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Macroeconomic Statistics

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PRELIMINARY. COMMENTS WELCOME

## Abstract

The Spanish Flu epidemic of 1918-19 is the closest historical parallel to today's Coronavirus pandemic. Its demographic aspects have been studied in detail, but the huge economic losses of Coronavirus have motivated researchers to pin down the economic costs of the Spanish Flu. The growing literature focuses on the US and uses city and state data to extract its costs with contradictory results. This paper uses historical statistics on GDP and industrial production to assess the economic costs of the Spanish Flu on the US, European, and UK economies. We find relatively small economic effects with the possible exception of the UK. Pandemics affect economic activity through human capital losses, voluntary changes in behavior to avoid infection, and state-decreed measures. The first two channels can produce economic effects similar to a substantial recession, but the third channel is required for the enormous economic losses we face today.

## **Non-Biological Black Swans**

Pandemics are not necessarily Black Swans. Biology dictates that they will recur and at unpredictable intervals. Pandemics claim human lives and destroy health, and human capital. If unmitigated by vaccines, pharmaceutical therapy, or effective administrative measures, pandemics should have negative effects on the economy. The economic impacts of past pandemics have ranged from trivial to altering society as we know it, such as the medieval Black Death and possibly the ongoing Coronavirus.

We are currently experiencing a non-biological Black Swan comprised of the consequences of the political and administrative decisions to close down much of the world economy in the hopes of mitigating the Coronavirus pandemic.

The Coronavirus Black Swan lacks close historical parallels. Postwar pandemics had [no significant effects](#) on a broad swath of world output, although particular regions and countries were hard hit. In many cases, local and regional interventions were imposed (called non-pharmaceutical interventions, or NPIs) to dampen the effects and spread of the pandemic. However, none were accompanied by the world-wide economic “lockdowns” that we are now experiencing.

The Coronavirus Black Swan has redrawn attention to the Spanish Flu pandemic of 1918-1919: Like Coronavirus, the Spanish Flu’s reach was worldwide. Its mortality effect, dwarfed Coronavirus, and some of the anti-virus administrative measures are similar to today’s social distancing, business closures, quarantines, and sheltering in place.

If we are looking for a historical parallel to today’s events, the Spanish Flu is as close as we are going to get.

## Measuring the Economic Effects of the Spanish Flu Using Historical Statistics

The most direct measure of the economic cost of a pandemic is lost economic activity. The most common summary measure of such costs would be the decline in real GDP or industrial production (relative to trend) that is attributable to the pandemic.

In an era of relatively reliable macro statistics, we can more readily assess a pandemic's effect on the economy. We already know that the economic costs of Coronavirus will be unprecedented. The 2019/2020 pandemic is the first time that we have voluntarily shut down much of the world economy. Thus we are operating on uncharted waters.

The 1918-1919 Spanish Flu preceded modern statistical measures; so we have to work with imperfect and limited data to get answers.

This study uses historical statistics of GDP and industrial production to assess the impact of the Spanish Flu on economic activity in its day. We examine separately the US, Europe (divided into WWI combatants and non-combatants), and the UK.

In their survey, economists from the Bank for International Settlements find that post-war pandemics (SARs, MERS, Avian flu, Ebola) did not depress world output in a significant way, although they were costly to individual countries and geographic regions.

The 1918-1919 Spanish Flu may be an exception, but we do not have a good fix on the economic losses it imposed. Three studies try to extract the aggregate damage from city or state cross sectional data. According to Robert Barro et al.'s country cross section study, the Spanish Flu cost minus 6 percent of GDP in its day. Correreia et al. calculate, from municipal data, an 18 percent decline in U.S. manufacturing as a consequence of the Spanish Flu. F. R. Velde's comprehensive study of the Spanish Flu using "high frequency" data concludes that, contrary

to Barro and Correia, the Spanish Flu had a negligible effect on the US economy.

