial losses connected to a premature death of a breadwinner or a family member.

Despite economic hardship during the crises in the early 1920s, most households still prioritized keeping policies purchased during the pandemic in force. However, when the perceived risk went back to the pre-pandemic situation, a massive increase in policy lapses took off, although the economy boomed.

The life insurance industry perceived the increase in the issuing of new (industrial) policies to be an effect of the pandemic, but it was unclear whether the rise in real wages also played a part. The excess mortality incentivized many uninsured less well-to-do workers to insure, but caused a major financial pressure due to the claims following the many cases of premature death. Although insurers' economic hardship put constraints on dividends, the inclusive policy was considered beneficial in the long-run and insurance representatives anticipated an enduring effect on insurance demand. Our study shows, however, that the expectations on a continuously high demand for insurance was not realized. The rise in life insurance policies issued during the pandemic was entirely offset by the rise in policies lapsed a few years later.

The historical experience of the 1918 influenza pandemic shows that households strongly responded to the excess mortality, by demanding a financial vehicle to mitigate the

consequences. However, when things returned to normal, households also returned to similar risk strategies as before the influenza outbreak. In that regard, the 1918 influenza pandemic had no enduring effects on household's risk assessment strategies and did not contribute to an improved financial readiness against future influenza pandemics.

In the current debate concerning the impact of the corona crises, one related question is whether the pandemic has led to temporary or enduring changes in risk and insurance strategies. Based on the historical experiences of the 1918 influenza pandemic, there is reason to believe more in a temporary than on an enduring effect. Hence, there are limits to the extent to which even a major 'shock', such a pandemic, can lead to the kinds of behavioural change predicated in the current debate.

Acknowledgements

The paper benefits by from comments from; (i) Professor Bernard Harris, Strathclyde University, (ii)

Participants at the seminar held at Centre for Demographic and Ageing Research in spring 2020.

However, the normal disclaimer applies. We gratefully acknowledge financial support from; (i)

‘Gender and morbidity: individual sickness trajectories of women and men in Sweden during the first

half of the 20th century’, financed by *Marianne and Marcus Wallenbergs foundation*; (ii) ‘Stronger

together? a micro-perspective of collective action and working life in turn of the last century Sweden’

financed by the Swedish research council for Health, Working life and Welfare (*FORTE*) and (iii) ‘The

dynamics of public welfare: industrial accident insurance in Sweden, 1880–1939’, financed by *Jan*

Wallanders and Tom Hedelius foundation.

References

- Adams, M., Andersson, L. F., Lindmark, M., Eriksson L. & Veprauskaite E. (2020). Managing policy lapse risk in Sweden's life insurance market between 1915 and 1947. *Business History*, 62:2, 222-239.
- Almond, D. (2006). Is the 1918 influenza pandemic over? Long-term effects of in utero influenza exposure in the post-1940 U.S. population. *Journal of political economy*, 114, no. 4, 672-712.
- Andersson, L. F., Eriksson, L. & Lindmark M. (2010). Life insurance and income growth: the case of Sweden 1830–1950. *Scandinavian Economic History Review*, 58:3, 203-219.
- Andersson, L. F. & Eriksson, L. (2015). The compulsory public pension and the demand for life insurance: the case of Sweden, 1884–1914. *The Economic History Review*, Vol.68 (1), 244-263.
- Angrist, J. D. & J. S. Pischke (2008). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton: Princeton University Press.
- Arnold, C. (2018). *Pandemic: 1918*. New York: St Martin's Press.
- Attanasio, O. P., Banks, J, Meghir, C & Weber G. (1999). Humps and Bumps in Lifetime Consumption. NBER Working Paper 5350, in *Journal of Economic and Business Statistics*.
- Barry, J. M. (2004). *The great influenza: the epic story of the deadliest plague in history*. New York: Viking.
- Bell, A. (1997). Flu Pandemic Hit Insurers Hard. *National Underwriter, Life & Health* (March 31), 46-47.
- Bengtsson, T., Dribe, M. & Eriksson, B. (2018). Social Class and Excess Mortality in Sweden During the 1918 Influenza Pandemic. *American Journal of Epidemiology*, 187(12), 2568–2576