If we rely on studies based on regional variation in NPI's, we are left with a wide range for the Spanish Flu's impact on the economy from minus 18 percent (U.S. industrial production) to scarcely detectable.

This study uses the historical statistics of the US, Europe, and the UK to try to isolate the effects of the Spanish Flu on US, European, and UK economic activity. The data are drawn largely from Historical Statistics of the United States, Millennial edition, from the Maddison Historical Statistics Data Base (2010 and 2018), and from individual studies.

The US *Historical Statistics* are drawn from the millennial edition, which has been carefully vetted by the top authorities on US economic history. They are therefore not century-old relics that have rested in dusty storage. Unfortunately, the pre-1929 statistics have wider margins of error than the post 1929 figures. Interest in the causes of the Great Depression motivated the pioneers of national income accounting to go back to 1929 as a base year but not further.

We are better positioned with respect to US industrial production. Given the widespread interest in the US business cycle, we have alternative indices of industrial production, even on a monthly basis. The author himself has recalculated the standard industrial production series by deflating the value series and deflators as published in *Historical Statistics*.

For the European GDP data, we have Angus Maddison's database of historical statistics. More on these figures below.

Let's begin with the United States.

## **United States**

*Figure 1* shows the growth rates of US industrial production (two separate series) and GDP from 1914 to 1925 (two series) as mainly drawn from (and calculated from) Historical Statistics.

(Figure 1 here)

For industrial production, we use William Shaw's 1947 monograph which interpolates between censuses via state data and a wide variety of government agencies and trade associations to obtain annual data. Our second industrial production series is the annual average figures from Jeffrey Miron and Christina Romer's 1990 index of industrial production compiled from 18 physical outputs.

It was not until the 1930s that the first authoritative GDP series were created to track the course of the Great Depression. Hence, GDP series for earlier periods, such as 1918, had to be reconstructed retroactively, by the pioneers of national accounting, such as Simon Kuznets and David Kendrick. We use both the so-called Standard Series and the Kuznets-Gallman series, both cited in *Historical Statistics of the United States*.

The conclusions to be drawn from Figure 1 are:

According to the best available historical statistics, the 1918-1919 Spanish Flu did not have a noticeable effect on industrial production and GDP in the US. None of the four series suggests a detectable effect of the Spanish Flu on economic activity-- not that there weren't significant downturns during this period of history, such as in 1914 and 1921.

America's entry into World War 1 could confound the above finding of an insignificant economic effect of the Spanish flu. In 1917, 719,000 men were in the armed forces. Within a year, that figure rose to almost three million. During the call up, the unemployment rate fell from an average of five percent to 1.4 percent in 1918 and 1919. Another complicating factor is that the US economy was gearing up military

production during this period – a form of possible [stimulus](#) of the economy.

To sum up, the historical data suggest that, despite its horrendous human capital costs, the Spanish Flu did not affect US economic activity in a significant way.

## **Europe**

The US cannot tell the whole story. The Spanish Flu was a worldwide phenomenon that blanketed Asia, Africa, the Middle East, Europe, and the Americas. Some contemporaries referred to it as the European Flu.

Thanks to the pathbreaking contributions to historical statistics by Angus Maddison of the Groningen Growth and Development Centre, we have annual [time series](#) at our disposal for the growth of GDP, population, and per capita GDP for more than a hundred countries extending back into the early 20th century or beyond.

The Maddison GDP data are far from perfect. They require interpolations between benchmarks to get annual data, and they are all expressed in difficult to understand constant international dollars. They are the best we have and constitute a lifetime of work by Maddison and his team.

Maddison's annual figures on economic growth before, during and after the Spanish flu are also confounded by World War 1 which began in August of 1914 and ended November 1918.

On the plus side, the European data for the period of the Spanish Flu offer something of a natural experiment that allows us to abstract from the effects of World War I: The majority of the European nations were noncombatants. By focusing on non-combatant nations, we can get a cleaner look at the Spanish flu's impact on economic growth in the crucial 1918-1919 years.

*Figure 2* shows the growth of GDP in European non-combatant nations for the period 1914 to 1925. It shows that, indeed, there was a prominent decline in GDP for non-combatant countries in 1918, averaging some seven percent. (Note that pre-Flu 1917 was an equally bad year relative to 1916).

(Figure 2 here)

The losses of output in non-Spanish-Flu years of 1917 and 1921 were equally large; so the Spanish Flu was just one of many economic setbacks for Europe during this period. Much longer time series from Maddison cement the conclusion that 1918-19 does not especially stand out as Coronavirus is today. There were a number of output declines of this magnitude (5 to 9 percent) in the period leading up to World War 1.

*Figure 3* performs the same exercise for combatant European nations. The figures reflect more the course of the war on the economy than any effects of the Spanish Flu. The combatants suffered substantial output losses in the first two years of war. Belgium and France suffered huge output losses in 1917 and 1918. Germany and Austria suffered the same fate in 1919.

(Figure 3 here)

Figure 3 supports the conclusion that the war dictated the pace of economic output among combatant countries, not the Spanish Flu. Further study is required to correlate battlefield fortunes with GDP losses and gains.

## **United Kingdom**

The United Kingdom was a combatant in World War 1 but did not serve as a battlefield. The Spanish Flu appears to have peaked in the UK after

the November 1918 armistice, as troops returned home in cramped rail cars and transport ships.

*Figure 4* shows 1918 to be a year of modest (1.9 percent) or zero GDP growth. As the Spanish Flu made its way into the UK in 1919, the economy went into decline, falling 12 percent according to Maddison and 7 percent according to the Bank of England [figures](#).

The years following the Spanish Flu were difficult ones, with substantial declines in 1920 and 1921. UK growth did not resume until 1922.

(Figure 4 here)

The UK is a possible exception to the relatively low and transitory economic effects of the Spanish Flu. The flu arrived in full force in 1919, and growth did not resume until 1922. In this regard, the UK seems to have been an outlier in terms of economic damage from the Spanish Flu. The UK suffered economic declines that were of greater amplitude than in the non-combatant countries and the US.

We must be cautious in attributing the UK's "interwar slump" to the Spanish Flu. There is a massive literature on the multiple causes of the UK's "interwar slump." Major [surveys](#) of this literature do not mention the Spanish Flu as a cause of Britain's relative economic decline. If the interwar slump were Spanish Flu induced, I believe the literature would reflect that fact.

There is no dearth of accounts of administrative anti-virus measures during the UK's bout with Spanish Flu. Work hours were staggered, pubs were closed early, theaters were aired between performances, and schools were closed. Yes, there were NPI's in Spanish-Flu UK, but we have little idea of their magnitude and endurance.

So far, there have been no attempts to combine these administrative measures into comprehensive indices that could be deployed for

analytical work. In terms of demographic losses, the UK is like the other countries examined. Flu deaths [equaled](#) about one percent of the labor force, which suggests (See below) that voluntary and involuntary measures must have played the decisive role.

We must be careful, however, in drawing too strong conclusions. Much has been written on the UK's "interwar slump" as caused by a premature return to the gold standard and the rise of the labor party. These policy events, however, were not to occur until 1925. My conclusion concerning the UK is that it suffered substantial economic declines that were of greater amplitude than in the non-combatant countries and, surprisingly, in the course of the UK's Great Depression.

### **Three Channels from pandemic to economy**

A pandemic can affect the economy through three channels: On the human capital side, pandemics reduce the labor force by excess mortality. The population's physical and mental health are eroded, and schooling and training are sacrificed. Insofar as the stock of human capital is diminished, the pandemic's effect may be stretched over a [longer period](#) of time.