- Bergander 1967 *Försäkringsväsendet i Sverige 1814-1914*, Wesmanns skandinaviske forsikringsfond, Försäkringsinspektionen, Stockholm.
- Brown, J. (2018). *Influenza: the hundred-year hunt to cure the deadliest disease in history*. New York, N.Y.: Touchstone
- Clay, K., Lewis, J. & Severnini, E. (2018). Pollution, Infectious Disease, and Mortality: Evidence from the 1918 Spanish Influenza Pandemic. *The Journal of Economic History*, 78, no. 4, 1179-1209.
- Eriksson, L. (2014). Beneficiaries or policyholders? The role of women in Swedish life insurance 1900-1950. *Business History*, 56, 1335–1360.
- Eriksson, L. (2010). Industrial life insurance and the cost of dying: The role of endowment and whole life insurance in Anglo-Saxon and European countries during the late nineteenth and early twentieth centuries, in: *The development of international insurance*, red. Robin Pearson, London: Pickering & Chatto, 1, 117-132.
- Försäkringsinspektionen, *Enskilda försäkringsanstalter, 1915 – 1925, Sveriges officiella statistik*, Stockholm.
- Framtiden Livförsäkringsbolag. De Förenade, Framtiden, Victoria. Minnesskrift* (1972). Uppsala: Almqvist och Wiksells.
- Garrett, T. (2009). War and pestilence as labor market shocks: US manufacturing wage growth 1914–1919. *Economic Inquiry*, 47 (4), 711–725.
- Gjallarhornet. Nordisk Försäkrings-Tidning*. (1919, 1920). Stockholm: Gjallarhornets förlag.
- Göteborgs dagblad*. Livförsäkringens giltighet vid dödsfall i spanska sjukan. nr. 22, 4 February, 1922.
- Göteborgsposten*. Nyttan av livförsäkring, 8 November; 10 December; 20 January, 1918.
- Helgertz, J. & Bengtsson, T (2019). The Long-Lasting Influenza: The Impact of Fetal Stress During the 1918 Influenza Pandemic on Socioeconomic Attainment and Health in Sweden, 1968–2012. *Demography*, Vol.56 (4), 1389-1425.

- Huynh, A., Bruhn, A. & Browne, B. (2013). A review of catastrophic risks for life insurers. *Risk Management & Insurance Review*, 10981616, Vol. 16, Issue 2., 233-266.
- Johnson, N. P., & J. Mueller (2002). Updating the Accounts: Global Mortality of the 1918-1920 "Spanish" Influenza Pandemic. *Bulletin of the History of Medicine*, 76, 105-115.
- Junestav, M. (2004). *Arbetslinjer i svensk socialpolitisk debatt och lagstiftning 1930–2001* (Doctoral thesis in Economic History). Uppsala: Uppsala University.
- Karlsson M., Nilsson T. and Pichler S. (2014). The impact of the 1918 Spanish flu epidemic on economic performance in Sweden. An investigation into the consequences of an extraordinary mortality shock. *Journal of Health Economics* 36, 1–19.
- Kock, K. (1924). Konjunkturutvecklingen och försäkringsrörelse under åren 1914-1923. *Svensk försäkrings årsbok*, 11- 31.
- Kolata, G. B. (2000). *Flu: the story of the great influenza pandemic of 1918 and the search for the virus that caused it*. London: Macmillan.
- Laura Spinney (2017). *Pale Rider: The Spanish flu of 1918 and how it changed the world*. London: PublicAffair.
- Lewis F. (1989). Dependents and the demand for life insurance. *The American Economic Review*, Vol 79, no. 3, 452-467.
- Roser, M., Ritchie, H., Ortiz-Ospina, E. & Hasell J (2020). "Coronavirus Pandemic (COVID-19)". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/coronavirus' [Online Resource]
- Socialstyrelsen (1921) *Levnadskostnaderna i Sverige 1913-1914*. Stockholm.
- Socialstyrelsen, *Sociala meddelanden: Löneinkomster för arbetare efter näringsgrenar*. 1919, 1920, 1921, 1922, 1924, 1925, 1926.
- Spinney, L. (2017). *Pale Rider: The Spanish flu of 1918 and how it changed the world*. New York: Public Affairs.
- Statistiska centralbyrån (SCB), *Dödsorsaker år 1917, Folkmängden och dess förändringar*, Sveriges Officiella statistik, Stockholm, 1922.

- Statistiska centralbyrån (SCB), *Dödsorsaker år 1918, Folkmängden och dess förändringar*, Sveriges Officiella statistic, Stockholm, 1923.
- Statistiska centralbyrån (SCB), *Dödsorsaker år 1919, Folkmängden och dess förändringar*, Sveriges Officiella statistic, Stockholm, 1924.
- Statistiska centralbyrån (SCB), *Dödsorsaker år 1920, Folkmängden och dess förändringar*, Sveriges Officiella statistic, Stockholm, 1925.
- Statistiska Centralbyrån (SCB) Statistikdatabasen, Konsumentprisindex (KPI)/Levnadskostnadsindex utan direkta skatter och sociala förmåner, juli 1914=100. År 1914 – 2019, 2020.
- Svenska Dagbladet* (1918). Livförsäkringsbolagens verksamhet 1918, 20 oktober, 1918.
- Tarbell, T. F. (1919). The Effect of Influenza on Insurance. In *Proceedings of the National Convention of Insurance Commissioners*, September 9-12, 1919. Hartford, CT, 302-311.
- Waldenström D. (2014). Swedish stock and bond returns, 1856–2012. In R. Edvinsson, t. Jacobson & D. Waldenström D (Eds.), *Volume II: House Prices, Stock Returns, National Accounts, and the Riksbank Balance Sheet, 1620–2012*. Stockholm: Sveriges Riksbank, Ekerlids förlag.
- Åman, M. (1990). *Spanska sjukan. Den Svenska epidemin 1918-1920 och dess internationella bakgrund* (Doctoral thesis in History), Uppsala universitet, Studia Historica Upsaliensia 160.