The second channel from pandemic to the economy would be through individual choices prompted by fear of the pandemic. People may limit mobility, engage in voluntary social distancing, keep their children home from school, flee to other jurisdictions, or decide to close their businesses. These behavioral changes would have similar effects to similar measures imposed by government except that they are chosen voluntarily.

The third channel from pandemic to the economy are NPI's, such as state-decreed business and school closings, binding restrictions on mobility, quarantines, and other ordinances that are designed to stop or slow down the spread of the disease through non-medical measures.

The broad outlines of the economic effects of the three pandemic channels are no mystery. With the exception of the medieval Black Death, we would expect the demographic-human capital effects on the economy to be small for the following reasons:

Even though the 1918 pandemic [spread](#) over the entire world and killed 25 to 40 million (the most deadly infectious disease of the twentieth century), [fatalities](#) accounted for two percent of world population and around one percent of the labor force. Despite their absolute enormity, standard growth models suggest that the Spanish Flu's human capital losses would show up as a small dip that would soon be obscured by other factors.<sup>1</sup>

If we find large economic effects associated with a pandemic, they would be due to the second or third channels, or a combination of the two. Whereas the demographic and human capital impacts are limited in scope, there are few upward bounds on the other two channels.

One of the few efforts to [model](#) the three channels of transmission from pandemic to economy was undertaken by World Bank analysts in 2006. They posited a hypothetical case of a pandemic of person-to-person Avian flu under “worst case” parameters of a Spanish-Flu-like event. Their conclusion is that the combined human-capital and voluntary-avoidance channels would depress GDP in the high-income countries by 3 percent.

Three percent happens to be the [loss of output](#) in the advanced countries from the Great Recession of 2008-9. So, the World Bank exercise, if it is accurate, suggests that the Coronavirus impact on the industrialized world – with avoidance strategies voluntarily employed by the people

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<sup>1</sup> As the most-deadly pandemic of the past century, the Spanish Flu cause a population loss of two percent and a labor force loss of one percent. Human capital costs must also be factored in along with the labor and hours loss. They are more difficult to measure. In a standard Solow growth model, the effect of a one percent loss in labor force would therefore be less than one percent.

but no Great Lockdown -- would have created an economic loss of the magnitude of the Great Recession.

If we now add, the Great Lockdown (with [forecasts](#) of a six percent loss of GDP for 2020 or much worse), we see that the Great Lockdown has doubled the effect of Coronavirus, and the underlying model applies to a virus of the virility of the Spanish Flu.

If we find large economic effects associated with a pandemic, they would be due to the second or third channels, or a combination of the two. For the human capital channel, we would expect, at the most, a small negative effect on aggregate economic activity.

During pandemics, the second and third channels could merge. Individual reactions could spill over into revolts, revolutions, civil disobedience and a collapse of law and order. Government-imposed NPIs could shut down the economy, create poverty, and spawn civil unrest. Whereas the demographic and human capital impacts are limited in scope, the upper bounds on the other two channels are not well defined.

To understand the interactions and correlations between the medical and administrative sides of the Coronavirus and the Spanish Flu, we require quantitative indexes of the severity or laxness of non-pharmaceutical interventions (NPIs) over time and space. Researchers have worked with regional measures for the US during Spanish Flu, which they correlate with regional economic activity and with a variety of results. But we still need much more research.

In sum, for the human capital channel: we would expect, at the most, a small negative effect on aggregate economic activity. If we do see strong negative economic effects, they would be due to the second and third channels.

## **Conclusions**

The broad conclusion to be drawn from the macro data is that, despite its immense demographic damage, the Spanish Flu did not depress economic activity in the US and Europe in a significant fashion. The UK was a possible exception but experts on the UK's interwar slump blame a number of factors other than the Spanish Flu.

These results should not come as a surprise. Here is why:

The administrative measures currently in place worldwide are modern history's most extreme reaction to a pandemic. It is these measures, rather than Coronavirus itself, that are the Black Swan.

Coronavirus is the first pandemic of modern history that has resulted in colossal economic costs. These costs come primarily through administrative measures, of varying degree of compulsion, which restrict economic activity.

The Spanish Flu was many times more severe than today's coronavirus, yet its economic costs were nowhere near the range of Coronavirus. Why is this the case? My preliminary explanation is that, although extraordinary measures were applied, pandemics and plagues were a normal part of life in 1918-19. People simply went about their business during plagues and fatalistically accepted the consequences.

The world in 2020 views pandemics quite differently from a century ago. We have come to believe that science and technology can handle all problems. To accept the mortality consequences of an invisible enemy is no longer in our public choice set.

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Figure 1: Annual Growth, US Industrial Production and GDP

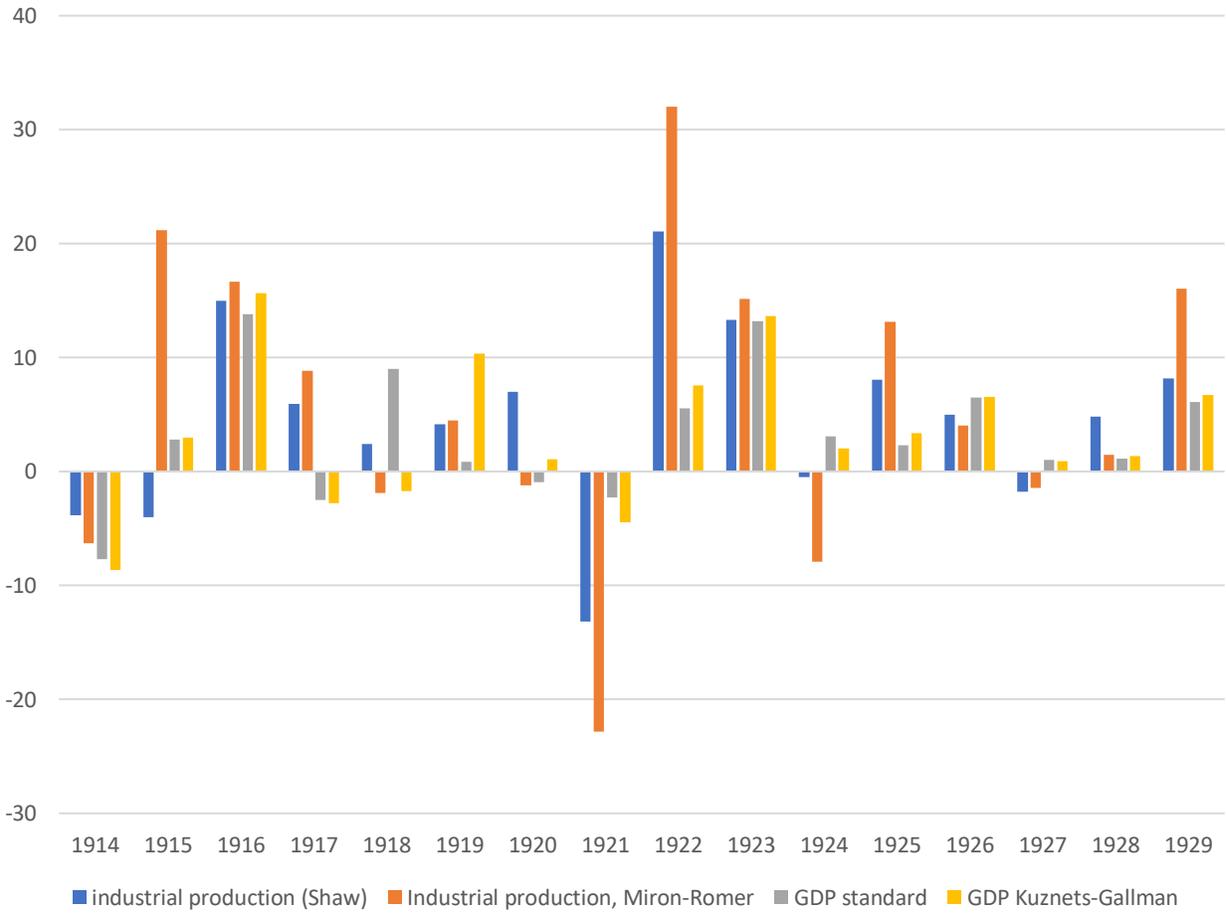


Figure 2: GDP Growth. Non Combatant European Nations

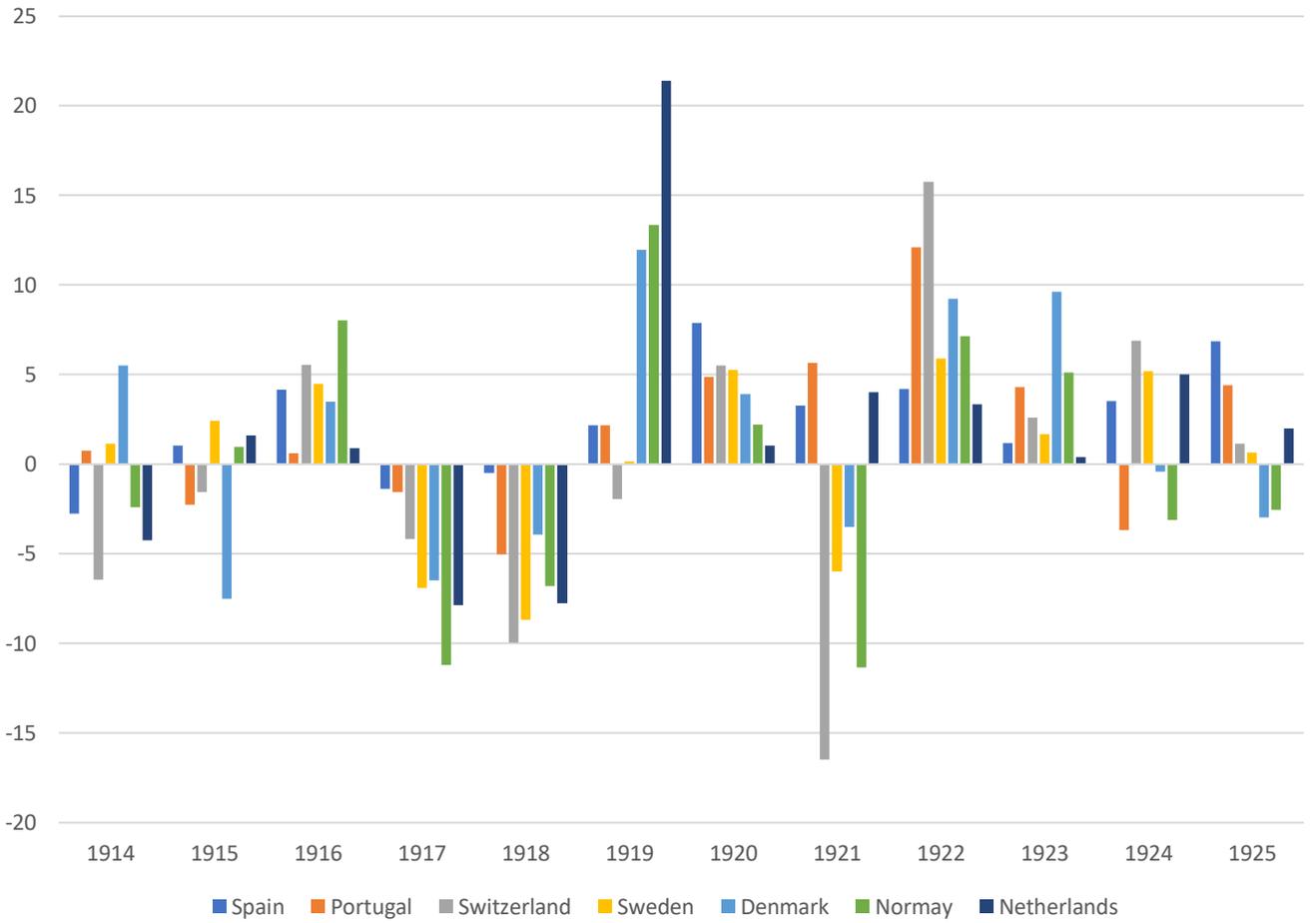


Figure 3: Growth of GDP, Combatant Countries

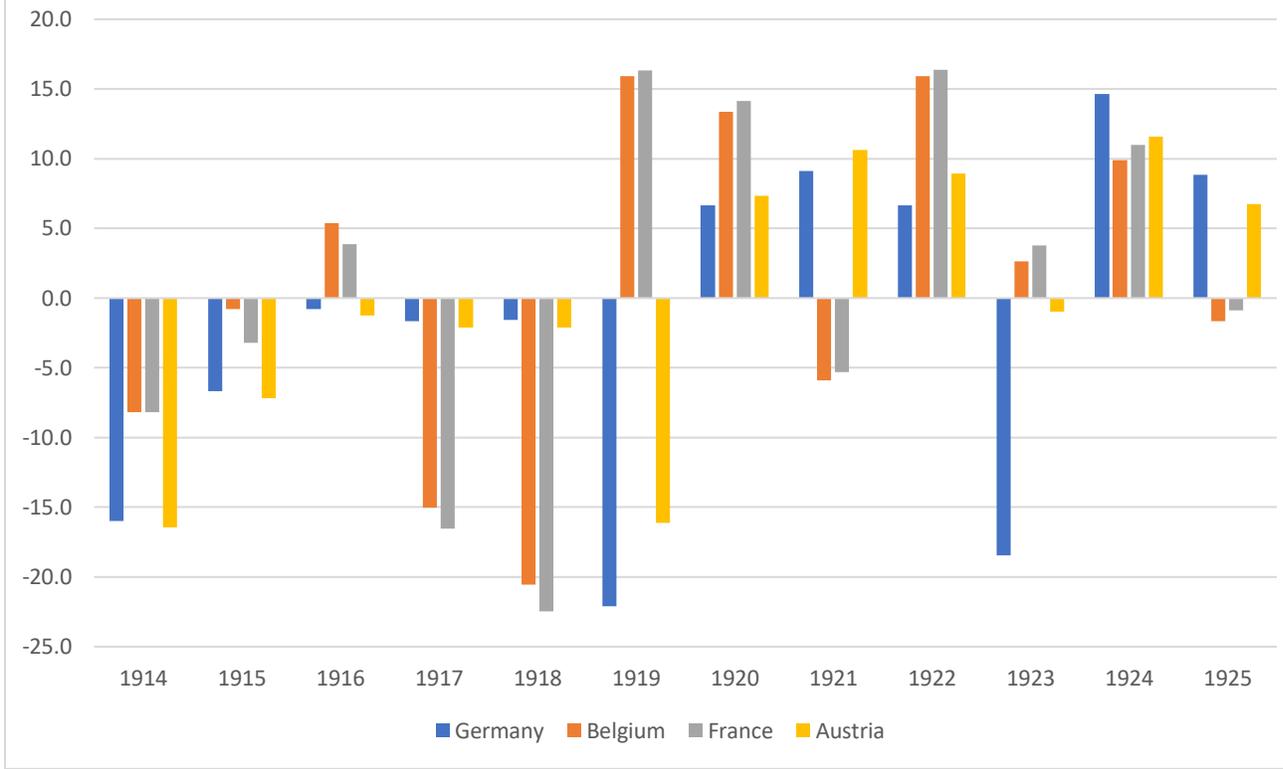


Figure 4: The Growth of GDP, UK

